

MODELING THE RELATIONSHIP BETWEEN INTEGRATED REPORTING QUALITY AND SUSTAINABLE BUSINESS DEVELOPMENT

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Abstract. The aim of the paper is to provide an overview of the sensitivity in terms of the preference for using the integrated reporting quality (IRQ) based on the reporting companies' field of activity. The study focusses on designing a sensitivity analysis relying on the most relevant financial and non-financial indicators as required by the stakeholders. They were adjusted by the key factors for the IRQ such as the social, natural, human and intellectual capital. The study has been designed based on the upgrade and in compliance with the connectivity principle as required by the IIRC. The data was collected from the IR examples Database between 2015–2017. The results suggest that based on sensitivity function value, those sectors of activity such as transportation and infrastructure, services and trade have a higher sensitivity preference for the IR due to the quantification of the stakeholders' interest in terms of performance positive trend indexes. Making use of regressive techniques, the authors undertook an econometrical model for the evaluation of the IRQ that may become very useful for those companies that intend to set in place a sustainable business as it provides them the opportunity of measuring the IRQ.

Keywords: integrated reporting quality, sustainable development, financial information, environmental, social and corporate governance, stakeholders' demands, GRI standards.

JEL Classification: M41, M14.

Introduction

Nowadays, companies have been exposed to major changes as a result of the social and economic phenomena that have an impact on their activity. The formation of new social groups, the development of a critical conscience of the companies' activity as well as the latest consumption patterns require taking on certain social responsibility policies. Given the

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present-day circumstances, it is of utmost importance for companies to redefine their positions by taking into account their commitment towards the social responsibility, too. Both the current financial reporting systems and the sustainability reporting fail to provide an overall image or sufficient information on an entity's economic, social and environmental performance (Siminică et al., 2015; Cosmulese, 2020). Throughout time, this fact has made certain organizations (i.e. The Coalition for Environmentally Responsible Economies (CERES), The Program of the United Nations for the Environment (UNEP), Global Reporting Initiative (GRI 102) (2018), International Integrated Reporting Council (2013) to project the guidelines in order to compile a full information mechanism based on a common structure in terms of the sustainability reporting which was meant to satisfy the information needs of the all stakeholders.

Taking into account the high transparency demands (Burcă et al., 2018; Ionescu et al., 2018), the introduction of a new type of corporate reporting such as the integrated reporting (IR) which was meant to disclose extra information on a company's strategy, governance and performance rendering the financial and non-financial information in the form of a single report (Nicolò et al., 2019). The IR is basically a type of corporate reporting which focusses on filling in these gaps by allowing companies to have a better view of their short-term, mid-term and long-term strategies for which the governance and the risk analysis play an important part in ensuring the fulfilment of the sustainability objective.

The encouragement of the companies to make sustainability a part of their business has become an objective in itself for the EU as stipulated by Directive 2014/95/EU (European Parliament, 2014).

The analysis of the specialty literature has revealed the fact that the IR has been researched in its relationship with several determining factors. Thus, a good part analyses the relationship that exists among the IR and certain concepts such as: the entity's performance (Pavlopoulos et al., 2019; Landau et al., 2020; Omran et al., 2020; Moloji & Iredele, 2020), the company's value (Wahl et al., 2020; Gal & Akisik, 2020), its liquidity (Zuniga et al., 2020; Barth et al., 2017) the cost of debt (Barth et al., 2017).

The study undertaken by Anifowose et al. (2020) analyzes the impact of the capitals' disclosure on the lasting value of the corporation based on the 6 capital elements (i.e. financial capital, manufactured capital, intellectual capital, human capital, social and relationship capital, and natural capital) by replacing the lasting value with the cost for financing and the revenue's growth rate.

The sustainable development can be accomplished based on certain strategies, which focus both on the social responsibility, the economic environment and the human resources components. In order to achieve the sustainable development as such, all these components need to be included in a sustainable development, which refers to a rational use of resources, a steady economic development and a decent standard of living for the members of a community. All these aspects are part of the sustainable development strategies focussed on achieving certain objectives such as those, which have been projected until 2030 and are part of a large debate in the specialty literature

The starting point of the present study refers to the fact that key element in terms of reporting a business' sustainability has to take into account the recommendations comprised

in the GRI standards. They suggest the use of 10 reporting principles in terms of the design of a CSR report. There are 4 principles which refer to the CSR report such as: the materiality principle, the principle of the stakeholders' involvement (Cosmulese et al., 2019; Constantin et al., 2020), the principle of the comprehensiveness as well as the principle of a sustainable development and other 6 principles regarding the CSR report such as: accuracy, clarity, comparability, reliability and timeliness.

The materiality principle is the most important of all and it refers to the identification of the most relevant topics (i.e. Material Topics) in terms of the sustainable development by taking into account the particular type of industry and market within which the reporting company is part of. Based on this very principle, the present study has identified the specific reporting areas, which are considered to be relevant for those entities belonging to this particular group. Consequently, the requirements of the GRI standards (i.e. series 200, 300 and 400) which are necessary to be used in order to provide those information demanded by the stakeholders have been identified. They refer to the exploitation of the social, natural or human capital, on the one hand, and, on the other hand, the emphasis on the consensus regarding the reporting of a series of economic and financial indicators (i.e. the intangible assets) which ensure and guarantee both the accuracy and the accurate data representation.

This study has proved the fact that the IR needs to be a tool allowing a company to be more transparent in terms of its commitments regarding the sustainability by clearly indicating the relationships, which exist between its financial and non-financial results directly impacting the stakeholders.

In this context, the aim of the present study is to monitor the sensitivity of the preference for the IRQ according to the field of activity of the reporting companies. In order to accomplish the purpose of the present research, certain estimation methods have been used in terms of the data collection related to the IR. This a reason why certain companies opt for or prefer a complex reporting.

The rest of the manuscript is organized as follows: the first parts focuss on IRQ and the stakeholders' expectations and interests by offering a review of the literature on IR and the six capitals of value creation; the second part sets out the research methodology of the study itself, whereas the next part focuses on interpreting the results by discussing them based on the validation of the study's objectives in order to formulate gthe conclusions.

1. The research methodology

In order to accomplish an empirical research, when collecting the necessary information, certain techniques of mediated data collection have been used by utilizing the IR Examples Database (that allowed us to access over 200 companies that function on the GRI principles). When selecting the companies to be analysed, the focus was on the IR based on the framework which has been designed based on the IIRC or the one within which there are references to it.

A selection of a sample that consists of 56 companies from the three continents has been made namely: 3 companies from South America, 2 companies from North America and 51 companies from Europe. The criteria in designing the sample were bidirectional ones such as:

the inclusion criteria (i.e. just for those companies which chose to take on the IR principles for at least 3 years) as well as the exclusion criteria (i.e. those that were used for the companies from South Africa that chose to apply the framework on the IR based on KING III). The study covers a 3 years period of time (2015–2017). Thus, based on the observational method, after applying the inclusion and exclusion criteria out of the total of the selected entities that were analysed further on, a sub-sample of 11 entities was excluded from the study due to the major deviation from the evolution trend of the main economic and financial indicators that were evaluated in the study. The final result was a sample of 45 entities that focus on the financial services, utilities, transport, mining/basic material, technology and telecommunications, oil and gas, chemicals, construction and materials, industrial, other services, retail, healthcare.

The authors have considered the objectives that were established in the introductory chapter as being relevant for the study in terms of the preferences of the companies for the IR.

Based on the 1st objective of the research which focuses on evaluating the relationship between the market share (MS) and the IR through the dynamic evaluation of the evolution of the turnover in relationship with the entity's objectives, a quantification indicator has been established, namely the MS. The maximization of the MS based on the turnover's rise represents a valuable tool for evaluating the companies' preferences for the IR. It is a direct and substantial consequence for the researched phenomenon. Thus, the 1st preferential test has been identified (i.e. the 1st researched objective that is part of the testing section of the causal factors).

Based on the 2nd objective of the research which focuses on the analysis of the causal relationship between the use of the non-current debts and the efficiency that is expressed by the progressive accumulation of the company's own equity a quantification indicator is established which means the access to the funding (AF). Thus, the second preferential test has been defined (i.e. the 2nd objective of the research that is part of the testing section of the causal factors).

The 3rd objective of the research focuses on estimating the degree of financial independence (FI) that is necessary for an optimal running of the entity itself as well as its congruence relationship with the IR that refers to the estimation of the evolution trend of the debts in regards to the estimation of the evolution trend of the entity's own capital. The IR has as an expected impact the FI. In the present study, the authors consider the FI as being equal to the reduction of the gearing by removing the braking elements of the economic development and the enhancement of the borrowed capital for this purpose, thus, being defined the 3rd preferential test.

According to the 4th objective of the research that focuses on the estimation of the preference for the IR based on the productivity objective of the human resource which is expressed by the quantification of the unitary productivity relationship which is estimated by the relationship between the turnover and the number of employees. An indicator of quantification is established, namely the work productivity (WP), thus, the 4th preferential test has been defined.

According to the 5th objective of the research which focuses on identifying the preference for the IR from the point of view of the development of the intangible assets (IA) that are

used for the entity's sustainable development, a quantification indicator has been established, namely the variance of the ΔIA . The last preferential test (i.e. the 5th objective of the research that is part of the testing section of the causal factors) has been thus defined.

According to the 6th objective of the research that focuses on estimating the relationship among the IR, the stakeholders' interest and the performance of the company's management through the dynamic goodwill accumulation, a quantification indicator (i.e. goodwill's variation ΔGW). Therefore, the first test that establishes the stakeholders' interest in relationship with the IR's sustainability from the point of view of the evaluation of the goodwill's contribution to the company's sustainable development is defined.

Based on the 7th objective of the research that focusses on the evaluation of the preference for the IR based on the company's ability of generating an added value by building up growing profitability rates, a quantification indicator (i.e. profitability variation- ΔNP). Therefore, the 2nd test is thus defined in terms of establishing the stakeholders' interest for the IR from the point of view of the cost effectiveness as a contributing factor to the company's sustainable development.

According to the 8th objective of the research on the evaluation of the return of the invested capital, a quantifying indicator – the variance of the return of the invested capital ($\Delta ROIC$). The 3rd test is thus defined in order to establish the stakeholders' interest in relationship with the IR's sustainability based on the reimbursement of capital as a result of the placement of the capital's investment.

The 9th objective of the research focusses on the analysis of the impact of the trend of the profitability indicators and the competitive advantage on the companies' preference for the IR. A quantification indicator – the variation of the gross profitability (ΔGP). The 4th test is thus defined in order to establish the stakeholders' interest in regards to the IR's sustainability from the point of view of the estimation of the competitive advantage on the companies' preference for the IR.

The 10th objective of the research focusses on the estimation of the growing financial profitability trend that is quantified based on the use of the aggregated return on equity (ROE) and its interdependence relationship with the IR. The latter test that corresponds to the 10th objective of the research focusses on the trend analysis of the financial profitability. Based on its bivalent nature, it represents a powerful stimulus or decelerator of the interest for using the IR as such.

The authors have emphasized the fact that the achievement of each objective is possible depending on the domain of the selected companies, the attributes of the indicators analyzed in relation to the preference for IRQ for which the most relevant markers were selected from the structure of social capital (SC), human capital (HC), natural capital (NC) and IC. The selection of the markers was based on the financial and non-financial information gathered from the integrated reports of the sample of companies included in the study.

Based on the data of the present study and their results, it could also be said that there is a lack of those studies analyzing the relationship between the MS and a company's sustainable development based on the IRQ.

After establishing the group of the financial and non-financial indicators (see Table 1), the authors have defined the work hypothesis in order to analyze the business model as follows:

1st Hypothesis (H1) – the increase of the MS has a direct impact on the preference for the IR by contributing to its quality and is mostly influenced by the exploitation of the social and relational capital and the preservation of the environmental, social capital and corporate governance (ESG).

2nd Hypothesis (H2) – the sustainable economic development based on the IA capitalization, the growth of the WP and the reduction of the degree of indebtedness are the prerequisites for the preference for the IR only if the trends of the quantified indicators of the above- mentioned phenomena ensure the setting up of the IC, the exploitation of the SC, the development of the HC and the preservation of the NC.

3rd Hypothesis (H3) – the financial profitability, the accumulation of goodwill are those elements which have an impact on the preference for the IR only if the trends of those three indicators are congruent and growing and are in line with the entity's sustainable objectives based on the setting up of the IC, the exploitation of the SC and the development of the HC.

4th Hypothesis (H4) – there is an optimal preference function which has been defined based on the result with a logical value. It stands for the reverse of the non-binding so that the sum of the value of both functions is a result with certain values within $\{0,1\}$ powerset. The optimal preference function has a direct and ready impact on the quality of the reporting when it reaches a peak value, yet it also influences the retaining of the sustainable development goals which have been ensured based on the IC, the exploitation of the HC and the preservation of the NC.

When using the scenarios method, the authors have identified the following evolution patterns of the aggregated indexes:

$$\text{The 1}^{\text{st}} \text{ case study - Aggregated index } I_a = \frac{X_n}{X_{n-1}}.$$

The formula for the estimation of the value of the aggregated index is:

$$\frac{-X_n}{X_{n-1}} - 1. \quad (1)$$

The 2nd case study – The formula that is used for the estimation of the value of the aggregated index is as follows:

$$1 - \frac{X_n - X_{n-1}}{X_{n-1}}. \quad (2)$$

The 3rd case study – The value of the aggregated statistical indicators is the highest during the $n - 1$ year and null during the n year:

$$\begin{cases} X_{n-1} = 0; X_n < 0; \text{ the value of the aggregated index in this case is } -1; \\ X_{n-1} > 0; X_n = 0; \text{ the value of the aggregated index in this case is } -1. \end{cases}$$

The 4th Case Study – the value of the aggregated statistical indicators is:

$$X_n = X_{n-1} = 0; \text{ the value of the aggregated index in this case is } 0.$$

The 5th case Study – the value of the aggregated statistical indicators is:

$$\begin{cases} X_{n-1} < 0; X_n = 0; \text{ the value of the aggregated index in this case is } 1; \\ X_{n-1} = 0; X_n > 0; \text{ the value of the aggregated index in this case is } 1. \end{cases}$$

The 6th case Study – the formula which establishes the value of the aggregated index is:

$$\frac{X_n}{X_{n-1}}; X_{n-1} > 0; X_n > 0. \quad (3)$$

The statistical data as a result of the consolidation of the data base were made part of a multiplicative type of an econometrical model based on the correlation of the dependent variable in the form of the MS which was quantified by the dynamics of the turnover in relationship with the regressors expressed by the aggregated indicators. They were mentioned in the 2nd up to the 10th objectives as the dependent variable (MS) and the ROE, FI, WP, IA, GW, and NP regressors. It is worth mentioning the fact that they were selected within the model comprising the aggregated indicators that are highly sensitive as compared to the dependent variable based on the correlation test of all those 10 aggregated indicators that were initially established by following the above-mentioned objectives. The model was designed by using the GRETL (the 2019 version) statistical software and can be synthetically rendered as a general equation such as:

$$MS = \sum_{i=1}^5 \alpha_i \cdot Ia_i + \epsilon, \quad (4)$$

where: MS – dependent variable, the market share; α_i – value of the regression coefficient; Ia_i – regression variables, aggregated indicators that are estimated by the sensitivity function of the phenomenon as being relevant for the correlated study respectively; ϵ = residual value.

The turnover's average values on sectors of activity varies between 6 to 21 million euros. There is an average profit of 352 thousand euros and an average of 3 million euros capitalization of the analysed companies. There is a 49 million peak in the agriculture sector for the grain production. The analysed time frame for the data that were published online refers to 2015–2017.

2. Results and discussions

In order to generate the dynamic statistical series of the aggregated indicators that were expressed within the objectives from 1 to 10, the authors have used an algorithm to estimate the dynamic series that resulted from the comparison of the trend of those 10 aggregated indicators displayed on value layers and corresponding to the established formulas. Thus, based on the GRETL statistical software, the coefficients of the regression variables were expressed by using the method of the smallest squares for the first series of aggregated indicators resulting from the dynamic comparison of the data corresponding to 2015–2016. The model's equation is:

$$\begin{aligned} \wedge MS_{65} = & + 0.000756 \times ROE_{65} + 0.203 \times FI_{65} + 0.721 \times WP_{65} + \\ & 0.0526 \times IA_{65} + 0.0227 \times GW_{65} + 0.000753 \times NP_{65}; \end{aligned} \quad (5)$$

(0.00581) (0.0456) (0.0374) (0.0212)
(0.0183) (0.00486);

$n = 45$, R-squared = 0.996 (standard errors in parentheses).

Based on the data that were introduced in the GRETL, the significance statistical tests were calculated. The final result was a model that had a 99.6% statistical representativeness and homogeneity on the FI, WP and IA regressors. For this particular case, the estimated p values had a high statistical significance. These indicators make up the section that attributes to the IRQ in the sense that based on the rise of the WP in relationship with the accumulation IA the foundations of the development of a sustainable business is laid for any type of company. This is followed by the cutting down the gearing or the rise of the FI (H2, the 1st, 4th and 5th objectives). Given the lack of the ESG prerequisites, the sustainable economic development based on the capitalization of the IA has a low value in terms of the impact rate of the exploitation of the SC and the protection of the NC (i.e. 64.28%).

As far as the other three aggregated indicators are concerned, they refer to the nature of the financial reporting that has a high degree of volatility and a lower statistical representativeness from the point of view of its relationship with the MS which is a dependent variable in itself (H1, the 1st, 2nd, the 3rd objectives). Given the lack of the exploitation of the SC as well as the preservation of the NC, the MS has an impact on the IR as it goes down to 44.67%. Thus, an efficient use of the IR has led to an abnormal profitability of the stock returns (Pavlopoulos et al., 2019). This fact has been positively linked with the quality of the revenues. The study, which has been done by Carp et al. (2019) shows a low influence of the sustainable reporting on a company's growth indicators (i.e. the market value, increase sales and the cost of the capitals).

The p value for the GW also indicates the fact that it is a defining and relevant indicator for the IR as it can be considered a tool for both measuring the management performances within a company as well as an important information for the stakeholders who are its direct beneficiaries (H3, 6th, 7th, 8th, 9th and 10th objectives). This positive relation between the company's performance and the quality of IR disclosure has also been emphasized by Pavlopoulos et al. (2019) and Mans-Kemp and van der Lugt (2020).

Both the human resource which refers to the exploitation and the development of the HC and the sustainable resources regarding the development, the exploitation of the social and IC whose impact on the sustainability is of 52.22% have been included in the present equation.

As far as the statistical model is concerned, the heteroscedasticity tests together with the residues' normality indicate the fact that it is valid and well-defined. The tests indicate the absence of the heteroscedasticity in regards to the given data and the fact that the errors are naturally distributed. The study renders the statistical tests for the model as follows:

Model 1: OLS using the 1–45 observations, dependent variable: MS65

| | Coefficient | Std. Error | t-ratio | p-value |
|-------|-------------|------------|---------|---------|
| ROE65 | 0.000756409 | 0.00581170 | 0.1302 | 0.8971 |
| FI65 | 0.203075 | 0.0456026 | 4.453 | <0.0001 |
| WP65 | 0.721399 | 0.0374304 | 19.27 | <0.0001 |
| IA65 | 0.0526198 | 0.0212328 | 2.478 | 0.0176 |
| GW65 | 0.0226573 | 0.0182869 | 1.239 | 0.2228 |
| NP65 | 0.000753248 | 0.00485519 | 0.1551 | 0.8775 |

| | | | |
|----------------------------|-----------|----------------------------------|-----------|
| Mean dependent variable | 1.046724 | S.D. dependent variable | 0.253528 |
| The residual's squares sum | 0.188677 | Standard error of the regression | 0.069555 |
| Uncentered R-squared | 0.996381 | Centered R-squared | 0.933286 |
| F (6, 39) | 1789.456 | P-value(F) | 5.41e-46 |
| Long-likelihood | 59.32139 | Akaikecriterion | -106.6428 |
| Schwarz criterion | -95.80280 | Hannan-Quinn | -102.6017 |

The Breusch-Pagan test for the heteroscedasticity –

The null hypothesis: heteroscedasticity is absent

Statistics test: LM = 12.6722

with p-value = $P(\text{Hi square}(6) > 12.6722) = 0.0485464$

The test for the residues' normality –

The null hypothesis: the error is normally distributed

The Statistics test: Hi squared (2) = 1.07713; with p-value = 0.583584

The following diagram shows the model's homogeneity and its position on the gaussian evolution curb (see Figure 1).

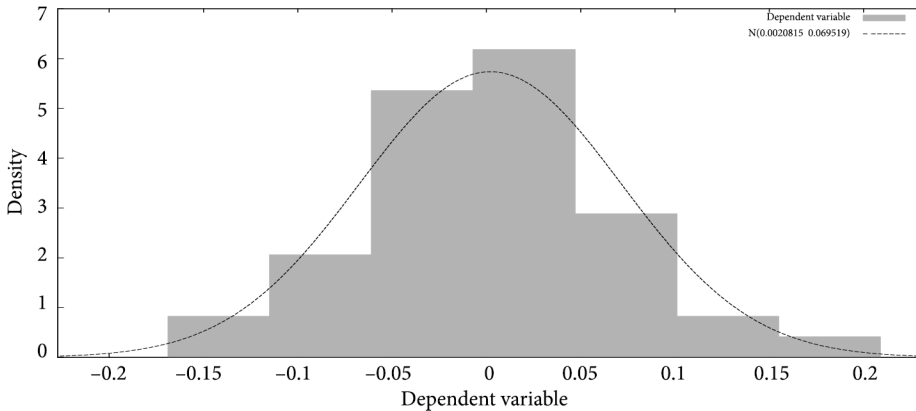


Figure 1. The normality of the residual (source: GRETL program)

Test for null hypothesis of the normal distribution:

Hi squared (2) = 1.077 with p-value 0.58358

Figure 2 indicates the fact that there is distribution on small layers of the right trend in relationship with the predicted trend. This re-confirms the homogeneity of the model itself.

According to Figure 3, the coefficients of the regression variables were established by using the smallest squares method for the second series of aggregated indicators that resulted from the dynamic comparison of the data during 2016–2017 (those two series are the only estimated markers during the time when the IR became mandatory, namely 2015). The sample equation is:

$$\hat{MS} = +0.138 \times ROE + 0.928 \times FI - 0.00128 \times WP + 0.0520 \times IA + 0.00616 \times GW - 0.0692 \times NP; \quad (6)$$

(0.0583) (0.0578) (0.0246) (0.0247) (0.00585) (0.0645)

$n = 45, R\text{-squared} = 0.971$ (standard errors in parentheses)

As far as the first series of aggregated indicators are concerned, in the second example the estimated model has a homogenous high 97.1% statistics significance. It has been calculated based on the FI's evolution, an ROE evolution (i.e. a statistics degree of correlation). One needs to specify the fact that the labour productivity has lowered under the influence of the macro and micro business factors that are influenced by the labour mobility, the continuous decrease of the employment rate and the enhancement of the capital movements.

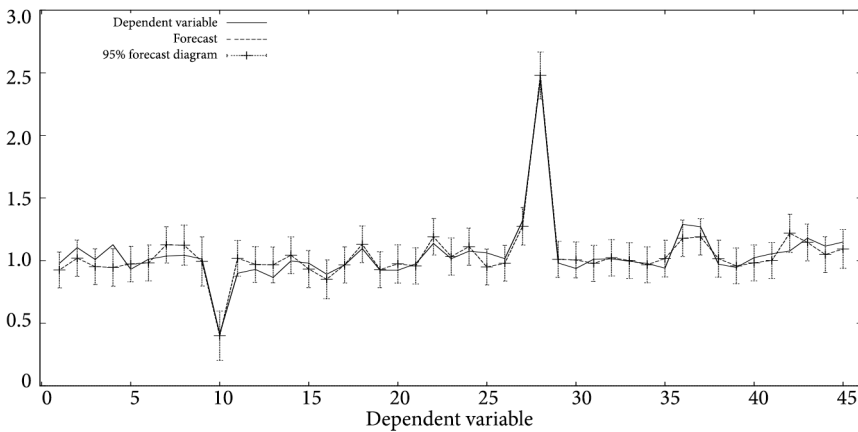


Figure 2. Forecast diagram on the evolution of the dependent variable for the 1st model (source: GRETL program)

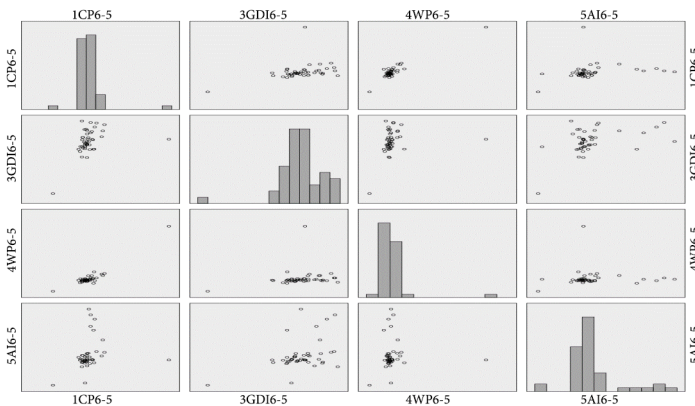


Figure 3. The correlation diagram of the regression variables and of the dependent variable for Model 1 (source: GRETL program)

Model 2: OLS by using the 1–45 observations, dependent variable: MS

| | Coefficient | Std. Error | t-ratio | p-value |
|----------------------------|-------------|----------------------------------|----------|-----------|
| ROE | 0.137589 | 0.0583349 | 2.359 | 0.0234 |
| FI | 0.928498 | 0.0577646 | 16.07 | <0.0001 |
| WP | -0.00127771 | 0.0245843 | -0.05197 | 0.9588 |
| IA | 0.0519603 | 0.0247346 | 2.101 | 0.0422 |
| GW | 0.00616051 | 0.00585407 | 1.052 | 0.2991 |
| NP | -0.0692246 | 0.0644950 | -1.073 | 0.2897 |
| Mean dependent variable | 1.060186 | S.D. dependent variable | | 0.122821 |
| The residual's squares sum | 1.470167 | Standard error of the regression | | 0.194156 |
| Uncentered R-squared | 0.971310 | Centered R-squared | | -1.214979 |
| F(6, 39) | 220.0610 | P-value(F) | | 1.76e-28 |
| Long-likelihood | 13.12672 | Akaikecriterion | | -14.25343 |
| Schwarz criterion | -3.413457 | Hannan-Quinn | | -10.21240 |

The Breusch-Pagan test for heteroscedasticity

The null hypothesis: the heteroscedasticity is absent

The statistic test: LM = 41.5677

with p-value = $P(\text{Hi square}(6) > 41.5677) = 2.23787e-007$

The test for the residues' normality –

The null hypothesis: the error is normally distributed

The statistics test: Hi square (2) = 8.52864; with p-value = 0.014061

Within Figure 4, one can notice a slightly inhomogeneous distribution of the data based on the reporting of the gaussian curve within a significant drop of the WP due to the above-mentioned causes.

The frequency distribution for uhat2, obs 1–45

number of bins = 7, mean = 0.017212, sd = 0.193274

Test for the null hypothesis of the normal distribution:

Hi square (2) = 8.529 with p-value of 0.01406

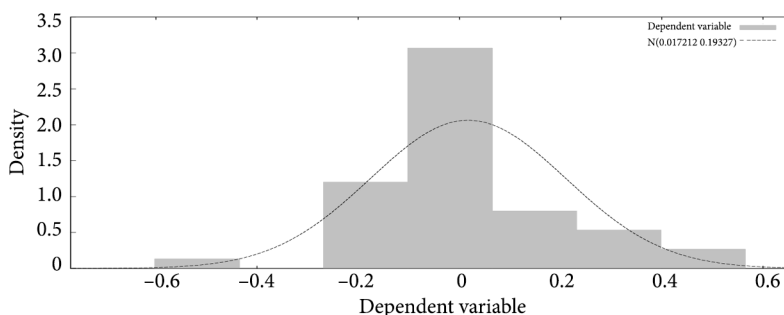


Figure 4. The normality of the residual test for the 2nd model (source: GRETL program)

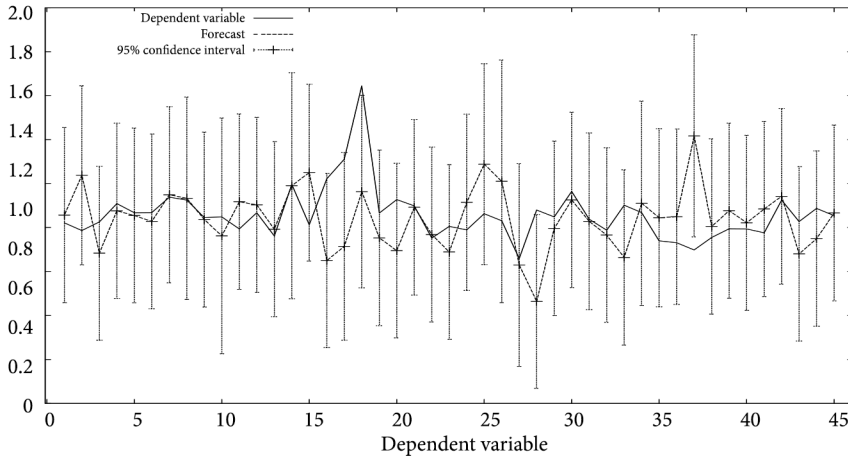


Figure 5. The forecast diagram on the evolution of the dependent variable for the 2nd model (source: GRETL program)

According to Figure 5, the variable intervals between the trend curve and the forecast itself has diminished its amplitude based on the significant reduction of the labour productivity index.

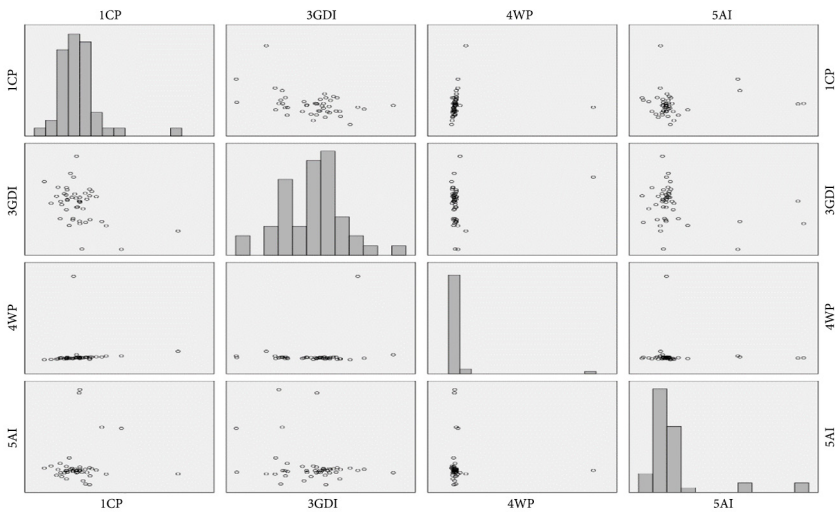


Figure 6. The correlation diagram on the regression and dependent variable for the 2nd model (source: GRETL program)

The data presented in Figure 6 were under the bivariational sensitivity analysis by focussing on the logical variables (H4) of the results of the aggregated indicators and their comparison after using the regression coefficients which have the logical value of the aggregated indicator that is assimilated to the dependent variable are multiplied with the sum of the regression coefficients. The bivariational sensitivity analysis enabled the quantification

of the difference between the two intrinsic values that were estimated based on the above-mentioned methodology. This fact reefs to the use of either positive or negative indexes for each and every company out of those 45 entities that use the IR in order to evaluate the IR's positive preference or the negative obligation and its quantification for the mathematical study of the calculus of the optional quality versus the imposed quality in the case of the IR. The final results indicate the fact that those segments which are part of the global trade (i.e. services, trade, transportation) are more prone to using the IR, while the strategic sectors such as the use of the natural resources (energy, natural gases, water, oil), the telecommunications and part of the manufacturing industry are much more rigid.

From a methodological point of view, the bivariational sensitivity analysis can be mathematically rendered as follows:

$$P_1(I_a) = \lim_{Ia_i \rightarrow 1} I_a = 0, \tag{7}$$

where P_1 stands for the probability function that is defined on the set of $\{0,1\}$ logical values, a set that reaches a 0 value for $Ia \rightarrow 1$ and a regular trend of rising I_a or $Ia \rightarrow \infty$ and an I_a regular descending trend;

$$P_2(I_a) = \lim_{Ia_i \rightarrow 1} I_a = 1, \tag{8}$$

where P_2 stands for the probability set that is defined on the set of $\{0,1\}$ logical values, a set that reaches a value of 1 or $I_a \rightarrow \infty$ and a regular trend or rising Ia or $Ia \rightarrow 1$ and an I_a regular descending trend.

We define the sensitivity function as follows:

$$S = \left(\lim_{Ia_i \rightarrow \infty} \sum_{i=1}^5 \alpha_i \right) \cdot \lim_{CP \rightarrow 1 \Delta CP \rightarrow \infty} CP - \left(\sum_{i=1}^5 \alpha_i \cdot \lim_{Ia_i \rightarrow \infty} I_a + \sum_{i=1}^5 \alpha_i \cdot \lim_{Ia_i \rightarrow 1} I_a \right). \tag{9}$$

Based on the above shown methodology, the study opted for the indexation of the database by using the sensitivity coefficients. The study has shown positive and negative dynamic values for each and every indicator that was defined in the methodology chapter. The cumulative value of the positive evolution is trending (IR > 0 preference). One can notice the fact that the results of the sensitivity function bring about quality parameters for the IR (see Table 1).

Consequently, the above-mentioned analysis shows that the preference for the IR depends both on the reporting company and on the stakeholders' demands. This is the reason why this communication tool should be able to allow the achievement of the following important objectives (also confirmed by Eccles et al., 2012).

Within the 2nd sensitivity phase, we have made use of those information from the field of the ESG (Landau et al., 2020) and we have put together the ESG and the IR indicators in order to quantify the impact of using these indicators as such. Consequently, the study has used markers from the field of the exploitation of the SC and of the preservation of the NC for those indicators which refer to the market share. Both components have quantified

based on the qualitative intake percentage as a result of the exploitation of the SC through the chain of suppliers, retail, the exploitation of the market value and the exploitation of the reporting itself (see Table 1).

Table 1. The monitoring of the sensitivity of the preference for the IR for the companies, which were analysed from the point of view of the sectors of activity (source: author's own compilation)

| The results of the sensitivity function on sectors of activity for the compared data between 2015–2017 | | Companies | Preference for the IR based on the market share | Preference for the IR based on the companies'FI | Preference for the IR based on the WP | Preference for the IR based on the variation of the IA | Preference for the IR based on the variation of the goodwill | Preference for the IR based on the invested capital | Preference for the IR based on the return on equity | $MS \times \sum_{i=1}^5 \alpha_i$ | S | $\sum_{i=1}^5 \alpha_i \cdot \lim_{I_{a_i} \rightarrow \infty} I_{a_i} + \sum_{i=1}^5 \alpha_i \cdot \lim_{I_{a_i} \rightarrow 1} I_{a_i}$ |
|--|-----------------------------|-----------|---|---|---------------------------------------|--|--|---|---|-----------------------------------|-------|--|
| Services, Transportation and Infrastructure | 2015–2016 (α _i) | 4 | 3 | 2 | 1 | 1 | 4 | 1 | 1 | 9 | 4.93 | 4.07 |
| | 2015–2016 (ESG) | 4 | 50% | 70% | 100% | 70% | 70% | 70% | 70% | 71.43% | 8.45 | 6.98 |
| | 2016–2017 (α _i) | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 3 | 3 | 0.69 | 2.31 |
| | 2016–2017 (ESG) | 4 | 50% | 70% | 100% | 70% | 70% | 70% | 70% | 71.43% | 1.18 | 3.96 |
| Energy, natural gases, water and oil | 2015–2016 (α _i) | 8 | 4 | 5 | 3 | 3 | 6 | 1 | 7 | 12 | -0.16 | 12.16 |
| | 2015–2016 (ESG) | 8 | 60% | 40% | 100% | 60% | 90% | 60% | 40% | 64.29% | 0.10 | 18.92 |
| | 2016–2017 (α _i) | 8 | 7 | 3 | 6 | 6 | 3 | 2 | 5 | 7 | 3.34 | 3.66 |
| | 2016–2017 (ESG) | 8 | 60% | 40% | 100% | 60% | 90% | 60% | 40% | 64.29% | 5.49 | 6.01 |
| Industry | 2015–2016 (α _i) | 25 | 12 | 12 | 14 | 13 | 13 | 7 | 15 | 36 | -2.93 | 38.93 |
| | 2015–2016 (ESG) | 25 | 55% | 30% | 100% | 70% | 50% | 60% | 50% | 59.29% | 1.74 | 65.67 |

Continued Table 1

| The results of the sensitivity function on sectors of activity for the compared data between 2015–2017 | | Companies | Preference for the IR based on the market share | Preference for the IR based on the companies'FI | Preference for the IR based on the WP | Preference for the IR based on the variation of the IA | Preference for the IR based on the variation of the goodwill | Preference for the IR based on the invested capital | Preference for the IR based on the return on equity | $MS \times \sum_{i=1}^5 \alpha_{-i}$ | S | $\sum_{i=1}^5 \alpha_i \cdot \lim_{I_{a_i} \rightarrow \infty} I_{a_i} + \sum_{i=1}^5 \alpha_i \cdot \lim_{I_{a_i} \rightarrow 1} I_{a_i}$ |
|--|-----------------------------|-----------|---|---|---------------------------------------|--|--|---|---|--------------------------------------|-------|--|
| | 2016–2017 (α _i) | 25 | 17 | 18 | 9 | 18 | 13 | 4 | 19 | 17 | -3.05 | 20.05 |
| | 2016–2017 (ESG) | 25 | 55% | 30% | 100% | 70% | 50% | 60% | 50% | 59.29% | 1.81 | 33.82 |
| Telecommunications | 2015–2016 (α _i) | 3 | 1 | 2 | 2 | 0 | 1 | 2 | 3 | 3 | -2.85 | 5.85 |
| | 2015–2016 (ESG) | 3 | 49% | 40% | 100% | 28% | 24% | 80% | 60% | 54.43% | 1.55 | 10.75 |
| | 2016–2017 (α _i) | 3 | 0 | 1 | 0 | 2 | 0 | 1 | 1 | 0 | -1.10 | 1.10 |
| | 2016–2017 (ESG) | 3 | 49% | 40% | 100% | 28% | 24% | 80% | 60% | 54.43% | 0,60 | 2,02 |
| Services | 2015–2016 (α _i) | 3 | 3 | 0 | 2 | 2 | 3 | 3 | 1 | 9 | 2.81 | 6.19 |
| | 2015–2016 (ESG) | 3 | 42% | 60% | 100% | 24% | 24% | 80% | 50% | 54.29% | 4.34 | 9.55 |
| | 2016–2017 (α _i) | 3 | 2 | 2 | 2 | 0 | 1 | 1 | 1 | 2 | 0.07 | 1.93 |
| | 2016–2017 (ESG) | 3 | 42% | 60% | 100% | 24% | 24% | 80% | 50% | 54.29% | 0.11 | 2.98 |
| Trade | 2015–2016 (α _i) | 2 | 2 | 0 | 2 | 1 | 2 | 1 | 0 | 6 | 2.83 | 3.18 |
| | 2015–2016 (ESG) | 2 | 12% | 40% | 100% | 25% | 8% | 14% | 40% | 34.14% | 3.79 | 4.26 |

End of Table 1

| The results of the sensitivity function on sectors of activity for the compared data between 2015–2017 | | Companies | Preference for the IR based on the market share | Preference for the IR based on the companies'FI | Preference for the IR based on the WP | Preference for the IR based on the variation of the IA | Preference for the IR based on the variation of the goodwill | Preference for the IR based on the invested capital | Preference for the IR based on the return on equity | $MS \times \sum_{i=1}^5 \alpha_i$ | S | $\sum_{i=1}^5 \alpha_i \cdot \lim_{I_{a_i} \rightarrow \infty} I_{a_i} + \sum_{i=1}^5 \alpha_i \cdot \lim_{I_{a_i} \rightarrow 1} I_{a_i}$ |
|--|-----------------|-----------|---|---|---------------------------------------|--|--|---|---|-----------------------------------|------|--|
| | 2016–2017 (ai) | 2 | 2 | 1 | 0 | 2 | 0 | 1 | 1 | 2 | 0.90 | 1.10 |
| | 2016–2017 (ESG) | 2 | 12% | 40% | 100% | 25% | 8% | 14% | 40% | 34.14% | 1.21 | 1.48 |
| TOTAL (ai) | | 45 | 31 | 27 | 19 | 30 | 18 | 10 | 30 | 31 | 0.85 | 30.15 |
| TOTAL (ESG) | | 45 | 44.67% | 46.67% | 100.00% | 46.17% | 44.33% | 60.67% | 51.67% | 56.31% | 1.33 | 47.13 |

The first 3 markers have been introduced on a quantitative basis as they stand for the intake share as a result of the exploitation of the SC and of the specialty researches (Anifowose et al., 2020) whereas the last 2 markers have been introduced under the form of the logical variables with a logical value corresponding to their presence (value 1) or the absence (value 0) in relationship with the field of activity and interest. As far as the preservation of the NC is concerned, the study comprises 2 markers which have been assigned some logical variables that referred to the use of the policies on the preservation of the environment and on the sustainability, too (their presence – value 1; their absence – value 0). The findings have generated a qualitative score, which has adjusted the sensitivity function as such from the point of view of enhancing the preference given the adoption of the sustainability policies on the MS. As far as the 2nd indicator is concerned, the analysis of the financial autonomy was based on the same algorithm as the ESG's impact on the fields of the NS and NC. The indicators, which have been used in this particular situation, have allowed getting certain higher sensitivity results when using the sustainability policies in the field of the FI. The analysis of the WP was based on certain indicators from the field of the skills and competence, the increase of the staff turnover, of the level of education, the leadership and management improvement, the increase of the employee engagement. These markers have been introduced under the form of the logical variables and have been validated for the entire analyzed casework. The result is a high degree of the sensitivity function based on the use of the ESG indicators for the WP.

The analysis of the variable IA was based on those markers belonging to the category of the IC and the exploitation of the SC. As far as the IC is concerned, the markers have been selected from the R&D, innovation, organization field while, in terms of establishing the value of the SC, the same category of markers has been used as for the analysis of the MS, yet with different shares from the point of view of the sectorial relevance. The result referred to the increase of the sensitivity function and the emphasis on the importance of using the sustainability policies for the IR preference. Similar results have been obtained for the latter indicators such as the analysis of the capitals' profitability. A special remark needs to be made on the fact that in this particular instance those indicators belonging to the ESG group on the exploitation of the SC and the development of the HC have been used.

The result of the above-mentioned analysis shows the key role of the accumulation of IA and the growth of the WP in regards to the IRQ, which has direct consequences on the positive behaviour in the regards to the preference for this type of reporting, especially for those companies that operate in the service, trade and transportation sectors.

The findings of the study as a result of the dynamics analysis of the panel data highlight the fact that the profitability growth of a company's capital has a positive and significant impact on the increase of the profitability (H1). However, as far as the reduction of the cost of funding is concerned, there are certain ESG elements, which are likely to impact significantly the profitability growth by reducing the influence of the (H2) direct factor. These results are in line with the study of Anifowose et al. (2020). The study has identified the fact that the reporting of the SC and the NC has an indirect influence on the cost funding (H2) from the point of view of its decrease/increase (namely the increase/decrease of its FI) while the reporting of both the intellectual and the SC capitals has an indirect impact on the portfolio of IA and the goodwill value (H3). Having in view the fact that Dilling and Caykoylu (2019) use the scoring method for each and every capital scores, whereas the fully integrated score has been estimated as an average of all the capital scores, the study makes use of the sensitivity analysis in order to avoid providing the stakeholders some useless information, yet giving them some useful ones by having in view the compliance with the connectivity principle as suggested by the IIRC.

The reporting of the HC has an indirect impact on the growth of the WP, the profitability of a company's own capital. At the same time, the study highlights the fact that all those factors that make up the social, human, natural and IC have a direct impact on the sustainability of those companies, which are part of the analyzed group. In other words, the value creation represents a key concept for the IR. However, this issue needs to be given a broader meaning. Basically, the value creation on a short-term basis can very well be excluded from the sustainability and the stakeholders' approach, yet this situation cannot be done on a long-term basis. The long – term value creation both for a company and for a community itself can be accomplished only if this particular company meets the needs of all the involved parties. This is a direct consequence of the fact that the use of certain tools like the IR may be part of a long-term strategy, which has to do with its credibility on the market, which is a key element for ensuring any type of entity's economic sustainability.

Conclusions

The study has been designed to provide an analysis of the possible relationship between the IRQ and the sustainability demand for the financial and non-financial information that are meant to satisfy the stakeholders' demands.

The importance of the issue of the IR resides from the fact that at present the majority of the companies have become more and more interested in and focus on integrating their financial information within the sustainable context of their economic development that results in enhancing the transparency, integrity and accuracy of their financial results by using a single reporting tool. This tool that is identified by the authors based on the suggested model will enhance its sustainable use by offering its users a new form of integrated thinking and a new means of communication with the outside world by making a stronger connection between the company's internal functions and the demands of the interested parties.

The increasing importance of the communication methods manifesting between a business entity and its stakeholders has frequently led to the design of a fragmented CSR Report in the sense that the inclusion of the data regarding the economic, financial environmental and social performances may sometimes lack while the detailed information on the environment, the social topic or any situation when the reporting on the extra information in terms of the 3 types are equally represented, yet their inclusion is minimal or non-existent as such. Consequently, the study suggests a viable model, which is able to ensure the best inclusion, an analysis and an identification of those correlations among the 3 sustainable development areas (i.e. the economic and financial, the environmental and social areas).

The study's findings reveal the fact that the sensitivity function value shows that those sectors of activity such as transportation and infrastructure, services and trade have a higher sensitivity preference for the IR based on the quantification of the stakeholders' interest in terms of performance positive trend indexes, while those sectors such as industry and telecommunications are much more rigid in terms of their sensitivity as well as their preference as a result of the sectorial structure of the business itself and of the stakeholders' different interest for the IR as such.

The findings of the present study show that all those companies, which opt for the use of the IR, are able to improve their perspective on the way all these financial and non-financial information could satisfy the stakeholders' demands. They also provide them the opportunity of choosing a quality IR due to the fact that the sensitivity analysis offers them the chance of selecting those significant, reliable, comprehensible, comparable information which will provide the stakeholders confidence and will lead to a long-term value creation.

The model can be successfully applied in practice but the small number of indicators integrated in the econometric model may represent a limitation of its applicability. It is also worth mentioning the limitations of the present research which refer to the fact that the existence of certain heterogenous areas in terms of the entities' affiliation, the market's specificity, the difficulty of integrating those 3 aspects of the CSR and, and last but not the least, the IR based on the GRI Standards and the European Directives which are fairly new ones whereas the number of those business entities reporting based on the GRI standards is somehow a limited one. Furthermore, the study fails to take into account the global risks such as the

pandemics the entire world is facing nowadays whose effects will have a direct impact on the IR's short – term data.

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Author contributions

MS, VG and CGC designed the study and were responsible for the design and development of the data analysis. MSC, MS, VG and SM were responsible for data collection and analysis. MS and VG were responsible for data interpretation. CGC and VG wrote the first draft of the article.

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