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CORPORATE SUSTAINABLE VALUE: CONCEPTUALIZATION, MEASUREMENT AND FINANCIAL IMPLICATIONS

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Abstract:

The purpose of this study is to analyse the concept of corporate sustainable value (CSV), measure it and see its impact on financial performance of a company. In order to achieve this comprehensive objective, the methodological approach of this paper focuses on the conceptualization of the term based on a logical analysis, on the development of an evaluation model based on principal components analysis (PCA) and at the same time on the construction of multifactorial linear regressions, where the dependent variable is an indicator of financial performance and the independent variables are the determinants of sustainable corporate value. A structure of five factors was obtained as a final solution, through the factorial method. The findings also indicate that environmental performance, asset management, government relations, human capital productivity, financial management and sales growth are useful in predicting financial performance in the context of our analysis of STOXX Europe 50 index companies. By providing comparability and transparency at the company level, this model can contribute to the practical implementation of CSV assessment tools.

Key words: *sustainable value, corporate performance, corporate measuring model, value creation, sustainability, corporate finance*

1. Introduction

Several themes have been identified to approach the concept of sustainable value. Three different criteria can be used to classify them, namely: "sustainable value measurement", "opportunity cost in sustainability", and "integrated sustainability assessment". These themes highlight the importance of measuring corporate contributions

to sustainability, the role of opportunity costs in valuing sustainability capital, and the need for comprehensive methods to assess sustainability performance.

With regard to the first criterion, some researches measure sustainable value in financial terms, while others measure it in non-financial units. For example, Figge et al (2004) focus on the efficiency with which a company creates value, considering the opportunity costs associated with the allocation of resources, and propose a new approach to measuring a company's contribution to sustainability, called Sustainable Value Added. It therefore captures both efficiency (eco- and social efficiency) and the absolute level of consumption of environmental and social resources (eco- and social effectiveness). It provides a holistic view of corporate impact by expressing sustainability performance in economic, environmental, and social dimensions. Hahn et al. (2007) assess the sustainability performance of companies, revealing their exposure to policy changes and allowing for comparisons across sectors. Both Hart and Milstein (2003) propose a multidimensional perspective on sustainable value creation. This includes economic, social, and environmental concerns. In the article by Van Passel et al. (2007), the issue of measuring sustainable value is addressed through sustainable efficiency, which refers to how well firms perform in terms of sustainability in relation to the resources they use, indicating how efficiently they combine economic and environmental factors.

On the basis of the second criterion, the methodological frameworks show that the measurement of sustainable value has to be based on opportunity costs. The concept of opportunity cost is therefore critical to the assessment of a company's sustainability performance, as it is a reflection of the forgone returns from alternative investments (Kuosmanen T. and Kuosmanen N., 2009). Moreover, a valuation methodology has been developed to calculate the costs associated with different forms of capital. This methodology emphasizes the importance of opportunity costs in sustainable value creation (Figge and Hahn, 2005). It integrates the analysis of different forms of capital and allows for a comprehensive understanding of sustainability efficiency and value creation beyond the cost of sustainability capital.

As for the third criterion, the need for a comprehensive set of methodologies to assess sustainability performance that considers the specific circumstances of each company, is surprising. The combination of sustainable value approaches with efficiency benchmarks enhances the assessment of a firm's sustainability performance by comparing the productivity of its resources with established benchmarks (Van Passel et al, 2009). A novel value mapping tool has been developed to assist businesses in creating balanced social, environmental, and economic value, facilitating better sustainability business modeling (Bocken et al, 2013). Notably, Ogorean and Herciu (2020) argue that sustainable business models are essential tools for operationalizing sustainability, as they translate abstract ambitions into measurable and actionable frameworks.

To summarize, the main knowledge gaps identified in these articles include the lack of a conceptualization of "corporate sustainable value", the integration of multiple dimensions of sustainability (economic, environmental, social), the lack of comprehensive approaches for companies in different sectors, i.e. the development of holistic and practical frameworks for sustainable value creation across industries, and the development of more comprehensive assessment tools.

Sustainable value has been used mainly as a general term to describe positive business outcomes, rather than as a concept. (Cardoni et al, 2020). Creating a commonly accepted definition of sustainable value requires a complex process. It involves integrating sustainability performance frameworks and industry-specific assessment methods. A literature review also highlighted the interconnections between stakeholder engagement, evolving definitions of corporate social responsibility (CSR), and the impact of social performance on financial outcomes when it comes to conceptualizing sustainable value at the corporate level.

Stakeholder theory is supported by three aspects: descriptive accuracy, instrumental power, and normative validity, which are interrelated but distinct, emphasizing the importance of property rights in establishing a normative basis for stakeholder relations (Donaldson and Preston, 1995). A typology of stakeholders is proposed based on the attributes of power, legitimacy, and urgency. This typology helps managers to understand their salience (Mitchell et al, 1997). Oprean-Stan et al. (2020) contribute to the conceptual foundation of Corporate Sustainable Value by emphasizing the importance of sustainable value creation in modern enterprises. Their work highlights the need for new financial models and performance indicators that incorporate not only profitability but also social and environmental dimensions.

The relationship between CSR and corporate strategy should be viewed as interdependent, promoting a mindset that sees social responsibility as an opportunity for innovation and competitive advantage (Porter and Kramer, 2006). Waddock and Graves (1997) find a positive association between corporate social performance (CSP) and prior financial performance, suggesting that good management practices enhance both. This idea is also supported by Herciu and Șerban (2016) arguing, that sustainable value is only achievable when managers integrate both corporate and societal value into the decision-making process.

The relationship between environmental performance and economic performance is also found to be positive (Al-Tuwaijri et al, 2004), particularly in high-growth industries, reinforcing the idea that "it pays to be green" (Russo and Fouts, 1997).

Applying sustainable methodologies, such as Sustainable Value Added, has shown promising results among companies, but the scalability and adaptability of such frameworks across different industries and company sizes has not yet been sufficiently researched. Some articles suggest that while the methodologies have been validated for specific industries or company sizes (e.g. Henriques and Catarino, 2015), further research is needed to ensure that they can be applied on a broad scale.

Scholars, who conduct an in-depth analysis of sustainable value, do not integrate all three dimensions (economic, environmental, social) in identifying the drivers of sustainability. However, there are papers, such as Hart and Milstein's (2003) that acknowledge that globalization, economic fluctuations and knowledge innovation have become as important as green technologies and carbon reduction policies.

There is another significant issue that arises when it comes to the disclosure of financial data. The identified gap is related to the challenge of integrating intangible assets into financial statements and their role in sustainable value creation. Oprean-Stan et al, (2020) offer a valuable contribution to the conceptualization of CSV by highlighting the

central role of intangible resources in driving sustainable performance. Their proposed model emphasizes assets such as reputation, knowledge, organizational culture and innovation capacity as critical to long-term value creation. This aligns with CSV's emphasis on the integration of non-financial and strategic intangible elements into core business models to generate shared value for both companies and society.

Existing legal and reporting frameworks limit the disclosure of intangible assets. This hinders the understanding of their contribution to sustainable business practices (Da Silva et al, 2015). There is also a gap in how organizations measure and combine environmental, social, and corporate governance (ESG) factors when assessing sustainability. Many companies report on these factors. However, existing methodologies for incorporating these factors into a comprehensive value-added model are underdeveloped.

Thus, this paper aims to contribute to the literature on corporate sustainability by updating the current debate on sustainable value by providing a clear and comprehensive conceptualization of the term of corporate sustainable value (CSV). It also proposes a framework for measuring corporate sustainable value and verifying its impact on financial performance. In particular, the first objective is to propose a functional definition for corporate sustainable value (CSV), based on a logical analysis by identifying some predicates of sufficiency, through the interconnection of the stakeholder theory that refers to the creation of a sustainable value for all implied parties and the positive association between corporate social performance and corporate environmental performance with financial performance. We acknowledge the need to link performance to sustainable value, the latter having its origin in the economic, social and environmental performance achieved by the company. The second objective of the paper is to establish a set of indicators that influence the corporate sustainable value, followed by the reduction of the number of component variables through the principal component analysis (PCA) using SPSS software. The final objective is to verify correlations between the variables identified, more precisely to determine the implications of CSV on companies' performance, through a multifactorial linear regression model, using Eviews software.

In the context of the transition towards sustainability, this article provides valuable insights for future research on the establishment of new methodologies for the complex measurement and monitoring of economic value at the firm level. Summarizing, the novelty of this study consists in proposing the conceptualization of the notion of corporate sustainable value (CSV), followed by the development of a model for determining the most relevant factors in the creation of CSV and then the analysis of CSV, by substantiating an evaluation framework that correlates financial data with non-financial ones, so that the implied parties are able to monitor and manage existing risks and opportunities.

The remaining part of the paper proceeds as follows: Section 2 describes the theoretical background of the term "sustainable value", referring to the approaches over time regarding the fundamental objective of companies in relation to value creation. It also addresses the issue of sustainable value in the context of corporate performance, concluding with a proposal for a conceptualization of the corporate sustainable value and the development of the factorial model as a framework for its evaluation. The research methodology is presented in section 3. The fourth section presents the findings of the

research. The discussion and final conclusions of the study on the impact of CSV factors on financial performance are outlined in Section 5 of the article.

2. Literature review

2.1. Approaches regarding the basic objective of companies, in terms of value creation

There have been significant shifts in approaches to the fundamental objectives of business in terms of value creation as major economic theories have evolved over the past few decades. In the 1970s, Milton Friedman argued that there is only one social responsibility of businesses – to use their resources and engage in activities aimed at increasing their profits, as long as they operate within the rules of the game (i.e., in a market characterized by free competition, without deception or fraud), thereby contributing to market efficiency and, consequently, to the overall well-being of society. However, the perception of a company's purpose has changed over time. Of course, Milton Friedman's viewpoint still holds true today, although he himself has nuanced his theory by stating that "I agree that corporate directors might have obligations to the general public that sometimes exceed their obligations to shareholders" and that "the responsibility [of a corporate director] is to run the company in accordance with the wishes of the shareholders, who will generally want to make as much money as possible, while complying with the basic rules of society, both those enshrined in law and those enshrined in ethical customs" (Carson, 2018). However, the new way of doing business has led to a shift from the traditional system – focused solely on profit generation and maximization of shareholder value – to a system that embraces a new approach, emphasizing the maximization of value for stakeholders, viewed as business partners. This stakeholder theory-based approach is increasingly regarded as a source of competitive advantage rather than merely a moral obligation (Laszlo, 2017, p. 119). Moreover, the principles of behavioral economics are being discussed, which define economic value in terms of value for the common good (i.e., "common good" or "shared value"), referring to that which is common and beneficial to all or most members of a community (Tirole, 2017). As such, the roles, responsibilities, and decision-making power of all stakeholders – shareholders, customers, employees, suppliers, local community, etc. – become essential to the creation of economic value for all members of a community.

Thus, economic value is a concept that generally refers to the benefit generated and attributed to a good or service after having evaluated it over a given period of time, expressed not in price but in quality. The concept of economic value is therefore different from that of price (Ciora, 2013, p. 20). The latter is the result of the interaction between supply and demand in a given market at a given moment, while value is determined by the opinion of buyers or sellers. In other words, value is defined by an individual's subjective assessment of the quality of a good or service, as established by, whereas price has an objective character. In the case of price, we approach it from a transactional perspective, while value should be approached from a non-transactional, purely positional perspective (Dinga, 2022).

Moreover, economic value refers to the potential/capacity of an economic system (firm) to generate a felt and perceived response by users of the system's outputs to disturbances experienced by the system (firm). According to Dinga's perspective (2022), this is a subjective advantage, where advantage is broadly understood as surplus effect relative to the effort associated with that effect. Companies must first offer value to users in order to obtain an advantage (benefit, added value) from them (in the form of increased sales, profits, loyalty, etc.). Thus, the corporate sustainable value refers to a positional advantage felt by the beneficiary (the user), and it is considered that it should be returned, either in whole or in part, to the agent who generated it, in the form of a high level of corporate performance.

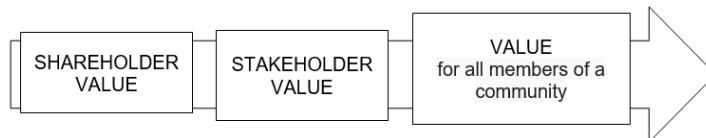


Figure 1. The purpose of companies according to various economic theories over time

Source: Authors' own creation

Moreover, the fundamental objective of a company reflects value in the context outlined above (schematized in Figure 1). In the direction of corporate sustainability, it is observed that all its aspects, whether in terms of time, space, or functionality, are directly related to the issue of satisfying the interests of all members of a community, who can simultaneously play the role of producer and consumer, producer and public opinion, investor and consumer, etc. In classical economic theory, these different human positions are seen as antagonistic in terms of the expectations associated with their respective roles (i.e., producers expect their wages to reflect the total effort involved in the production process, while consumers are willing to pay only for the utility of the good), but in a sustainable economy where companies are capable of generating economic entropic value, these expectations can be compensated by the pace at which low entropy is pumped from the environment of economic activity into the economic activity in question (Dinga, 2016, p. 16). More precisely, respecting the principle of minimal entropy production, the sustainability of economic (process) systems requires a lower consumption of low entropy (i.e., a higher degree of complexity).

2.2 The binomial Sustainable Value – Corporate performance

The existence of a link between the impacts of sustainable value on corporate performance has been recognized. First, the term performance is widely used in different fields, especially in the economic sphere. In the context of a sustainable and/or circular economy, aspects related to the concept of global corporate performance need to be considered, including financial, social and environmental performance.

Studies have highlighted the importance of achieving social performance at the company level, with Chen et al. (2017) identifying two main categories: "social capital" and "human capital," which managers should consider in their economic activities within the context of sustainability. Social capital is a company's ability to value the capital and

resources it relies on, aiming at improving the quality of life of individuals and protecting the surrounding environment, while human capital consists of ensuring the integrity and fairness of working conditions, employee inclusion, ensuring safety and health, continuous skills development, and enhancing employee engagement (Carter & Rogers, 2008).

Economic performance can be achieved through the efficient use of resources, where products consume less energy and materials (El-Khalil and Mezher, 2020) and focus on increasing sales and profitability. Several studies have shown a positive correlation between sales growth and sustainability (Sarkis et al., 2011). For example, economic performance as measured by return on assets (ROA), return on equity (ROE), and return on capital employed (ROCE), is improved by adopting sustainable practices. In addition, researchers and practitioners are increasingly focusing on value in measuring economic performance. Over time, a series of value measurement indicators have been developed and used, including economic value added (EVA), total shareholder return, market value added (MVA), and customer value added, among others.

Environmental performance focuses on reducing the use of natural resources, such as energy, raw materials, and water (Paulraj, Chen, and Blome, 2017). The measurement of environmental performance is based on indicators created for the monitoring of CO₂ emissions, the quality of wastewater discharged into sewage systems, the amount of waste generated, or the quantity of production of toxic and hazardous substances, which are increasingly being used by companies.

Therefore, the concept of overall corporate performance is promoted as a tool for measuring a company's impact on economic, social, and environmental aspects, with the ability to have an impact particularly on the owners of a company's assets. On the other hand, sustainable value must be viewed and evaluated from the perspective of non-asset owners. It implies the transformation of natural, human, and financial resources into something that meets the needs of others, customers, investors, employees, and the local community, referred to as users, with minimum energy consumption.

If we focus on the relationship between performance and sustainable value, we maintain that it has to be analyzed in both directions and that it is therefore a two-way relationship. Therefore, the process of evaluating a company involves forecasting its future potential and performance. In this sense, it can be said that sustainable value is the best tool for assessing corporate performance. Conversely, it can be affirmed that, from the perspective of the business environment, sustainable value is created when a company attains corporate performance, since achieving corporate performance implies the ability to generate a positive impact on the three dimensions (environment, social, and economic).

In other words, the implementation of sustainability practices in company management leads to corporate performance that is reflected in creating sustainable value. Thus, the outcomes of companies determine the overall impact on society, the economy, and the surrounding environment – a measurable impact through the lens of corporate sustainable value.

2.3 The conceptualization of Corporate Sustainable Value

This study proposes a new type of value: Corporate Sustainable Value, which is conceptually formalised below, based on a logical perspective, by identifying logical attributes, hereafter called sufficiency predicates.

Identifying sufficiency predicates is used to assign a specific definition to the analyzed value concept. The notation CSV is used to designate the concept of CSV and $M(\text{CSV})$ represents the set of sufficiency predicates of CSV.

The following logical sufficiency predicates for the concept of CSV are considered:

P1: is a quality of an economic system (company);

P2: is of the nature of a subjective and non-transactional advantage;

P3: derives from the economic, social, and environmental performance achieved by the company;

P4: adheres to the principle of low entropy consumption;

P5: is an effect generated by the company's ability to achieve and maintain sustainability over time.

Considering the above, corporate sustainable value (CSV) can be defined as follows: a quality of an economic system (company), of the nature of a subjective and non-transactional advantage, which derives from the overall corporate performance achieved by the company (and consequently experienced by all members of society (users), as a result of the efforts made to reduce the level of entropy (thus possessing a dynamic character over time), while also representing an effect generated by the company's ability to achieve and maintain sustainability over time.

From a formal standpoint, the following logical expression of sustainable value can be written as follows: $M(\text{CSV}) = \{P1, P2, P3, P4, P5\}$.

3. Methodology

The study aimed to identify specific indicators for evaluating corporate sustainable value (CSV). The analysis model focused on five dimensions, as described below in Table 1. The dimensions under which the key indicators were selected were established based on the four perspectives (financial, customer, internal processes, and learning and growth) of the Balanced Scorecard (BSC) methodology (a concept introduced by Kaplan and Norton in 1992). The choice to use this BSC methodology was made because it represents an integrated management tool that encompasses the three pillars of sustainability, based on stakeholder theory and explaining organizational performance in relation to their expectations (Hubbard, 2009). Furthermore, a list of potential variables from theoretical and empirical studies was compiled, based on which a series of financial and non-financial value measurement indicators were established, such as human capital performance, employee satisfaction, share prices, etc., along with sub-indicators of ESG scores according to the Refinitiv methodology (grouped into Environmental Scores, Social Scores, Governance Scores), with a fifth dimension being the performance generated by focusing on sustainability.

Table 1. Indicators proposed for analysis

No	Indicators	Formula / Calculation method
LEARNING AND GROWTH		
1.	Human capital performance	$\text{Human capital performance} = \frac{\frac{\text{Salary costs}_1 - \text{Salary costs}_0}{\text{Salary costs}_0}}{\frac{\text{CA}_1 - \text{CA}_0}{\text{CA}_0}} \quad (1)$
2.	Average number of training hours	„Average Training Hours” sub-indicator of the SOC_score Workforce ESG indicator
3.	Employee satisfaction	„Employee Satisfaction” sub-indicator of the SOC_score Workforce ESG
4.	Annual human capital productivity	$\text{Human capital productivity} = \frac{\text{Sales}}{\text{No. of employees}} \quad (2)$
INTERNAL PROCESSES		
5.	Innovation	The Forbes 2022 ranking has been used, available at: https://www.forbes.com/special-features/innovative-companies-list.html If the company is included in the ranking YES=1, if NO=0
6.	Value of intangible fixed assets	The value of intangible assets is determined by the proper valuation and recognition of the intangible assets of an entity in accordance with the applicable accounting standards.
7.	Digitalization	The Forbes 2022 ranking has been used, available at: https://www.forbes.com/top-digital-companies/list/ If the company is included in the ranking YES=1, if NO=0
8.	ROA	ROA is calculated by dividing net income by total assets and expressed as a percentage. The ROA formula is the following: $\text{ROA} = \frac{\text{Net income}}{\text{Total assets}} \times 100 \quad (3)$
9.	ROE	ROE is calculated by dividing net income by shareholders' equity and expressed as a percentage. The ROE formula is the following: $\text{ROE} = \frac{\text{Net income}}{\text{Shareholders' equity}} \times 100 \quad (4)$
10.	Brand image	The Forbes 2022 ranking has been used, available at: https://www.forbes.com/the-worlds-most-valuable-brands/#35d9fa4d119c If the company is included in the ranking YES=1, if NO=0
11.	Online penetration rate	The score of the companies evaluated (between 1 and 10) has been checked and obtained using the Page Rank algorithm developed by Google, available at: https://dnschecker.org/pagerank.php .
12.	Sales growth	$\text{Sales growth} = \frac{\text{Sales}_1 - \text{Sales}_0}{\text{Sales}_0} \times 100 \quad (5)$
FINANCIAL PERFORMANCE		
13.	Share price	This ratio measures the relationship between the current share price and earnings per share (EPS). Therefore, the formula is the following: $\text{PE} = \frac{\text{Price}}{\text{Earnings per share}} \quad (6)$
14.	EBITDA	EBITDA is calculated as follows: $\text{EBITDA} = \text{Net Income} + \text{Interest} + \text{Taxes} + \text{Depreciation} + \text{Amortization} \quad (7)$
15.	Net income	Net income is calculated as follows: $\text{Net income} = \text{Total income} - \text{Total expenses} \quad (8)$
16.	Enterprise value (EV)	The EV formula is the following: $\text{EV} = \text{Market capitalization} + \text{Total Debt} - \text{Cash} \quad (9)$
SUSTAINABILITY-DRIVEN PERFORMANCE		
17.	GOV_score	Indicator calculated using Refinitiv ESG score methodology
18.	ENV_score	Indicator calculated using Refinitiv ESG score methodology

No	Indicators	Formula / Calculation method
19.	SOC_score	Indicator calculated using Refinitiv ESG score methodology

Source: authors' processing.

There are a large number of factors or variables with different influences on CSV. Therefore, it was important to identify those factors/variables that play a significant determining role in optimizing its level. Thus, among the 19 different proposed indicators, we selected and chose only those that incorporated the greatest amount of common variability, grouped as a set of orthogonal factors (uncorrelated with each other).

To achieve the above objective, we performed a Principal Component Analysis (PCA) using IBM SPSS software (version 26) on the 50 companies listed in STOXX Europe 50 index, which represents a diverse range of economic sectors. The data are for the year 2022 and have been collected from the Refinitiv Eikon Thomson Reuters database.

The results obtained from the PCA were used for the proposed multiple linear regression model aimed at establishing the relationship between CSV and corporate performance. Eleven indicators (the components of the factors resulting from the PCA) were considered as independent variables (X), while the dependent variable (Y) related to profitability was EBITDA. We conducted a multiple linear regression analysis with Eviews 10 software, using the logarithmic value of the dependent variable (LogEBITDA) and of the independent variables (LogEV, LogFixed_Assets, LogHC_productivity, etc.) (to avoid problems of autocorrelation and nonlinearity) and assuming that each independent variable has a significant linear relationship with a company's financial performance.

3.1 CSV evaluation model: Description and Hypothesis

After removing five variables to improve correlation, the analysis produced a Kaiser-Meyer-Olkin (KMO) sampling adequacy value of 0.555 and a Bartlett's test of sphericity with an approximate Chi-square of 272.206 (df = 91, $p < 0.001$). These outcomes confirm that the dataset is suitable for factor analysis. A similar conclusion was supported by the communalities assessment, where all values exceeded 0.5, indicating the appropriateness of the test. To determine the number of factors to retain, the Eigenvalue criterion (>1) was applied. In this study, five factors met this condition, contributing to the structure of the latent variables. Collectively, these five components accounted for 71.466% of the total variance.

In order to establish the composition of the factors, we employed Varimax orthogonal rotation, which involves redistributing the variation of the variables within the factors to generate a new set of eigenvalues that are easier to interpret. Generally, an orthogonal rotation (rotating the axes by 45 degrees) assumes that the extracted factors are independent of one another, meaning they are not allowed to be correlated. Consequently, by varying the 14 variables within the factors, the Rotated Component Matrix (Figure 2) was generated, from which we observe that the first two variables (ROA and ROE) have significant loadings on the first factor but low loadings on the other factors. It should be noted that we eliminated variables with complex loadings, that is, those with

values greater than 0.4 on more than one factor at a time. These were: EBITDA, Net Income, and Innovation.

Rotated Component Matrix^a

	Component				
	1	2	3	4	5
ROA	.931				
ROE	.928			.124	
ENV_score		.869			
GOV_score		.767	.153	-.216	
Valoarea_imobilizărilor_n ecorporale	-.106	.196	.843		
EV	.347		.641		.349
Digitalizare	.194	-.293	.620	-.368	
EBITDA		.488	.600	.527	
Productivitatea_anuală_a capitalului_uman		-.186		.772	
Creșterea_vânzărilor	.117	-.200	-.115	.653	-.112
Venit_net	.428	.456	.384	.530	
Inovatie		-.347	.232	-.423	.275
Imagine_de_marcă	-.138	.115	.114		.866
PE	.297	-.157			.725

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Figure 2. Solution after factor rotation
Source: Generated by SPSS Software

To summarize, factor analysis was applied to fourteen indicators related to Corporate Sustainable Value (CSV) using SPSS software. This process yielded a final structure consisting of five orthogonal components that captured the majority of shared variance associated with CSV. These factors were identified as follows: Factor 1 (ROA, ROE), Factor 2 (ENV_score, GOV_score), Factor 3 (intangible asset value, enterprise value, digitalization), Factor 4 (annual productivity of human capital, sales growth), and Factor 5 (brand image, price-to-earnings ratio).

The newly constructed composite indicator is denoted as CSV_t, which is mathematically expressed as a function of the five components: CSV_t = (F1, F2, F3, F4, F5).

Based on the research results, in which we demonstrated that CSV is a broad concept determined by a series of factors, we consider it unhelpful to study CSV as a whole before identifying which of its determinants are the most important. In order to statistically examine the relationship between CSV and a company's performance, specifically the strength and direction of the linear relationship between them, this work carried out the construction of multifactorial linear regressions where the predictor variable is CSV and the outcome is financial performance. In particular, the dependent variable is EBITDA and the independent variable is CSV, measured by the CSV factors, namely: ROA, ROE, ENV_score, GOV_score, value of intangible assets, EV, digitalization, annual human capital productivity, sales growth, brand image, and PE.

In this sense, the hypothesis tested will be the following:

Hypothesis 1 (H1). There is a significant relationship between CSV and EBITDA.

3.2. Generating the regression model

In order to investigate the relationship between CSV and EBITDA it was necessary to construct the multifactorial linear regression as is presented below:

$$\text{EBITDA} = \beta_0 + \beta_1 \text{ROA} + \beta_2 \text{ROE} + \beta_3 \text{ENV_score} + \beta_4 \text{GOV_score} + \beta_5 \text{Value of intangible assets} + \beta_6 \text{EV} + \beta_7 \text{Digitalization} + \beta_8 \text{Annual human capital productivity} + \beta_9 \text{Sales growth} + \beta_{10} \text{Brand image} + \beta_{11} \text{PE} \quad (10)$$

where $\beta_0, \beta_1, \dots, \beta_{11}$ are the presumed parameters.

Before conducting the multifactorial linear regression, the data have been subject to verification of specific preliminary conditions. The independence of errors (residuals) was present, as measured by a Durbin–Watson statistic of 2.099, indicating that there is no correlation between the residuals. The Ramsey Reset test results, showed us a F-statistic equal to 0.520 and the corresponding p-value equal to 0.475. Therefore, there is no evidence of rejection of the null hypothesis of linearity. For testing the homoscedasticity, we performed the Breusch-Pagan-Godfrey test, where F-statistic was equal to 1.184 and the corresponding p-value 0.330, affirming that there is no evidence to reject null hypothesis of homoscedasticity. In order to verify that the independent variables are not strongly correlated with each other, which would make it difficult to determine the individual effect of each variable on the dependent variable, we performed a two-step analysis: the inspection of the correlation coefficients and the inspection of tolerance/VIF values (Variance Inflation Factor). After examining the correlations among the model's variables, it was found that the majority of independent variable pairs showed weak correlations, with the exception of ROA and ROE, which had a high correlation coefficient of 0.803. Despite this, all variables exhibited Variance Inflation Factor (VIF) values below the threshold of 10, indicating no significant multicollinearity concerns. Consequently, both ROA and ROE were retained in the regression model. These findings support the conclusion that collinearity is not an issue within the model. To assess whether the residuals from the regression followed a normal distribution, the Jarque-Bera test was conducted, supported by histogram analysis. Given the skewness ($S = 0.133231$) and kurtosis ($K = 2.787646$) values, which fall within acceptable ranges, and considering that multiple regression models are generally robust to mild departures from normality, no data transformation was deemed necessary and the normality assumption was considered satisfied.

4. Results and discussions

4.1. Determining Whether the Multiple Regression Model Is a Good Fit for the Data

On the analyzed model, as observed in Figure 3, the adjusted R^2 value was 72.83%, suggesting a significant impact of the independent variables on the dependent variable. Approximately 72% of the volatility in EBITDA for the companies included in the analysis can be explained by the independent factors considered in the predictive utility model.

Dependent Variable: LEBITDA
Method: Least Squares
Date: 06/06/24 Time: 15:04
Sample: 1 50
Included observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BRAND_IMAGE	0.426679	0.259581	1.643722	0.1085
DIGITALISATION	0.129709	0.375727	0.345221	0.7318
ENV_SCORE	0.019760	0.008793	2.247122	0.0305
LEV	0.154109	0.146159	1.054389	0.2984
LFIXED_ASSETS	0.193624	0.072006	2.688986	0.0106
GOV_SCORE	0.021943	0.009902	2.216031	0.0328
LHC_PRODUCTIVITY	0.248230	0.127679	1.944169	0.0593
PE	-0.002926	0.003504	-0.834827	0.4090
ROA	-0.059840	0.027558	-2.171438	0.0362
ROE	0.027190	0.013866	1.960871	0.0573
SALES_GROWTH	1.404177	0.508945	2.758998	0.0089
C	10.38188	3.491923	2.973113	0.0051
R-squared	0.728330		Mean dependent var	22.96851
Adjusted R-squared	0.649688		S.D. dependent var	1.039436
S.E. of regression	0.615212		Akaike info criterion	2.071864
Sum squared resid	14.38247		Schwarz criterion	2.530749
Log likelihood	-39.79660		Hannan-Quinn criter	2.246610
F-statistic	9.261409		Durbin-Watson stat	2.099996
Prob(F-statistic)	0.000000			

Figure 3. Summary of the regression model

Source: Generated by Eviews Software

4.2 Statistical Significance of the Model and the Null Hypothesis Test

The regression output generated in EViews was evaluated using the F-test statistic to assess the overall significance of the model. The F-test helps determine whether the model provides a reliable prediction of the dependent variable. According to the 5% significance threshold applied in this analysis, if the p-value associated with the F-test is below 0.05, it indicates that at least one of the explanatory variables significantly contributes to the model, leading to the rejection of the null hypothesis. Conversely, if the p-value exceeds 0.05, the evidence is insufficient to reject the null, implying that the model lacks statistical significance, but this does not confirm the null hypothesis as true.

In this study, *the null hypothesis proposed that no meaningful relationship exists between EBITDA and the selected independent variables*. The F-statistic was calculated to be 9.261409, and the corresponding p-value was less than 0.05 ($p = 0.00$), confirming that the overall regression model is statistically significant. As a result, the null hypothesis was partially rejected, indicating a statistically meaningful association between EBITDA and the independent predictors used in the model: Env_score, Fixed_Assets, Gov_Score, Hc_Productivity, ROA, ROE, and Sales_Growth.

4.3 Interpreting and Displaying the Regression Model Coefficients

The regression output, including coefficients and standard errors, is displayed in Figure 3. In the estimated model, the independent variables PE and ROA exhibited a

negative relationship with EBITDA, the dependent variable, meaning that they are not important for the financial performance metric. In contrast, the remaining predictors showed positive associations with EBITDA. Among the independent variables, ENV_SCORE, FIXED_ASSETS, GOV_SCORE, HC_PRODUCTIVITY, ROA, ROE, and SALES_GROWTH were found to be statistically significant, as their p-values were below the 0.05 threshold, indicating their effectiveness in predicting the dependent variable. On the other hand, BRAND_IMAGE, DIGITALISATION, EV, and PE did not show statistical significance, as their p-values exceeded 0.05, suggesting that these variables do not have a meaningful influence on EBITDA in the context of this model.

The negative relationship between PE and EBITDA suggests that companies with higher market valuations (i.e., higher PE ratios) tend to have lower EBITDA. This could be due to high growth expectations. Companies such as Adidas AG, Adyen NV with high PE ratios might prioritize future growth over immediate profitability. As a result, they may reinvest profits in expansion, R&D, or other long-term investments, which can suppress EBITDA in the short term.

On the other hand, the negative relationship between ROA and EBITDA can be explained by referring to industry-specific factors. The STOXX Europe 50 index includes companies from a wide range of industries. In some sectors, companies with a high PE ratio or a high ROA may have a business model that doesn't prioritize a high level of EBITDA in the short term. For example, companies in high-growth or technology sectors often invest heavily in future growth (e.g., R&D) and may therefore have a lower EBITDA despite high asset utilization or market valuations.

In fact, the positive and statistically relevant effect of environmental performance, asset management, government relations, human capital productivity, financial management, and sales growth on EBITDA value means that they are useful predictors of financial performance in the context of our analysis of the STOXX Europe 50 index companies. In other words, the result highlights that these factors are crucial in predicting a company's operational success, suggesting that companies with strong performance in these areas are likely to generate better operational profits, as measured by EBITDA.

Environmental performance has become an increasingly important issue for companies over the past few years (Elkington, 1994; Russo and Fouts, 1997; Al-Tuwaijri et.al., 2004). A positive relationship between ENV_SCORE and EBITDA suggests that companies with stronger environmental performance (i.e., those that follow sustainable practices, comply with environmental regulations, or operate in an eco-friendly manner) may be able to benefit from greater operational efficiency. A higher ENV_SCORE could indicate cost savings (e.g., through energy efficiency, waste reduction) or a more favorable reputation, which can lead to higher revenues and operating profitability (EBITDA). Additionally, sustainable practices may help avoid environmental penalties, improve relationships with customers, or result in more favorable regulatory treatment, all of which can have a positive impact on financial performance.

Fixed assets typically refer to long-term investments such as property, machinery, or equipment that a company uses in its business operations. A positive effect of fixed assets on EBITDA suggests that these assets are being used effectively for profit generation. Companies that have invested heavily in fixed assets are likely to have a robust

infrastructure or capacity to support production. This could translate into higher operational output and increased earnings. For example, manufacturing companies (such as Siemens AG, Airbus SE, BASF, Royal Dutch Shell or Volkswagen Group, all components of STOXX Europe 50 index) with substantial fixed assets may see a direct link between their capital investments and their ability to produce goods efficiently, leading to higher EBITDA.

Government score is likely to reflect a company's ability to comply with regulatory standards or its relationship with government entities (e.g., through subsidies, favorable policies, or government contracts). A higher GOV_SCORE could suggest that companies with strong governmental ties or favorable regulatory standing are able to operate more smoothly, avoid legal or regulatory penalties, and benefit from government incentives. Such advantages, by allowing companies to focus more on their core operations rather than dealing with legal issues or regulatory hurdles, could reduce operating costs and contribute positively to EBITDA.

Human capital productivity refers to how effectively a company uses its workforce to generate value. A positive relationship between HC_PRODUCTIVITY and EBITDA suggests that companies with more productive workforces are better able to convert labour into operating profit. Companies with higher HC_PRODUCTIVITY are likely to enjoy greater operational efficiency, meaning they can generate more revenue per employee while controlling costs. Efficient use of human capital (through better skills, innovation, or effective management) leads to higher output and, consequently, higher profitability (EBITDA).

Return on equity (ROE) is a measure of financial performance that shows how effectively a company uses its shareholders' equity to generate profits. A positive relationship between ROE and EBITDA suggests that companies with higher ROE tend to perform better operationally. A strong ROE often indicates capital efficiency, which can correlate with strong operating performance and profitability. Companies that achieve high ROE may be better at managing their assets and costs, allowing them to generate higher EBITDA from their core operations. High ROE could also suggest a profitable and stable business model, which directly influences operational profit margins.

Sales growth is a direct indicator of increasing revenues. A positive relationship between SALES_GROWTH and EBITDA suggests that as sales increase, so does the company's ability to generate profit from its operations. As a company's sales grow, it typically benefits from economies of scale, more efficient production processes, or an increase in market demand. This directly boosts EBITDA, as the company is able to generate more earnings while potentially managing its fixed costs more effectively. Growing sales indicate expanding market share or higher consumer demand, both of which contribute to better financial performance.

5. Conclusions

Motivated by the leading sustainability-performance literature, the current study is methodologically aligned through its use of regression, multidimensional constructs, and non-financial indicators. However, it is also innovative in combining PCA and CSV-specific factors, offering a more structured, empirical evaluation model for large European firms. This makes it both complementary and distinct from existing works.

More specifically, our study uses multifactorial linear regression to analyze the influence of sustainability drivers on financial performance. Similar studies, as Oprean-Stan et al. (2020) and Arduini et al. (2022) employ multivariate regression, incorporating both financial (e.g., ROA, Tobin's Q) and ESG indicators. Oprean-Stan et al. (2020) demonstrated that poor ESG management negatively affects corporate growth and reputation, supporting the relevance of ESG factors as explanatory variables in performance modeling. Arduini et al. (2022) found that environmental and governance dimensions of ESG had a positive and statistically significant impact on firm value, while the social dimension was less conclusive. In another notable application of multivariate regression, Van Thuong and Singh (2023) analyzed the implementation of the Balanced Scorecard (BSC) framework in Vietnamese enterprises. The study demonstrated a strong relationship between the use of BSC and improved enterprise performance, highlighting that regression results supported both financial and non-financial components of performance as essential for sustainable development. By incorporating strategic alignment, internal processes, learning and customer satisfaction into a regression based evaluation framework, the BSC study achieved a higher explanatory power in predicting enterprise performance compared to single dimension models. Kumari et al. (2023) article adopted multiple linear regression to examine the influence of HR analytics on employee performance in Indian firms. Their model explained 29% of the variance in employee performance, identifying employee engagement, satisfaction and training as significant predictors. This relatively low R^2 suggests a moderate model fit, emphasizing the complexity of human behavior and the possible omission of unmeasured variables. In the study by Mumtaz et al. (2018), multiple linear regression was applied to evaluate the impact of Green Supply Chain Management (GSCM) practices on organizational performance in Pakistan's industrial sector. The model identified significant relationships between GSCM dimensions (internal/external practices, investment recovery, eco-design) and performance outcomes (environmental pollution, operational cost). Notably, while reductions in pollution and costs were observed, organizational flexibility did not show a statistically significant improvement. The regression model was well-suited for testing hypothesized relationships, although the study's generalizability may be limited by regional and sector-specific characteristics.

Another common thread of our study and the existing literature is the recognition that traditional financial metrics are insufficient to explain corporate value, admitting therefore that non-financial sustainability indicators are increasingly relevant. More precisely, our model includes environmental performance, governance, and human capital productivity, which are aligned with ESG and Triple Bottom Line (TBL) principles. Our model includes environmental performance, governance, and human capital productivity, which are aligned with ESG and Triple Bottom Line (TBL) principles. Similarly, Miljenović (2018) introduces Sustainable Value Added (SVA) based on TBL. Unlike purely financial measures, SVA integrates environmental, social and financial dimensions derived from Corporate Social Responsibility (CSR) and Triple Bottom Line (TBL) reporting, and the study empirically validated the sensitivity and robustness of this model using regression techniques. Arduini et al. (2022) show that environmental and governance dimensions of ESG correlate with firm value. McWilliams et al. (2006) emphasize CSR as a strategic

resource under the resource-based theory, arguing that non-financial indicators can yield competitive advantage. Rather than treating CSR as a cost center or purely reputational tool, the authors argue for its integration as a source of sustainable competitive advantage, particularly when it is strategically aligned with firm specific resources and capabilities. Their conceptual model, grounded in economic theory, supports the idea that firms can “create and capture value” when CSR activities are rare, inimitable, and organized to exploit internal strengths. While the article is primarily theoretical, it encourages future empirical validation through multiple regression analysis that incorporates firm heterogeneity, intangible assets and strategic fit. This complements the quantitative approaches used in the previously discussed studies, especially those that incorporate non-financial indicators (e.g., ESG factors or Balanced Scorecard dimensions), to measure the real impact of CSR on performance outcomes. Also Herciu and Ogorean (2018) embrace multidimensionality, incorporating productivity, profitability, effectiveness, and sustainability to assess firm competitiveness, recognizing that single-variable models are insufficient for explaining corporate performance; instead, the authors promote holistic frameworks, equally surprising the similarity in approaches.

The key difference between the current study and others is related to corporate sustainable value (CSV) conceptualization. While our paper proposes CSV as a distinct, measurable construct, building a five-factor structure (e.g., asset management, government relations), Miljenović (2018) uses SVA, but it aggregates CSR-based performance more generally. Kuosmanen T. and Kuosmanen N. (2009) critique the SV model, which we avoid by applying empirically driven PCA and regression. The aforementioned authors argued that SV’s reliance on flawed opportunity cost estimators and unrealistic assumptions leads to poor empirical validity. The authors recommend adopting econometric models with sound statistical foundations instead of rigid deterministic metrics. Their critique is especially relevant for researchers considering regression models in sustainability contexts, where data limitations and multidimensionality pose major challenges.

Another notable difference is related to the sector and geographic focus of the paper. Our study is focused on large European firms (STOXX Europe 50), while Mumtaz et al. (2018), Kumari et al. (2023), Anggraini et al. (2020), and Van Thuong & Singh (2023) focus on Asian or emerging markets, with sector-specific contexts (e.g., industrial, HR, supply chains). Our findings may be relevant to developed, multi-sector European corporations, limiting cross-context comparability but enhancing regional specificity.

The use of PCA for model construction enhances dimensionality reduction and addresses multicollinearity, improving model interpretability. Unlike our approach, others (e.g. Arduini et al. (2022), Miljenović (2018)) use direct variable entry into regression models or rely on predefined ESG scores.

In conclusion, considering the studies that address frameworks for sustainable value creation at company level across different industries, the goal of the current study was to provide a definition for the concept of „corporate sustainable value”, followed by the development of a corporate sustainable value analysis model, which can be used by researchers and practitioners who want to adapt their processes and strategies in order to survive and develop under the conditions of the new economy based on the transition

towards sustainability. In this regard, we followed a three-step analysis: 1. Establishing a system of indicators for measuring sustainable value at the corporate level; 2. Selecting the most significant and relevant indicators; and 3. Creating the corporate sustainable value analysis model. Empirically, the present study is was conducted over the 50 companies listed in STOXX Europe 50 index, for the year 2022.

In summary, the research proposes a set of financial and non-financial indicators for measuring the corporate sustainable value. In order to identify the most significant and relevant indicators, we selected only those that incorporated the greatest amount of common variability, grouped as a set of orthogonal factors, which we subsequently used in developing a model for the analysis and evaluation of the corporate sustainable value. With this objective in mind, we employed the principal component analysis (PCA) method, applied to the 50 companies comprising the STOXX Europe 50 index – using SPSS software. As a solution, we consider that companies should strive to maximize the following five determinants of CSV: F1 (ROA, ROE), F2 (ENV_score, GOV_score), F3 (Value of intangible assets, EV, Digitalization), F4 (Annual human capital productivity), and F5 (Brand image, PE).

Finally, the study presents an approach based on the idea that there is a direct and significantly positive link between sustainable value and performance, as demonstrated by testing a multiple linear regression model using the determinants of corporate sustainable value and financial performance, represented by the EBITDA indicator. The article has discussed how CSV, through its determinants, affects a company's financial performance (i.e., EBITDA). The findings from the regression analysis suggest that a majority of the correlations between the principal component-based indicators and the financial performance metric (EBITDA) are statistically significant. This implies that the key drivers of Corporate Sustainable Value (CSV), as identified through PCA, are positively and strongly associated with firm performance among companies listed in the STOXX Europe 50 index. As a result, the research hypothesis H1 receives partial support, confirming a significant positive link between EBITDA and several explanatory variables, including environmental effectiveness, asset utilization, governance practices, productivity of human capital, financial efficiency, and revenue growth.

Nonetheless, the study is not without its limitations. Certain independent variables were found to be statistically insignificant, which could be attributed to the relatively narrow scope of the dataset—focusing solely on firms included in the STOXX 50 index. This limited sample size may reduce the robustness and external validity of the conclusions. Consequently, the results should be interpreted with caution when applied to broader populations. Future studies are encouraged to expand the sample size and incorporate additional variables to enhance the reliability and generalizability of these findings.

The challenge for organizations is to adapt their processes and strategies in order to survive and develop under the conditions of the new economy based on the transition towards sustainability. Analyzing performance by creating and measuring corporate sustainable value can be considered a new niche in the approach to private finance in this context marked by profound changes. In this sense, we believe that future research efforts will be focused on the establishment of new methodologies for the complex measurement

and monitoring of economic value at the firm level (which, as we have demonstrated, is a concept much broader than price) under the conditions of a sustainable economy.

6. References

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