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# Linking of Financial Data with Non-Financial Information on CSR of Companies Listed on the Warsaw Stock Exchange

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***Abstract:***

***Purpose:*** *Reporting on CSR activities has become the essence of reporting for modern business entities. In this regard, particular attention is paid to public interest companies. Therefore, the following paper aims to answer the question of whether there are differences in the linguistic structure of the studied CSR reports in three selected industry indices on the Warsaw Stock Exchange (WSE) in Poland, i.e. WIG-energy index, WIG-fuel index, WIG-mining index and their relationship with the performance of selected companies.*
***Approach/Methodology/Design:*** *The study was conducted on a purposely selected sample of companies between 2013 and 2018. A total of 138 CSR reports and 138 annual separate financial statements prepared in accordance with IAS/IFRS were collected. The study was carried out based on a panel regression model.*
***Findings:*** *It was found that CSR reports contained similar average percentages of parts of speech such as nouns and adjectives. When linking the economic performance of companies, expressed with selected indices, to the information on the implementation of CSR concepts, it was revealed that the results are more likely to describe business performance when it is satisfactory.*
***Practical Implications:*** *The article indicates an important issue related to the attempt to answer the questions whether the description of the companies' activities is related to the financial data. This issue is extremely important from the point of view of an external recipient who uses the financial statements.*
***Originality/Value:*** *The results of the reaserch and theoretical considerations contained in the article complement the existing research in accounting. Previously, such studies were not carried out.*

***Keywords:*** *CSR, non-financial reporting, non-financial disclosures.*

***JEL classification:*** *M40, M41, M42.*

***Paper Type:*** *Research study.*

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## 1. Introduction

Attempts to evaluate environmental disclosures were recorded as early as the 1970s (AAA, 1971; 1972; 1973; 1974; 1975; 1978; AICPA 1973; 1976). Following that period, this research area was abandoned by scholars who readdressed the issue in the late 20th century. The return to assessing environmental disclosures thus falls within broad contemporary research on business reporting that includes financial and non-financial reporting. Currently, no research is conducted in this respect in Poland, especially in public interest companies listed in stock indices, WIG-energy, WIG-fuel and WIG-mining. Few studies conducted in Poland were based on the concepts of disclosure research, but they lack the tools to verify the hypotheses they set out. This may be an approach that should be developed.

Therefore, this article uses modern IT tools to confirm the research hypotheses posed. The first novelty of the paper is the use of tools (computer software) to analyse the text of the reports of selected companies and determine their relationship with business performance using econometric modelling. The second one consists in determining the relationship of CSR activities with the financial performance of companies from selected indices listed on the Warsaw Stock Exchange. The article may be considered an advancement over previous research in that it contributes to a broader understanding of the possible sources of variation in research findings linking CSR to business performance in the selected industries of energy, fuels and mining.

The aim of the article, i.e., an attempt to answer the two research questions: *Are there differences in the linguistic structure of the studied CSR reports in selected indices of companies listed on the Warsaw Stock Exchange?* and *Are there relationships between financial and non-financial information in the reports of the listed companies?* constitutes an answer to an important problem of corporate reporting, which concerns the assessment of the consistency of financial and non-financial reporting. It should be noted that such a research approach is related to an attempt to improve the reporting information, i.e. to meet the paramount accounting principles established in the conceptual framework for International Financial Reporting Standards (IFRS) and International Accounting Standards (IAS) (The Conceptual Framework for Financial Reporting, 2010).

For the research objective thus formulated, the following research hypotheses were defined:

*Hypothesis 1: There are significant differences in the linguistic structure of the analysed CSR reports in Poland.*

*Hypothesis 2: There is a relationship between business performance and a description of business activity in reporting of Corporate Social Responsibility (CSR).*

## 2. Literature Review

Studies on the link between non-financial information and financial data have been conducted by many researchers using different research methods. Researchers note that one of the most significant limitations associated with examining non-financial disclosures and financial data of companies is the difficulty of measuring the extent of voluntary disclosure (Healy and Palepu, 2001). The literature on the subject includes various approaches to measuring the extent of disclosure. One of such methods is an examination using qualitative tools. Among others, it consists in analysing the text through word count and sentence count, as well as determining its difficulty using readability indices such as FOG, FGL or expert methods, surveys, etc. According to Beattie, McInnes, and Fearnley (2004) and Beattie (2014), various approaches applied to measure disclosures can be categorised as subjective assessments or objective studies (Urquiza *et al.*, 2009). In contrast, the results of these evaluations do not provide satisfactory results.

For that reason, the approach to the study of disclosures in company reporting by scholars has changed, and an effort to develop methods that combine two types of variables that affect the evaluation of disclosures has been made. The assessment of disclosures on corporate social responsibility was based on two groups of variables: qualitative variables and quantitative variables. It should be noted that such an approach is not free from error, and during evaluation or testing, these methods provide divergent results. The most commonly used quantitative and qualitative variables are listed in Table 1.

***Table 1.*** *The list of the most frequently used quantitative and qualitative variables in selected studies from the period of 2008-2017*

| Year | Author(s) | Title of the article | Quantitative variables | Qualitative variables |
|---|---|---|---|---|
| 2017 | Jamal A. Nazari, Karel Hrazdil, Fereshteh Mahmoudian | Assessing social and environmental performance through narrative complexity in CSR reports | INST, SIZE, ROA, CURRAT, CAPSP, PNEW, LEV, WRDS, SENT, TSIZE | Readability indices: FRE, FGL, FOG, CLI, SMOG, AR, AVE |
| 2017 | Wiengarten, Frank; Lo, Chris K.; Lam, Jessie Y. | How does sustainability leadership affect firm performance? The choices associated with appointing a chief officer of corporate social responsibility | ROA | Gender Professional experience |
| 2016 | Verbeeten, Frank H. M.; Gamerschlag, Ramin; Möller, Klaus | Are CSR disclosures relevant for investors? Empirical evidence from Germany | Share price, return per share RET | Readability indices |
| 2015 | Venkatraman, Sitalakshmi; Nayak, Raveendranath | Corporate sustainability: An IS approach for integrating triple bottom line elements | Top dividends for shareholders, business profitability, | Not applicable |

| | | | | |
|---|---|---|---|---|
| | Ravi | | return on average capital employed, meeting tax obligations, debts/equity ratio | |
| 2014 | Wang, Chung-Jen | Do ethical and sustainable practices matter? Effects of corporate citizenship on business performance in the hospitality industry | ROI, profit growth | Not applicable |
| 2013 | Torugsa, Nuttaneeya Ann; O'Donohue, Wayne; Hecker, Rob | Proactive CSR: An empirical analysis of the role of its economic, social and environmental dimensions on the association between capabilities and performance | ROA, net profits to sales, liquidity | Not applicable |
| 2012 | Quazi, Ali; Richardson, Alice | Sources of variation in linking corporate social responsibility and financial performance | ROA, ROE, ROI, market return, market valuation, stock returns, share price, EPS, survey measures | Not applicable |
| 2011 | Hahn, Tobias; Figge, Frank | Beyond the bounded instrumentality in current corporate sustainability research: Toward an inclusive notion of profitability | Capital efficiency, market efficiency, total sales | Not applicable |
| 2010 | Nguyen, Dung K.; Slater, Stanley F. | Hitting the sustainability sweet spot: having it all | ROA, revenue growth rate, share value appreciation rate | Not applicable |
| 2009 | Chung-Hua Shen, Yuan Chang | Ambition versus conscience, does corporate social responsibility pay off? The application of matching methods | ROA, ROE, PTI, RGM, EPS | Not applicable |
| 2008 | Clarkson P.M., Li Y., Richardson G.D., Vasvari F.P.. | Revisiting the relationship between environmental performance and environmental disclosure: An empirical analysis | EP, FIN, TOBIN, VOLAT, ROA, LEV, SIZE, NEW, CAPIN | GRI, EPI |
| 2004 | Al-Tuwaijri, T.E., Christensen, K.E., Hughes | The relations among environmental disclosure, environmental performance, and economic performance: a simultaneous equations approach | SIZE, MARGIN, GROWTH, ENVDISC, | ECONPERF, ENVPERF, ENVDISCL, PREDISC, |

***Source:*** *Own study.*

Table 1 presents publications that attempt to assess the disclosure of information on CSR and its possible correlation with the company performance, or solely assess the

financial results of companies focused on the implementation of CSR. The results of studies conducted by Nazari *et al.* (2017) confirm that there are significant and negative relations between the variables under study, namely readability indices and company performance. It was determined that business units with poorer performance were more likely to be characterised by less clear information on CSR.

Additionally, it was confirmed that poor financial performance determined lower CSR disclosures in the companies under study. An important finding was that companies, which renewed assets provided clearer reports on CSR. It was also indicated that ROA, CURRAT, CAPSP and LEV were not linked with the CSR report readability. A different approach was used in the study on CSR conducted by Wiengarten *et al.* (2017), where the effect of employing a CSR director on the company's financial performance was investigated. It was found that hiring a CSR director influenced financial performance benefits under certain conditions. It was also concluded that the most significant financial benefits were obtained when the position of a CSR director was held by a woman with professional experience in the scope of CSR.

In contrast, a study performed by Verbeeten *et al.* (2016) answered the question of whether narrative CSR disclosures are related to the value of a company. Accordingly, 130 companies that conducted business in Germany over a four year period were examined. The research revealed that information on CSR varies depending on the CSR category, in that social disclosure is positively related to the value of a company, but environmental disclosure is not. Subsequently, studies by Venkatraman *et al.* (2015) investigated the relationships between three areas, i.e. environmental performance, social performance and financial performance, in 85 different business entities in Australia.

It was found that there are weak but positive links between the areas under study. In the case of the hospitality industry, it was determined whether economic responsibility, ethical responsibility and legal responsibility affect financial performance. The variables ROI and profit growth were applied to identify the relationship. As a result, it was concluded that the analysed areas of responsibility have little impact on the financial performance of the hospitality industry (Wang, 2014).

A study conducted by Torugs *et al.* (2013) used a different approach, in which the role of the economic, social and environmental dimensions of proactive CSR on the association between three specific capabilities shared vision, stakeholder management and strategic proactivity and financial performance in small and medium enterprises (SMEs) was identified. In the study, data from 171 Australian small and medium sized enterprises in the machinery and equipment manufacturing sector was used and the positive impact of implementing CSR on the financial performance of the assessed companies was determined. With regards to the assessed companies, it was found out that the implementation of CSR activities

improved their financial performance and had a significant positive impact on sustainable and longterm financial success.

In turn, very interesting results were presented by Quazi *et al.* (2012), who made an attempt to identify possible sources of variability in the results of previous studies that linked assumptions of CSR to the performance of a company. In the study, a metaanalysis of 51 previous studies, included in Orlitzky *et al.* (2003), was conducted, to ensure consistency with the results of the research performed so far. The study results were surprising. The association between CSR activities and financial performance was found to be most influenced by sample size and research methodology, and it is these two factors that most significantly affect the research findings and conclusions. Subsequent studies found that most current approaches in corporate sustainability research are incompatible with the concept of sustainability.

The current approaches are rooted in a limited notion of instrumentality that establishes a systematic a priori preference for economic organisational performance over environmental and social aspects (Hahn and Figge, 2011). Nguyen and Slater (2010) conducted an interesting study, in which they compared the financial performance of recognised sustainability leaders with that of a carefully selected group of competitors using secondary data. On average, sustainability leaders were found to perform better than their competitors.

However, this is only true in two out of three cases. The clear implication of this analysis was that a commitment to sustainability does not hurt financial performance and may actually improve it. Another study by Shen and Chang (2009) examined the impact of CSR on the financial performance of companies operating in Taiwan and found that companies conducting CSR activities have significantly higher ROA, ROE, and PTI. At the same time, introducing CSR does not impair RGM and EPS.

The lack of consistency between the environmental performance of business entities and the level of environmental disclosures, which is present in research findings, was noted by Clarkson *et al.* (2008). Based on a study of 191 US based businesses, a positive relationship was found between environmental performance and the level of discretionary environmental disclosures. Importantly, the result is consistent with the predictions of the economics disclosure theory but inconsistent with the negative association predicted by socio-political theories. Nevertheless, we show that socio-political theories explain patterns in the data ("legitimisation") that cannot be explained by economics disclosure theories.

Another interesting study was performed by Al-Tuwaijri *et al.* (2004) with the main objective to conduct an integrated analysis of the interrelationship between environmental disclosures, environmental performance, and economic performance. The study found that good environmental performance is significantly associated with good economic performance, as well as more extensive measurable environmental disclosures.

Based on a brief review of CSR researches, one may conclude that there exists a divergence of results between studies by researchers around the world in terms of determining CSR disclosures within a single country, within a single legal regulation, political system, or even the same variables. The reason behind this divergence is that there is no specific method to examine the extent of CSR disclosures and their relationship to company financial performance. Therefore, it is worthwhile to analyse and attempt to identify research methodologies for CSR disclosures and their links to company performance, particularly for public interest entities, to improve the quality of corporate reporting.

## 3. Materials and Methods

### 3.1 Research Sample

Since the late 1990s, a strong increase in the number of indices has been observed (benchmarks), the primary objective of which was to describe the economic situation among companies that met certain CSR requirements. The need to create that type of index was due to a large response to the emergence of the idea of socially responsible business in the process of popularising the idea (Wiśniewski, 2010). However, apart from indices that are used to group companies which are clearly socially responsible, there are other types of indices on the stock exchange that are divided according to industries in which companies implement the concept of Social Responsibility of Business.

Therefore, an attempt was made to examine the public interest companies listed on the Warsaw Stock Exchange in Poland (WSE), in the period from 2013 to 2018, grouped according to three industry indices i.e.: WIG-energy index (11 companies), WIG-fuel index (7 companies), WIG-mining index (5 companies). In each year, a total of 23 companies were assessed, and the sample represented 100% of all companies grouped according to each surveyed index (Table 2).

***Table 2.*** *A list of assessed companies grouped according to individual indices, during the period from 2013 to 2018.*

| Index | Instrument | ISIN code | Share in portfolio (%) |
|---|---|---|---|
| WIG-energy | PGE | PLPGER000010 | 49.745 |
| | TAURONPE | PLTAURN00011 | 20.901 |
| | ENEA | PLENEA000013 | 11.348 |
| | PEP | PLPLSEP00013 | 7.193 |
| | CEZ | CZ0005112300 | 4.618 |
| | MLSYSTEM | PLMLSTM00015 | 1.882 |
| | KOGENER | PLKGNRC00015 | 1.352 |
| | PHOTON | NL0010391108 | 1.273 |
| | ZEPAK | PLZEPAK00012 | 1.112 |
| | INTERAOLT | LT0000128621 | 0.516 |
| | BEDZIN | PLECBDZ00013 | 0.060 |
| WIG-fuels | PKNORLEN | PLPKN0000018 | 54.734 |
| | PGNIG | PLPGNIG00014 | 29.692 |

| | | | |
|---|---|---|---|
| | LOTOS | PLLOTOS00025 | 12.392 |
| | MOL | HU0000153937 | 2.412 |
| | UNIMLOT | PLUNMOT00013 | 0.423 |
| | SERINUS | JE00BF4N9R98 | 0.174 |
| | SKOTAN | PLSKTAN00010 | 0.173 |
| WIG-mining | KGHM | PLKGHM000017 | 93.665 |
| | JSW | PLJSW0000015 | 5.275 |
| | BOGDANKA | PLLWBGD00016 | 0.890 |
| | PRAIRIE | AU000000PDZ2 | 0.145 |
| | COALENERG | LU0646112838 | 0.025 |

***Source:*** *GPW Benchmark.*

The choice of the indices is deliberate and they represent industries that have a high impact on the natural environment and the surroundings in which they operate. Energy, fuel and mining industries are of strategic importance in the fulfillment of all obligations related to, i.a., environmental protection, as those industries ensure the basic good of civilisation which is access to electricity, heat and gas. The above mentioned industries are also a major source of water, air or soil pollution and they contribute to adverse climate change.

Therefore, such companies must combine, in a balanced way, the efficiency of their operations with the ecological and ethical aspects of their functioning in the social space (Jacyno *et al.*, 2013). The assessed industries, i.e.: fuel, energy and mining, are perceived as leading ones in the field of corporate philanthropy in Poland. According to a report "Corporate Foundations in Poland" (NGO portal, 2021), business entities from the aforementioned sector, right after the financial sector, most frequently establish foundations and are represented in rankings and indices in large numbers (e.g., Ranking of Responsible Companies and WIG-ESG Index, formerly known as Respect Index).

Another criterion to select the sample was the publishing of information on the implementation of Corporate Social Responsibility (CSR), in the form of CSR reports or integrated reports, in the period from 2013 to 2018, and the preparation of consolidated financial statements in accordance with international legal regulations, i.e. International Accounting Standards (IAS) and International Financial Reporting Standards (IFRS). All companies reported their activities in the filed of Corporate Social Responsibility in accordance with the Global Reporting Initiative (GRI Standard, 2021) and a necessary condition was that the report had to be prepared in Polish.

Information on CSR was collected directly from the websites of the companies listed in the stock exchange or as a result of interviews conducted with employees of the investor relations department and obtaining documentation from them. In turn, the financial data of the examined public interest companies were obtained from the database of Emerging Markets Information Service (EMIS). A total of 138 CSR

implementation reports and 138 consolidated annual financial statements were analysed (Table 3).

***Table 3.*** *A number of assessed companies, CSR reports and annual consolidated financial statements broken down by industry and year*

| Specification | | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | Total |
|---|---|---|---|---|---|---|---|---|
| WIG-energy | Number of assessed companies | 11 | 11 | 11 | 11 | 11 | 11 | 66 |
| | Number of companies listed on WSE | 11 | 11 | 11 | 11 | 11 | 11 | 66 |
| | Percentage of assessed companies | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| | Number of CSR reports | 11 | 11 | 11 | 11 | 11 | 11 | 66 |
| | Number of financial statements | 11 | 11 | 11 | 11 | 11 | 11 | 66 |
| WIG-fuels | Number of assessed companies | 7 | 7 | 7 | 7 | 7 | 7 | 42 |
| | Number of companies listed on WSE | 7 | 7 | 7 | 7 | 7 | 7 | 42 |
| | Percentage of assessed companies | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| | Number of CSR reports | 7 | 7 | 7 | 7 | 7 | 7 | 42 |
| | Number of financial statements | 7 | 7 | 7 | 7 | 7 | 7 | 42 |
| WIG-mining | Number of assessed companies | 5 | 5 | 5 | 5 | 5 | 5 | 30 |
| | Number of companies listed on WSE | 5 | 5 | 5 | 5 | 5 | 5 | 30 |
| | Percentage of assessed companies | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| | Number of CSR reports | 5 | 5 | 5 | 5 | 5 | 5 | 30 |
| Total number of assessed companies | | | | | | | | 138 |
| Total number of CSR reports | | | | | | | | 138 |
| Total number of analysed separate financial statements | | | | | | | | 138 |

***Source:*** *Own study.*

The selected sample was to answer two research questions, that is: *Are there differences in the linguistic structure in the studied CSR reports of selected indices of companies listed on the Warsaw Stock Exchange?* and *Are there relationships between financial and non-financial information in the reports of the listed companies?*

Following the two above mentioned research objectives, the following two research hypotheses were identified:

*Hypothesis 1: There are significant differences in the linguistic structure of the analysed CSR reports in Poland.*

*Hypothesis 2: There is a relationship between business performance and a description of business activity in reporting of Corporate Social Responsibility (CSR).*

### 3.2 Research Methods

The research methods were selected in a way that the research objectives could be met and the two research hypotheses could be verified. To verify the first research hypothesis which reads: *There are significant differences in the linguistic structure of the analysed CSR reports in Poland (H1)*, a research tool for statistical analysis of text was used - Jasnopis software (jasnopis.pl). JASNOPIS is a computer tool, with the use of which it is possible to measure whether a certain text is easy to read and understand.

More difficult parts of text are selected and corrections are suggested. With the use of the programme, it is possible to analyse a message posted on a website or a selfwritten text. The tool analyses the linguistic form of a certain text, it calculates and presents the degree of difficulty of the text on a scale from 1 to 7. "1" indicates easy texts, understandable for the Polish reader. "7", on the other hand, denotes the most difficult ones, specialised texts, the understanding of which usually requires special preparation.

The programme helps to analyse the language used in the text, i.e., it calculates the average length of sentences and paragraphs, determines the number of difficult words (based on the list of most often used words and subjective probability), calculates the percentage of nouns and verbs, calculates the percentage of abstract nouns, checks the length of the so called chains of genitive cases ("assessment of the correctness of the performance of an action ..."), calculates the percentage of participles, and checks the position of individual words in various sections of the text. The tool marks potentially difficult words, sentences that are too long, paragraphs that are more difficult than the average paragraph of the text (jasnopis.pl).

The programmer is adapted to the conditions of the Polish language. Following the possibilities of the software, the areas of statistical analysis of text in the CSR reports on the assessed companies that are listed on the stock exchange are presented in Table 4. Basic statistical areas of the analysed text are presented for three main areas as follows: 1. text in numbers, 2. average length of the text, 3. text in percentages. Each of those areas was divided into subareas.

***Table 4.*** *Areas of statistical analysis of the text in CSR reports on the assessed companies that are listed on the stock exchange*

| Area | | Description |
|---|---|---|
| Area 1: text in numbers | Number of sentences | Calculated based on the number of punctuation marks and marks that indicate the end of a paragraph. Punctuation marks that indicate the end of a sentence are: full stops (except those after abbreviations or numbers), question marks, and exclamation marks. A sentence is also considered to be any part of text that begins with a new paragraph or starts after a punctuation mark that suggests the end of a sentence and ends with an end of paragraph mark. |
| | Number of words | A word is any sequence of letters or numbers not separated by a space or a punctuation mark (a hyphen is also considered to be a punctuation mark). |
| | Number of difficult words | Difficult words are considered to be those (basic, base) that consist of four syllables or more, and which are not commonly known words, i.e., one of the 5,000 words most frequently used in Polish texts, they are also not words of a high, the so-called subjective probability. |
| Area 2: average length of units of text | Average length of words | A number obtained from dividing the number of all syllables in a given text by the number of all words in the text. The greater the average length of words, the more difficult the text is to understand. |
| Area 3: text in percentages | Percentage of difficult adjectives | Calculated analogously to the way in which the percentage of difficult nouns is estimated. |
| | Percentage of difficult verbs | Calculated analogously to the way in which the percentage of difficult nouns is estimated. |
| | Percentage of difficult nouns | Calculated as the ratio of detected occurrences of difficult nouns in the text to the number of occurrences of all words times 100%. |
| | Percentage of difficult words | Calculated as the number of words that are considered to be difficult divided by the total number of words in the text times 100%. |
| | Percentage of adjectives | Calculated as the number of different types of adjectives detected in the text divided by the number of total words times 100%. |
| | Percentage of nouns | Calculated as the number of different types of nouns detected in the text divided by the number of total words times 100%. Nouns are considered to be the so-called gerunds, i.e. verbal nouns such as reading, spitting, noun names of features such as innocence, transparency, and words such as sick in a clear noun function (e.g. there were two sick lying in the room). |
| | Percentage of verbs | Calculated as the number of different types of verbs detected in the text divided by the number of total words times 100%. Adjectival and adverbial participles are not considered to be types of verbs. |

***Source:*** *Jasnopis.pl.*

The second research hypothesis, which reads: *There is a relationship between business performance and a description of business activity in reporting of Corporate Social Responsibility (CSR) (H2)*, was verified with the use of a model of panel linear regression.

In the initial phase of the research, 75 quantitative variables that were directly related to the financial performance of the assessed companies were selected. The variables were derived from various annual consolidated financial statements that were prepared in accordance with IFRS/IAS. Additionally, the variables that were derived from financial statements were supplemented with variables derived from the calculation of indicators of economic and financial analysis. However, during the process of constructing and selecting variables for the study, certain variables were eliminated in accordance with the assumptions of building an econometric model, adopting the principles of elimination of variables, and taking into account the capacity of information and economic content of a quantitative variable. As a result, five quantitative variables were selected (Table 5).

***Table 5.*** *Quantitative variables used in the study*

| Variable | Description |
|---|---|
| ROA (return on assets) | The ratio of a company's net income to the value of its assets. It shows the ability of a certain company to generate profit and the effectiveness of managing its assets. The higher the ROA, the better the financial situation of the company. |
| Book value | A ratio that assesses the total value of a company if it liquidated its assets and paid off all its liabilities. Book value is also the net worth of a business entity. It is calculated as follows: Assets - Liabilities - Priority shares - Intangible assets |
| Short-term debt | The ratio includes any financial obligations incurred by a company that must be settled within 1 year. It is calculated as follows: Short-term borrowings + Derivative financial instruments + Other short-term financial liabilities |
| Debt-to-capital ratio | Assesses the value of debt that a business entity uses to finance its equity. It is calculated as follows: Debt / Equity |
| Dynamics of net sales revenues | Illustrates the increase and decrease in net sales compared to the previous fiscal year. It is calculated as follows: Net sales revenue for current year / Net sales revenue for previous year |

***Source:*** *Own study.*

A model of panel linear regression was formulated based on the selected variables. The weighted least squares method was used (formula 1).

$$Statistical\ analysis\ of\ the\ text_{it} = \beta_0 + \beta_1\, ROA_{it} + \beta_2\, book\ value_{it} + \beta_3\, short-term\ debt_{it} + \beta_4\, debt-to-capita\ ratio_{it} + \beta_5\, dynamics\ of\ net\ sales\ revenues_{it} + \varepsilon_{it} \quad (1)$$

Based on formula 1 above, certain models to be used in the study were constructed (Table 6).

***Table 6.*** *Models used in the study.*

| Areas | Models | Qualitative variables | Quantitative variables |
|---|---|---|---|
| Area 1 | Model 1 | Number of sentences | Those variables are: ROA, book value, short-term debt, debt-to-capital ratio, net sales revenue growth. |
| | Model 2 | Number of words | |
| | Model 3 | Number of difficult words | |
| Area 2 | Model 4 | Average length of words | |

| | | | |
|---|---|---|---|
| | | [syllables] | |
| Area 3 | Model 5 | Percentage of difficult adjectives | |
| | Model 6 | Percentage of difficult verbs | |
| | Model 7 | Percentage of difficult nouns | |
| | Model 8 | Percentage of difficult words | |
| | Model 9 | Percentage of adjectives | |
| | Model 10 | Percentage of nouns | |
| | Model 11 | Percentage of verbs | |

***Source:*** *Own study.*

## 4. Results

### 4.1 Assessment of the Linguistic Structure of CSR Reports on the Examined Companies, in the Period from 2013 to 2018: Verification of the First Research Hypothesis

#### *4.1.1 Descriptive statistics*

The first research hypothesis which reads as follows: *There are significant differences in the linguistic structure of the analysed CSR reports in Poland (H1)*, was verified by means of statistical text analysis which was conducted in three selected areas of text analysis i.e., area 1: text in numbers, area 2: average length of text, and area 3: text in percentages. Descriptive statistics for selected areas of text analysis for reserch sample, for the period from 2013 to 2018, are summarised in Table 7.

***Table 7.*** *Descriptive statistics for selected areas of text analysis for reaserch sample for the period from 2013 to 2018*

| Areas of text analysis | | Average | Standard error | Median | Standard deviation | Max. |
|---|---|---|---|---|---|---|
| Area 1 | Number of sentences | 1959 | 81 | 1980 | 396 | 2516 |
| | Number of words | 22908 | 2137 | 21369 | 10471 | 36996 |
| | Number of difficult words | 849 | 83 | 729 | 407 | 1612 |
| Area 2 | Average length of words [syllables] | 3 | 0 | 3 | 0 | 3 |
| Area 3 | Percentage of difficult adjectives | 9.42% | 1.54% | 5.50% | 7.55% | 27.00% |
| | Percentage of difficult verbs | 1% | 0% | 1% | 0% | 1.00% |
| | Percentage of difficult nouns | 6% | 0.09% | 6.00% | 0.42% | 7.00% |
| | Percentage of difficult words | 3.42% | 0.16% | 3.50% | 0.78% | 5.00% |
| | Percentage of adjectives | 14.67% | 1.04% | 17.00% | 5.07% | 18.00% |
| | Percentage of nouns | 47.67% | 1.24% | 48.00% | 6.08% | 61.00% |
| | Percentage of verbs | 5.71% | 0.11% | 6.00% | 0.55% | 7.00% |

***Source:*** *Own study*.

In the case of all companies, area one of the text analysis, the average number of sentences used in CSR reports was 1,959 sentences per report, with an average word

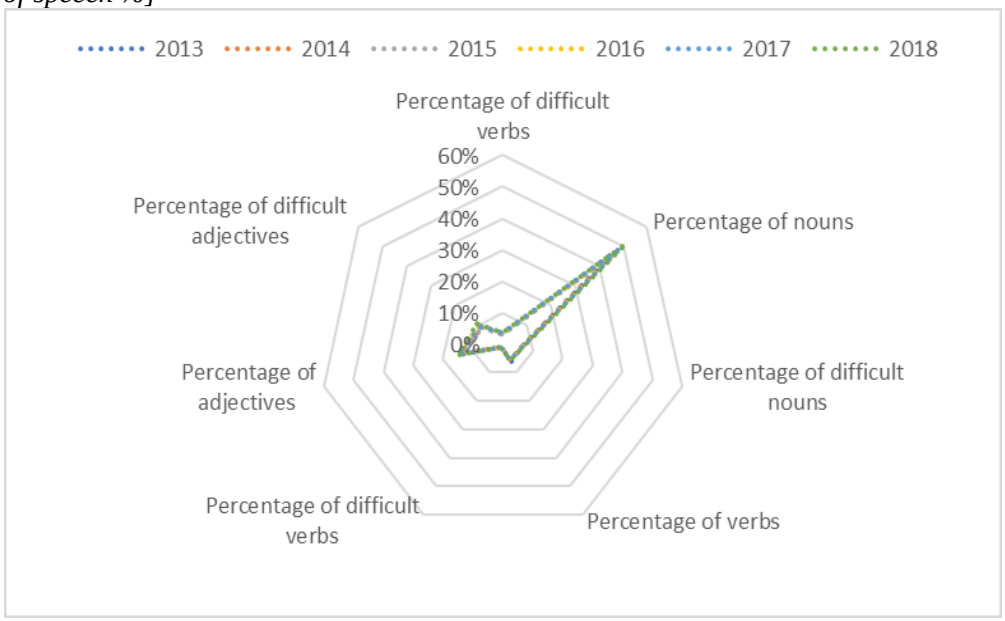
count of 22,908. In the reports the number of difficult words in the total number of used words was 849, on average. In turn, the average length of words, expressed in syllables, was three syllables.

With regards to the analysis of text area in percentages, the largest percentage of words used in the text was nouns (approximately 47.65%, maximum 61%) and adjectives (approximately 14.67%, maximum 18%). The percentage of difficult adjectives in the text was significant (approximately 9.42%, maximum 27%) and the percentage of difficult verbs was insignificant - only 1%.

### *4.1.2 Percentage of parts of speech in the CSR reports*

Figure 1 shows a summary of selected parts of speech (in percentages) for the reserch sample. The use and application of all available language forms in the examined CSR reports of selected companies from the 2013-2017 period are similar, i.e. the line depicting the percentage of difficult adjectives, percentage of difficult verbs, percentage of nouns, percentage of difficult words and percentage of verbs, percentage of adjectives and percentage of nouns, overlap. As such, one may conclude that in relation to the entire sample, all companies used the given parts of speech and described non-financial CSR information to a similar extent. All examined companies reported CSR information using Polish at a similar complexity level.

***Figure 1.*** *Percentage of parts of speech for reserch sample from 2013 to 2018 [part of speech %]*




***Source:*** *Own study*.

Nouns had the highest share in the full CSR report texts, with the average in the period studied amounting to 46% in 2013 and as high as 51% in 2018. Adjectives were another significant part of speech. The percentage of adjectives in the CSR reports was 14% of all parts of speech in the first year and 15% in the last year studied. Difficult verbs were the least important part of speech, accounting for 1% of all parts of speech, and this proportion was characteristic of the period as a whole.

### 4.2 Linking the Performance of Companies in Selected Stock Indices to the Presentation of Non-Financial CSR Information in the 2013-2018 Period: Verification of the Second Research Hypothesis

The second research hypothesis: *There is a relationship between business performance and a description of business activity in reporting of Corporate Social Responsibility (CSR) (H2),* was verified using an econometric model. Table 8 shows descriptive statistics for selected quantitative variables.

***Table 8.*** *Descriptive statistics for quantitative variables*

| Variables | Average | Standard error | Median | Standard deviation | Min. | Max. |
|---|---|---|---|---|---|---|
| ROA | 0.01 | 0.02 | 0.04 | 0.09 | (0.38) | 0.07 |
| Book value | 15.76 | 3.52 | 9.01 | 17.26 | 1.15 | 46.76 |
| Short-term debt | 0.92 | 0.26 | 0.39 | 1.26 | 0.02 | 4.57 |
| Debt-to-capital ratio | 0.29 | 0.04 | 0.24 | 0.20 | 0.02 | 0.70 |
| Dynamics of net sales revenues | (0.03) | 0.02 | (0.03) | 0.08 | (0.23) | 0.12 |

***Note:*** *(...) negative values.*
***Source:*** *Own research.*

The mean for the ROA variable was 0.01, with this variable reaching a maximum of 0.07 with a standard deviation of 0.09. In the case of the book value, the variable's mean value was 15.76, with a maximum value of 46.76. The standard deviation for this variable was 17.26. In the case of short-term debt, the average value was 0.92 and the maximum value was 4.57. The debt-to-capital ratio averaged 0.29. The mean value of the last variable was (0.03).Table 9 shows Pearson correlations for selected variables. It was examined whether the variables are statistically significantly related to each other. Pearson's correlation indicates that the explanatory variables are not related to each other.

In contrast, Table 10, summarise the results of the panel linear regression. For the all companies, the first area of statistical analysis of the text determined that with the text in terms of numbers – or more precisely, the number of sentences – this variable was associated with four explanatory variables, i.e. ROA, book value, short-term debt and net sales revenue dynamics. This means that the number of sentences in the

CSR reports studied was influenced by the ratio of the company's net profit to the value of its assets. The number of sentences showed the relationship between the company's ability to generate profits and the efficiency of asset management. This implied a positive relationship at the high confidence level of 1%, among others.

The second variable affecting the number of sentences is book value. The companies showed a positive relationship between total business entity value and the number of sentences. This means that variables whose content describes the size of a company's assets, its value, or its ability to generate profits, are positively correlated with the number of sentences. This may mean that companies enjoying a stable asset situation are more willing to describe this fact using a higher number of sentences. Conversely, in the case of variables labelled as current liabilities, one may conclude that the association with the number of sentences in the CSR reports studied is negative. This may mean that companies did not describe this disclosure extensively or the number of sentences used has been limited. Another variable negatively related to the number of sentences is the dynamics of net sales revenue. This variable illustrates the increase and decrease in net sales compared to the previous fiscal year. In the case of the second model from the first area explaining the changing word count, it was determined that three variables affected the number of sentences. These variables were ROA, book value, and net sales revenue dynamics. Similarly, these variables also affected the number of sentences in the first model.

***Table 9.*** *Pearson correlation*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | | | | | | | | | | | | | | | | | |
| 2 | 0.74 | 1 | | | | | | | | | | | | | | | | |
| 3 | 0.80 | 0.97 | 1 | | | | | | | | | | | | | | | |
| 4 | -0.18 | -0.16 | -0.16 | 1 | | | | | | | | | | | | | | |
| 5 | 0.67 | 0.96 | 0.90 | -0.17 | 1 | | | | | | | | | | | | | |
| 6 | 0.59 | 0.92 | 0.81 | -0.05 | 0.93 | 1 | | | | | | | | | | | | |
| 7 | 0.31 | -0.05 | 0.16 | -0.03 | -0.13 | -0.36 | 1 | | | | | | | | | | | |
| 8 | -0.29 | -0.73 | -0.58 | 0.15 | -0.72 | -0.82 | 0.60 | 1 | | | | | | | | | | |
| 9 | -0.01 | -0.33 | -0.19 | 0.14 | -0.33 | -0.51 | 0.54 | 0.63 | 1 | | | | | | | | | |
| 10 | 0.13 | 0.32 | 0.30 | 0.02 | 0.35 | 0.23 | -0.21 | -0.42 | 0.01 | 1 | | | | | | | | |
| 11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 1 | | | | | | | |
| 12 | 0.20 | 0.55 | 0.43 | 0.09 | 0.51 | 0.65 | -0.56 | -0.77 | -0.41 | 0.59 | 0.01 | 1 | | | | | | |
| 13 | -0.23 | -0.65 | -0.52 | 0.10 | -0.59 | -0.73 | 0.57 | 0.89 | 0.55 | -0.49 | 0.01 | -0.95 | 1 | | | | | |
| 14 | 0.42 | 0.26 | 0.26 | -0.13 | 0.32 | 0.27 | 0.06 | -0.09 | -0.04 | -0.06 | 0.01 | -0.06 | 0.02 | 1 | | | | |
| 15 | 0.69 | 0.59 | 0.76 | -0.20 | 0.45 | 0.25 | 0.68 | -0.07 | 0.19 | 0.13 | 0.01 | -0.07 | -0.01 | 0.18 | 1 | | | |
| 16 | 0.26 | 0.06 | 0.22 | 0.01 | 0.01 | -0.12 | 0.47 | 0.30 | 0.32 | 0.01 | 0.01 | -0.34 | 0.33 | 0.00 | 0.51 | 1 | | |
| 17 | -0.49 | -0.75 | -0.63 | 0.29 | -0.79 | -0.85 | 0.40 | 0.76 | 0.53 | -0.23 | 0.01 | -0.62 | 0.72 | -0.47 | -0.10 | 0.29 | 1 | |
| 18 | 0.17 | 0.09 | 0.13 | 0.22 | 0.05 | 0.13 | -0.03 | 0.03 | 0.18 | -0.01 | 0.01 | 0.16 | -0.08 | -0.32 | 0.01 | 0.29 | 0.13 | 1 |

***Note:*** *1 - Number of sentences, 2 - Number of words, 3 - Number of difficult words, 4 - Average word length [syllables], 5 - Average sentence length [words], 6 - Average paragraph length [words], 7 - Percentage of difficult words, 8 - Percentage of nouns, 9 - Percentage of difficult nouns, 10 - Percentage of verbs, 11 - Percentage of difficult verbs, 12 - Percentage of adjectives, 13 - Percentage of difficult adjectives, 14 - ROA, 15 - Book value, 16 - Short-term debt, 17 - Debt to capital ratio, 18 - Net sales revenues growth.*
***Source:*** *Own study.*

***Table 10.*** *Linking the performance of companies (reaserch sample) to the presentation of non-financial CSR information in the 2013-2018 period*

| Variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 | Model 9 | Model 10 | Model 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area 1 | | | Area 2 | Area 3 | | | | | | |
| Const | 0.314*** | 7.254** | 6.177*** | (0.245)** | 7.752 | 0.670 | 8.139*** | 10.787*** | 4.840*** | 8.327*** | 10.728*** |
| ROA | 0.005*** | 0.215* | (0.060)*** | (0.001) | 2.088 | (0.020) | (0.129)*** | 0.180*** | (0.070)*** | (0.123)*** | 0.149*** |
| Book value | 0.008** | 0.729*** | (0.028) | (0.231)*** | (5.795) | (2.177)*** | (0.113)*** | 0.110** | 0.098** | 0.053 | 0.029 |
| Short-term debt | (0.050)*** | (0.821) | 0.241*** | (0.001) | (0.020)*** | (0.001) | 1.039*** | 1.067*** | 0.871*** | 0.637*** | 0.624*** |
| Debt-to-capital ratio | (0.006) | (0.168) | 0.125 | (0.001) | (0.034)*** | 0.001 | 0.030 | 0.067 | (0.119) | 0.052 | 0.082 |
| Dynamics of net sales revenues | (0.091)*** | 4.406** | (0.189) | (2.0631)*** | (2.0023)*** | (1.657)*** | (1.238)*** | (1.327)*** | (1.550)*** | (1.406)*** | (1.025)*** |
| **Adjusted R-squared** | **0.74** | **0.75** | **0.72** | **0.84** | **0.81** | **0.79** | **0.87** | **0.88** | **0.79** | **0.78** | **0.81** |

***Note:*** **** significant at 1% level, ** significant at 5% level, * significant at 10% level, (...) negative values.*
***Source:*** *Own study.*

One may conclude that the company's ability to earn profits and the efficiency of managing its assets, as well as its value and the income dynamics building the previous two variables, are positively related to the explained variable: the number of sentences. This may mean that companies are eager to describe in words the companies' aptitude to generate economic benefits for companies. The final, third model in the first area explained the associations of the "number of difficult words" variable with the performance of the units studied. The number of difficult words was construed as the number of words with more than four syllables. Such words can generally be deemed long and not commonly present in the average person's vocabulary.

The model included 2 variables that significantly affected the number of difficult words. These variables were ROA – negatively related, as well as short-term debt – positively related. The use of difficult words in the case of ROA means that difficult words were used to describe the company's ability to earn profits or its management efficiency in cases where the ROA was low, whereas if it was high, the number of difficult words was ra-ther low. In contrast, the relationship with the number of difficult words was positive when describing short-term debt.

This may indicate that companies with significant short-term liabilities are more likely to use words that are difficult for the average person and generally absent from the basic vocabulary of a typical Pole to describe these circumstances as well as their possible negative impact on the companies' functioning. As such, one may conclude that the higher the level of short-term debt, the higher the number of difficult words used.

On the other hand, a single econometric model was formulated in area two of statistical text analysis concerning the study of the average length of text units. The explained variable was the variable indicating the average word length. In this case,

a negative relationship was found between the explained variable and book value and net sales revenue dynamics. The implication is that the book value of the company affected the average word length – i.e. the net worth of a business entity is negatively related to the average word length, which is the result of dividing the number of all syllables that a text consists of by the number of all words in the text.

A negative relationship is observed between average word length and book value, which means that the longer the words the lower the book value. In the third area of text analysis – text as a percentage – seven models were created and numbered from five to eleven. For model number five, which explained the variable percentage of difficult adjectives in the examined CSR report texts, it was determined that the short-term debt, debt-to-capital ratio, and net sales revenue dynamics varia-bles showed a negative relationship with the explained variable. The results indicate that companies with short-term debt, construed as the company's ability to settle its own obligations within twelve months, show a negative relationship in this regard. This may mean that the more difficult a company's ability to settle its shortterm obligations is, the lower the percentage of difficult adjectives used to describe it.

A similar tendency occurs when a company is required to describe the amount of debt relative to equity. The higher the debt financing the equity, the lower the percentage of difficult adjectives that describe these circumstances. The last variable showing a negative relationship was labelled the ratio of the dynamics of net sales revenue to the percentage of difficult adjectives in the text. This means that an increase or decrease in net sales compared to the previous year has a negative effect on the percentage use of difficult adjectives. It can be concluded that the greater the decrease in dynamics, the fewer difficult adjectives are used. In the case of the sixth model – which explains the relation-ship between the percentage of difficult verbs variable and the other variables – a negative relationship was shown for the book value and net sales dynamics variables. These variables show a strong negative relationship, which may mean that fewer difficult verbs are used to describe the net worth of a business entity when the ratio decreases.

On the other hand, when there is a change in the value of net sales ratio compared to previous years, there is also a change in the percentage of difficult verbs in the text – as in the case of book value. In model seven, where the explained variable is the percentage of difficult nouns, four explanatory variables were identified; these variables show a relationship between the explained variable. These variables are ROA, book value, sales revenue dynamics – negative relationship, as well as short-term debt – positive relationship. That is, the ROA variable indicating the company's ability to earn profits and its management efficiency is negatively related to the percentage of difficult nouns in the text. This suggests that the lower the company's ability to earn profits, the lower the percentage of difficult nouns.

A similar situation applies to the net worth of the business entity as well as the net sales revenue dynamics. Both of these variables were described using a lower

percentage of difficult adjectives. On the other hand, a positive relationship was observed for the variable that determines the company's ability to settle its short-term liabilities. The greater the ability to settle liabilities, the greater the percentage of difficult nouns in the text. Model eight identifies a positive relationship between the following variables: percentage of difficult words and ROA, book value, short-term debt, and a negative relationship between sales rev-enue dynamics. This means that the percentage of difficult words is positively related to the company's ability to generate profits and its net worth, including the ability to pay short-term liabilities.

In contrast, a negative relationship was found in cases where there was a change in the net sales dynamics compared to the previous year. In such a case, the percentage of difficult words may decrease. The ninth model points to the positive relationships between the percentage of adjectives and book value and short-term debt. Additionally, a negative relationship is evident between the percentage of adjectives in the text and ROA and sales revenue dynamics. This means that the percentage of adjectives in the examined reports of all companies was positively influenced by the given company's net worth and its ability to settle short-term liabilities. In contrast, a negative relationship was discovered in the case of the com-pany's ability to generate profits and the change in net sales dynamics. Companies did not describe such circumstances using a significant number of adjectives.

The second to last model describing the companies indicated that the percentage of nouns in the text is negatively affected by ROA and sales dynamics. In contrast, short-term debt has a positive impact. This means that the percentage of nouns depends on the company's ability to generate profits – the better its financial condition, the higher the percentage of nouns used. Additionally, the percentage of nouns is affected by the company's ability to settle its short-term liabilities. The percentage of nouns is negatively affected by the change in net sales dynamics compared to the previous year. In model eleven, the variable "percentage of verbs in the text studied" shows a positive relationship with ROA and short-term debt and a negative relationship with net sales revenue dynamics.

This means that the percentage of verbs used in CSR reports may increase when the company shows a greater ability to earn profits and the efficiency of its resource management increases. This also applies to the company's ability to pay its short-term liabilities within twelve months. A negative association between the variables is evident in the relationship of the percentage of verbs used to net sales dynamics changes. This may mean that companies use a smaller percentage of verbs when the explanatory variable negatively affects the explained variable.

## 5. Conclusions

The study was conducted to answer the research questions on: *Are there differences in the linguistic structure of the studied CSR reports in selected indices of companies*

*listed on the Warsaw Stock Exchange?* and *Are there relationships between financial and non-financial information in the reports of the listed companies?*

This problem is still unsolved and many researchers are trying to determine what tools available in science and practice could help answer these nagging questions. The answers to these questions are important contributions to the development of reporting, including corporate reporting. This is related to improving the presentation of reporting information not only on the financial results of the company's activities but also on the environmental impact and combating of the negative effects of these activities. Examples of such research include studies on improving financial reporting disclosures in farms (Węgrzyńska et al., 2018, Węgrzyńska, 2021) or pharmaceutical companies (Dyczkowska, 2019). A disadvantage of this research is the lack of combination of qualitative and quantitative variables, which, in the opinion of the authors, is the basis for evaluation.

Therefore, for research objectives formulated in this way, two research hypotheses were defined:

*Hypothesis 1: There are significant differences in the linguistic structure of the analysed CSR reports in Poland.*
*Hypothesis 2: There is a relationship between business performance and a description of business activity in reporting of Corporate Social Responsibility (CSR).*

The research made it possible to analyse and subsequently evaluate the linguistic structure in the studied Corporate Social Responsibility reports, measured in the following three areas of statistical text analysis: text in numbers, average length of text units, text in percentages, and determination of whether there is a relationship between financial performance and description of CSR activities, measured using econometric modeling. All of the tools and methods used were original contributions to science.

Hypothesis one was not confirmed in its entirety, as it was found that reports had similar values across the three areas examined, i.e. the percentage of nouns in each of the years examined was the most salient part of speech. Subsequently, this relationship was confirmed in the other parts of speech. Furthermore, it was found that the ROA variable had a positive relationship with the number of sentences only in one case while in the case of other variables, it was a negative relationship in each of the stock indexes. This may mean that the more unfavourable a company's net income to asset ratio is, the less willing companies are to describe it. In addition, it was found that in most cases, there is a positive association between the book value of a business entity and the explanatory variables. This was evident in reserch sample, where only a negative relationship existed in the area of percentage association with verbs and difficult nouns.

Research showed that there is a relationship between qualitative and quantitative variables. This relationship can be positive or negative. The research confirms that companies are more willing to describe favourable areas of the company's operations, while they are less enthusiastic about describing difficulties they encounter while conducting business activities or worse financial results. The results of the analysis conducted strengthen the theoretical arguments in favour of using obfuscation as a tool to hide poor performance of selected companies. These results contribute to both value relevance and opportunistic perspectives (Merkl-Davies and Brennan, 2007) with respect to predicting the relationship between firm performance and corporate disclosure (Nazari *et al*, 2017).

This paper makes an important contribution to the research on CSR disclosure and its relationship with the financial performance of companies listed on the Warsaw Stock Exchange (Poland). To the author's knowledge, similar studies have not been conducted by researchers. This study also has several practical implications. The approach used in this study may allow stakeholders to conduct preliminary assessments of a company's actual CSR performance without further investigation of actual, hard to find CSR performance data. The reserch results can also help policymakers support ongoing initiatives promoting the use of plain language in public disclosure documents.

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