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Original article

Having a better environmental performance translates into a better financial performance: A study of the European food industry

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ABSTRACT

This study examined the relationship between Environmental Performance (EP) and Financial Performance (FP) in the European food industry. The food industry is essential for population sustenance, but the rising population and the consequent increase in food production demand have implications for climate change. The aim of this study was to determine if businesses that consume water more efficiently and have lower CO_2 emission intensities might experience improved financial performance. Financial and environmental data were sourced from external databases and company reports, and both quantile regression and correlation analyses were conducted. The results reveal that various sectors within the food industry exhibit different linkages between Environmental Performance and Financial Performance. Furthermore, our findings indicate that water use efficiency can significantly influence financial performance, either positively or negatively, while CO_2 emission intensity did not exhibit a definitive impact on Financial Performance.

KEY WORDS: Return on Assets (ROA), Return on Equity (ROE), Profit Margin, CO_2 emissions intensity, water use efficiency, food industry, Europe

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1. Introduction

It is projected that by 2050, the global population will reach 10 billion (MARKETLINE, 2019). Feeding this entire population poses a significant challenge. RITCHIE (2020) found that food production accounts for 26% of global greenhouse gas emissions. Additionally, agriculture utilizes half of the world's habitable land, is responsible for 70% of global water withdrawals, and contributes to 78% of ocean and freshwater eutrophication globally. Furthermore, 94% of mammal biomass (excluding humans) comprises livestock.

The EU (European Union) Standing Committee on Agricultural Research (SCAR) highlighted that "Globally, and in many regions, including Europe, food production either exceeds environmental boundaries or is on the brink of doing so. This situation threatens to further limit food accessibility for the impoverished in future scenarios" (EUROPEAN COMMISSION, 2020).

In the EU, the food industry stands as the predominant industry within the manufacturing sector, both in terms of turnover and employment (FOODDRINKEUROPE, 2018). Consequently, the industry garners attention from consumers, governments, and regulators, prompting these businesses to emphasize environmental management (JACKSON & SINGH, 2015).

Historically, academic literature has centred on the European food industry, especially regarding the potential influence of environmental practices on the financial outcomes of food enterprises.

In contemporary times, companies are subject to increasingly stringent environmental regulations, urging them to transition from coal-centric techno-

logies towards more sustainable practices (Tzouvanas et al., 2019). A KPMG (2020) study revealed that out of the 5,200 companies analysed across 52 countries and jurisdictions, 80% have released corporate responsibility reports.

The primary objective of this study was to explore the relationship between Environmental Performance (EP) and Financial Performance (FP) in the food industry. We analysed EP indicators like water consumption intensity and CO_2 emission intensity for European food companies in 2018. Our analysis aimed to ascertain the influence of these variables on FP metrics such as Return on Equity (ROE), Return on Assets (ROA), and Profit Margin.

2. Literature review

2.1. Environmental performance

Several studies have explored Corporate Environmental Management (CEM), which encompasses practices companies have adopted over the years to mitigate their environmental impact. Three primary variables are commonly used to examine CEM: Environmental Management (EM), Environmental Performance (EP), and Environmental Disclosure (ED) (Yi et al., 2023; Albertini, 2013).

EM pertains to actions planned to achieve a company's environmental strategy and objectives, ensuring environmental protection (Schultze & Trommer, 2012). An example would be the acquisition of an ISO (International Organization for Standardization) 14001 certificate. EP represents the quantifiable outcomes of a company's environmental management efforts. These outcomes, typically expressed in physical units, can be either positive (like emission reductions) or negative (such as emissions produced). Some of these measures are also categorized as input or output-oriented (Albertini, 2013; International Organization for Standardization, 2013). ED, on the other hand, describes the way a company impacts the environment (Wilmshurst & Frost, 2000), and might include reports detailing its environmental effects or even the receipt of an environmental award.

Among these, EP is considered the most reliable indicator when exploring the relationship between CEM and financial performance. This is because it reflects the tangible outcomes of CEM, offering insights into a company's initiatives and goals in this domain (Yi et al., 2023; Albertini, 2013). For instance, companies with an ISO 14001 certification might exhibit varying levels of environmental performance.

2.2. Financial performance

When examining the relationship between environmental performance and financial performance, a variety of financial performance variables can be considered. Yi et al. (2023) and Albertini (2013) categorized these variables into three groups: market-based, accounting-based, and organizational measures. Market-based variables reflect the company's position in the market and its attractiveness as an investment opportunity. Examples of these variables include ratios such as the price-to-earnings ratio, the debt ratio (total debt divided by total assets), and the profit margin (Earnings Before Interest and Taxes (EBIT) divided by sales, which represents the company's profitability) (Yi et al., 2023; Albertini, 2013; Li et al., 2017). Albertini (2013) explains that accounting-based variables capture the company's internal economic status and managerial performance rather than external perceptions, though they can be utilized to assess stakeholder interests. Commonly used accounting-based variables include ratios like ROA, ROE, and return on sales (ROS). On the other hand, organizational measures denote specific strategies implemented to enhance the company's position, and they predominantly cater to managerial interests rather than market considerations (Yi et al., 2023; Albertini, 2013).

Authors such as Maqbool (2019), Iwata and Okada (2011), Konar & Cohen (2001), King & Lenox (2001), and Russo & Fouts (1997), incorporated various financial performance measures in their studies, including ROA, ROE, and Return on Capital Employed (ROCE).

Studies that analyse the connections between CEM and FP mainly utilize market-based or accounting-based variables.

2.3. Environmental performance and financial performance

In the past, environmental protection was often seen as an added cost to companies, with environmental issues viewed as a diversion from the primary aim of profit maximization (Friedman, 1970). However, Porter & Van der Linde (1995) reframed environmental performance not as a burden but as an avenue for enhanced financial outcomes. Hart (1995) predicted the increasing recognition of the natural environment's constraints as a competitive edge, providing both cost and differentiation advantages.

A review of research in this field reveals that approximately 60% of studies affirmed a positive relationship between environmental and financial

performance. In contrast, 20% indicated a negative link, and the remaining 20% found a negligible connection between the two variables (Tzouvanas et al., 2019). The discrepancies in these findings can be attributed to several factors: the specific process studied, the methodology used, the time period analysed, geographical considerations, endogeneity, ambiguous environmental criteria (Dangelico, 2015; Konar & Cohen, 2001), lack of definitive financial criteria (Cohen et al., 1995), and company size (Graham & Potter, 2015; Dixon-Fowler et al., 2013).

The differing conclusions can be categorized into two main perspectives. The neoclassical theory posits that environmental initiatives lead to increased expenses, thus negatively affecting financial performance (FP) (Friedman, 1970; Walley & Whitehead, 1994). Conversely, several theories suggest a positive impact of environmental performance (EP) on FP, including the Resource-based View Theory, Porter's Hypothesis, and Stakeholder Theory (Clarkson, 1995; Porter, 1991; Porter & van der Linde, 1995; Hart, 1995; Li et al., 2017; Hang et al., 2019). Refer to Table 1 for more details. The Natural Resource-Based View concedes that while EP might initially be costly, it can, like other investments, yield higher returns over time (Broadstock et al., 2018; Lewandowski, 2017; Trumpp & Guenther, 2017). This is because companies gain valuable insights into resources or capabilities, which can become competitive advantages (Wernerfelt, 1984; Hart, 1995). Porter's Hypothesis underscores the required time – typically around two years – for environmental innovations to produce positive financial results (Porter & van der Linde, 1995; Liu, 2020). Meanwhile, the Stakeholder Theory emphasizes the importance of stakeholder satisfaction in enhancing a company's external reputation, subsequently boosting profits, and growth (Hang et al., 2019; Pesqueux & Damak-Ayadi, 2005; Allouche & Laroche, 2005).

Table 1. Summary of EP and FP relationships

EP & FP Relation	Theories/Approaches	Authors
Positive (+)	Porter's hypothesis	Porter & Van der Linde, 1995; Liu, 2020
Positive (+)	Slack Resource Argument	Tzouvanas et al., 2019
Positive (+)	Stakeholder Theory	Allouche & Laroche, 2005; Salama, 2005; Pesqueux & Damak-Ayadi, 2005; Hang et al., 2019
Positive (+)	Natural Resource-Based View	Lewandowski, 2017; Trumpp & Guenther, 2017; Broadstock et al., 2018
No Significance	-	Waddock & Graves, 1997; Moneva & Cuellar, 2009; Aras et al., 2010
Negative (-)	Neoclassical theory	Friedman, 1970; Cohen et al., 1995; Cordeiro & Sarkis, 1997; Wagner, 2005; Earnhart & Lízal, 2007; Jacobs et al., 2010

The food industry has seldom been the focus of such studies. Additionally, the few that do address it examine varying notions of environmental and financial performance. Furthermore, the outcomes in this sector are inconclusive (Li et al., 2017; Jackson & Singh, 2015; Graham & Potter, 2015).

While a majority of studies identify a positive correlation between EP and FP, clarity on this relationship within the food industry remains elusive. Furthermore, existing research primarily includes companies from a single country, complicating the task of drawing comprehensive conclusions for the entire food industry.

2.4. Theoretical framework and research hypotheses

The aim of this study was to analyse the relationship between environmental and financial performance in the food industry (Fig. 1), which is a topic of great interest at a global human level, affecting regulators, investors, employees, customers and managers (Tzouvanas et al., 2019; Iwata & Okada, 2011).

Several authors worldwide have studied the impact of CO_2 emissions on financial indicators such as ROA, ROE and Profit Margin (Trinks et al., 2020; Qian & Xing, 2018; Gonenc & Scholtens, 2017; Rokhmawati et al., 2015; Iwata & Okada, 2011). Therefore, we hypothesize whether companies with lower intensity of CO_2 emissions benefit financially from this effort (*H1*), by analysing this hypothesis for each financial variable. In summary, the first hypothesis is:

H1: Companies with a lower CO_2 intensity have a higher financial performance.

H1 a. Companies with a lower CO_2 intensity have a better ROA.

H1 b. Companies with a lower CO_2 intensity have a better ROE.

H1 c. Companies with a lower CO_2 intensity have a better Profit Margin.

In addition, authors such as GATIMBU ET AL. (2018) and LI ET AL. (2017) investigated how water productivity can affect financial well-being, like Profit Margin and ROA. Hence, we posed the hypothesis that low water intensity companies have a better financial performance (*H2*). Thus, the second hypothesis is:

H2: Companies with lower water consumption intensity have a higher financial performance.

H2 a. Companies with lower water consumption intensity have a better ROA.

H2 b. Companies with lower water consumption intensity have a better ROE.

H2 c. Companies with lower water consumption intensity have a better Profit Margin.

The model is condensed in the theoretical framework model shown in Figure 1.

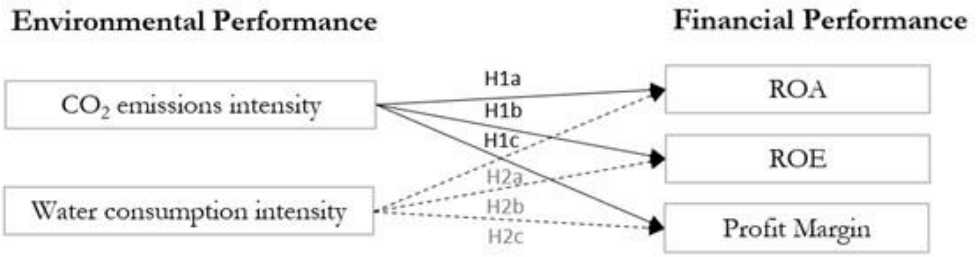


Fig. 1. Research framework - Relationship EP-FP

3. Methodology

3.1. Sample and data collection

Environmental Performance indicators were sourced from annual and sustainability reports published by food manufacturing companies. Some of these were obtained directly from the companies' websites, while others came from the Sustainable Disclosure Database (GRI, 2020). All financial data (including ROA, ROE, and profit margin) and control variables were procured from the Orbis[1] database.

There are 194,000 companies in the EU's food and drink industry. Approximately 99.1% of these are small to medium enterprises, and 0.9% are large companies. The latter account for 51.9% of the turnover (FOODDRINKEUROPE, 2018). This study examined data from 308 companies in the food industry for the year 2018, spanning January to December. Notably, these 308 companies represented 35% ($553 million/ $1.577 million) of the entire European food industry's turnover (STATISTA MARKET FORECAST, 2020). The sample size was narrowed down to 308 due to several constraint:

- The study included only companies headquartered in Europe to ensure a consistent sample.
- The Orbis list contained many factories belonging to the same corporation or headquarters, necessitating the removal of duplicates.
- Several companies on the list were subsidiaries of corporations with headquarters outside of Europe.

Environmental variables were converted into intensity indicators using the Operating Revenue data from the Orbis database. Moreover, not all companies maintain current reports that provide the needed sustainability indicators. Consequently, the sample was further narrowed to 93 companies, representing 23% of the industry's turnover. This suggests that larger companies might be more inclined to share their sustainability reports with stakeholders.

3.2. Description of variables

Environmental Performance indicators were sourced from company reports detailing the total CO_2 emissions for both scope 1 and scope 2, as well as total water consumption in 2018. Scope 1, termed Direct Greenhouse Gas Emissions, captures greenhouse gas emissions from sources owned or controlled by the reporting entity (ECOCHAIN, 2020). Meanwhile, Scope 2, or Indirect Emissions from Energy, refers to greenhouse gas emissions generated during the production of electricity, steam, and heating/cooling. These emissions are attributed to the entity that purchases and utilizes these resources (ECOCHAIN, 2020). Subsequently, intensity indicators for CO_2 emissions and water consumption were computed. We utilized the metric of CO_2 emitted

[1]Orbis is Bureau van Dijk's flagship company database. Bureau van Dijk is a major publisher of business information and specialises in private company data combined with software for searching and analysing companies. It is a Moody's Analytics company. Orbis has information on close to 450 million companies and entities across the globe – 45 million of these have detailed financial information.

per thousand USD of operating revenue and the Cubic meters of water consumed per thousand USD of operating revenue (refer to Table 2) as the independent variables. Among the three CEM categories, the EP approach was chosen due to its capability to yield more effective results (GRAHAM & POTTER, 2015; ALBERTINI, 2013; HORVÁTHOVÁ, 2010). CO_2 emissions and water consumption are, respectively, output and input indicators, which are the most prevalent measures of environmental impact (DRAGOMIR, 2018; GATIMBU ET AL., 2018).

Regarding the dependent variables or the financial performance indicators, we adopted two market-based metrics – ROA and ROE – and one accounting-based metric, Profit Margin, aligning with MAQBOOL (2019), IWATA & OKADA (2011), and LI ET AL. (2017).

We incorporated six control variables: Industry, Size, Age, Region, Growth, and Leverage (VINCENT & YUSUFF, 2020; NIZAM ET AL., 2019; TZOUVANAS ET AL., 2019; GATIMBU ET AL., 2018; GRAHAM & POTTER, 2015). By employing these variables, we were able to account for company-specific differences and isolate the EP-FP relationship. The Industry variable categorizes companies based on the sectors they operate in, using a NACE[2] code for classification. Size is pertinent since larger entities often encounter greater stakeholder pressures concerning environmental sustainability (VINCENT & YUSUFF, 2020; NIZAM ET AL., 2019). Age reflects a company's tenure in the industry (GATIMBU ET AL., 2018; GRAHAM & POTTER, 2015). The Region variable differentiates companies based on varying legislations that might influence EP. Revenue Operating Growth accounts for fluctuations in production (GATIMBU ET AL., 2018), while Leverage serves as a gauge for financial risk, associating a company's debt with its equity (VINCENT & YUSUFF, 2020; TZOUVANAS ET AL., 2019).

Table 2. Variables description

	Variable	Scale	Calculation	Source	Description
Dependent variables (FP)	(1) ROA_Net	0%-100%	-	Orbis	ROA using Net income (%) 2018
	(2) ROE_Net	0%-100%	-	Orbis	ROE using Net income (%) 2018
	(3) Profit Margin (ProfitM)	0%-100%	-	Orbis	Profit Margin (%) 2018
Independent variables (EP)	(4) Indicator- CO_2 emissions Scope 1&2 intensity (EmissionsRev)	Tonnes (t) per thousand dollar (k$)	Tonness of CO_2/ Operating Revenue 2018	Company reports, Orbis	Tonnes of CO_2 Scope 1&2 emited per k$ of operating revenue
	(5) Indicator- Water consumption intensity (WaterRev)	Cubic meters (m^3) per thousand dollar (k$)	Tonnes of CO_2/ Operating Revenue 2018	Company reports, Orbis	M^3 of water consumed k$ of operating revenue
Control Variabels	(6) Industry (Ind)	NACE code	-	Orbis	NACE code
	(7) Size (NEmp)	Number of employees	-	Orbis	Number of employees in 2018
	(8) Age (CAge)	Number of years	Today year (2020) - Company's foundation year	Orbis	Number of years since foundation
	(9) Region (Reg)	ISO Code	-	Orbis	ISO Code
	(10) Growth (Gwth)	Percentage	Operating revenue 2018/Operating revenue 2017-1	Orbis	Growth of the operating revenue
	(11) Leverage (Lev)	Percentage	-	Orbis	Gearing (%)

3.3. Methodological approach

We conducted the tests as recommended by PEÑA & SLATE (2006), utilizing the quantile regression, and focusing on the median of the dependent variables. We also adopted a method similar to that of TZOUVANAS ET AL. (2019), which did not use the Ordinary Least Squares (OLS) due to its failure to account for potential significant shifts across different conditional distributions in the EP-FP nexus. Additionally, the assumptions of the linear model were unmet.

Thus, the quantile regressions were employed to test the hypotheses and to ascertain if financial variables could be explained by environmental indicators:

[2]NACE codes are a standard classification system of similar European industries to Standard Industry Classification (SIC) and North American Industry Classification System (NAICS) for classifying business activities.

$$FP_{i,t} = \beta_0 + \beta_1 EmissionsRev_{i,t} + \beta_2 WaterRev_{i,t} + \beta_3 Company\ Control_{i,t} + \in_{i,t}$$

where $FP_{i,t}$ represents all three financial variables ROA_Net, ROE_Net, ProfitM for each company i, in the year t, in this case 2018. Company Control represents all control variables: Ind, NEmp, CAge, Reg, Gwth and Lev.

Companies from different industries (LIU, 2020) and located in different geographical regions (WAGNER, 2001) show different findings when investigating EP-FP relationships. Thus, we researched deeper to detect if distinct EP-FP dynamics existed across various sectors of the food industry and to see if the outcomes varied by region.

Many studies have focused their research on one industry (TZOUVANAS ET AL., 2019; IWATA & OKADA, 2011) or studied different industries and compared them (LIU, 2020; SALAMA, 2005). However, the conclusions regarding the food industry have so far been diverse. Therefore, in order to better understand the relationship between the EP and the FP variables, we created two clusters and used the Pearson and Spearman correlation methods.

Several studies have either centered their research on a single industry (TZOUVANAS ET AL., 2019; IWATA & OKADA, 2011) or analyzed multiple industries for comparison (LIU, 2020; SALAMA, 2005). However, conclusions pertaining to the food industry have remained inconsistent. Hence, to gain a clearer understanding of the relationship between EP and FP variables, we created two clusters and employed both Pearson and Spearman correlation methodologies: the cluster Industry and the cluster Region.

3.3.1. Industry cluster

This cluster was created to examine whether distinct outcomes might arise within the food industry when investigating the EP-FP relationship. As a result, the data was segmented into three groups, each reflecting similar manufacturing processes and according with the NACE classification: Manufacture of Dairy Products, Processing and Preserving, and Other Manufacturers.

Inside the food industry there are different sectors, for example those involved with the manufacture of dairy products, manufacture of sugar, coffee or chocolate, and the processing and preserving of fish, meat, or vegetables. Each sector of the industry has specific features, some need greater amounts of water to produce a ton of product and, others have a longer process and in consequence emit higher amounts of carbon dioxide (OUR WORLD IN DATA, 2020).

3.3.2. Region cluster

The Region cluster was established to ascertain whether being in different regions in Europe leads to variations in the EP-FP relationship. Data was categorized based on the location of the company's headquarters into three regions:

- Northern Europe (comprising companies from Denmark, Finland, Great Britain, Norway, and Sweden);
- Central Europe (featuring companies from Austria, France, Germany, Hungary, the Netherlands, Poland, and Switzerland);
- Southern Europe (with companies from Greece, Italy, Portugal, and Spain).

SALEM (2019) and Esty and Porter (2001) observed that more developed countries tend to have superior environmental performance. Moreover, when contrasting countries with comparable developmental stages, such as Portugal and Spain, they noted notable disparities in environmental regulatory quality rankings. Their findings suggest that countries with more assertive market-oriented economies might surpass those with a more interventionist economic approach.

4. Results

4.1. Descriptive statistics

As previously mentioned, 93 companies reported environmental indicators, implying that 215 of the 308 companies did not report the selected environmental indicators for this study. Although 34 of the 215 companies produced sustainability reports, these reports either lacked the EP variables essential for this research or did not publish their 2018 report. Hence, out of the 308 companies examined, there's clear evidence suggesting a lack of commitment to reporting environmental performance in this industry; 59% (181 companies) did not report this data in any capacity.

The most represented sector in this sample was the 'Manufacturers of dairy products' with 19 companies, followed by 'Processing and preserving of meat and production of meat products' (NACE code 101) and 'Manufacture of cocoa, chocolate, and sugar confectionery' (NACE code 1082), each having 9 companies. Each of the remaining sectors, based on their NACE code classification, comprised fewer than 8 companies, totaling 93 companies. Additionally, the majority of companies in the sample were headquartered in Germany (DE), Italy (IT), and the Netherlands (NL), which accounted for 33 of the 93 companies.

Regarding the quantitative data, some companies did not provide values for certain variables. Table 3 outlines the reasons for having fewer than 93 observations for several variables.

This sample predominantly consists of mature companies, with an average age of 91 years; the oldest being over 600 years old. In fact, 62 of these companies have been in operation for more than 50 years. Moreover, these companies experienced a decline in their operating revenue by an average of 3% in 2018 compared to 2017. Furthermore, the sampled companies were highly leveraged, signifying they posed a high financial risk to investors.

Table 3. Descriptive statistics of the quantitative variables

Variables	Unit	Number of observations	Average	Standard deviation	Maximum	Minimum
ROA_Net	%	92	5,34	5,69	27,98	-10,31
ROE_Net	%	92	12,47	15,37	79,45	-21,01
ProfitM	%	91	6,81	9,02	39,26	-11,46
EmissionsRev	Tonnes per K$	83	0,15	0,30	2,14	0,00
WaterRev	M^3 per K$	62	3,79	8,20	43,91	0,01
NEmp	Number of employees	91	12 267	36 816	308 000	52
CAge	Years	93	91	85	689	5
Gwth	%	92	-3,17	9,99	31,32	-29,22
Lev	%	92	87,45	84,26	597,78	2,00

4.2. Quantile regression

We used the collected data to perform the quantile regression, employing the quantreg formula in the RStudio[3] software (POSIT, 2019).

Table 4 presents the regression results, indicating the coefficient estimates (Coef.), the lower bounds (Lw bd), and the upper bounds (Up bd) of the confidence intervals (with a confidence level of 90%). Confidence intervals excluding zero correspond to parameters that are significant at the 10% level. Significant findings from this model pertain mainly to WaterRev and Gwth, which predominantly influenced ROA_Net. While many variables did not prove statistically significant, this outcome aligns with findings from comparable literature (TZOUVANAS ET AL., 2019; LI ET AL., 2017).

Therefore, for the first hypothesis (H1) - Companies with lower CO_2 intensity achieve higher financial performance - the results are inconclusive. Regarding the second hypothesis (H2), the H2a - Companies with reduced water consumption intensity exhibit superior ROA – is rejected. Table 4 suggests the converse: if water consumption intensity rises by 1%, ROA ascends by 0.2% (Coef. WaterRev x ROA_Net = 0.02). The subsequent hypotheses, H2 b. and H2 c., are also undetermined.

Table 4. Quantile regression results

	ROA_Net			ROE_Net			ProfitM		
	Coef.	Lw bd	Up bd	Coef.	Lw bd	Up bd	Coef.	Lw bd	Up bd
Intercept	-0,092	-0,511	0,094	-0,742	-1,537	0,280	-0,587	-0,900	-0,123
Reg	0,000	0,000	0,001	0,001	0,000	0,002	0,001	0,000	0,001
NEmp	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
CAge	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Lev	-0,005	-0,015	0,013	0,018	-0,022	0,119	-0,003	-0,010	0,002
Gwth	0,180*	0,019	0,439	0,259	-0,003	1,197	0,174*	0,082	0,511
EmissionsRev	0,001	-0,216	0,090	0,019	-0,751	0,130	-0,003	-0,161	0,257
WaterRev	0,002**	0,001	0,005	0,005	-0,002	0,007	0,002	-0,001	0,009

Notes: * p<0,05, ** p<0,1

[3]RStudio is an integrated development environment for R, a programming language for statistical computing and graphics.

Contrary to LI ET AL. (2017), our analysis detected a positive association between water consumption intensity and ROA, which contradicts their findings within the consumer staples sector. Moreover, the results regarding CO_2 emission intensity showed inconclusive results, potentially attributable to the diverse production methods inherent in the food industry. GONENC & SCHOLTENS (2017) support this viewpoint, positing that certain sectors within the Fossil fuel industry prioritize emission reduction more than others within the same field. Additionally in the manufacturing industry there have been contradictory results: while some studies corroborate the positive relationship between CO_2 emissions intensity and financial indicators (ROKHMAWATI ET AL., 2015), others counter this perspective (IWATA & OKADA, 2011).

4.2.1. Industry cluster

Pearson and Spearman correlation analyses were conducted to examine the relationship between EP (EmissionRev and WaterRev) and FP (ROA_Net, ROE_Net, and ProfitM) for each cluster within the food industry. The results are shown in Table 5. Regarding the CO_2 emissions intensity indicator, the correlation analysis produced results that are inconclusive and statistically not significant. The three clusters didn't provide any evidence of a connection between CO_2 intensity and ROA, ROE, or Profit Margin. As such, a definitive conclusion couldn't be drawn for the first hypothesis (H1). However, when assessing each sector individually, certain findings emerged. For example, the Other Manufacturers cluster encompasses diverse production types, including sugar, chocolate, tea, coffee, and more. But when these categories are segmented by specific production processes, certain sectors reveal a distinct EP-FP relationship. One notable example is sugar manufacturers: those with reduced CO_2 emissions tend to report better financial outcomes.

The correlation analysis (as presented in Table 5) suggests that, within the Manufacture of Dairy Products sector, water consumption intensity has a significantly impact on all three financial performance indicators. Consequently, dairy companies that utilize water more efficiently tend to achieve superior financial outcomes. Indeed, cheese production consumes a large amount of freshwater per kilogram compared to other food items, marking it as an intensive user of water. As water is an essential resource in the cheese production process, increasing efficiency in its use can lead to cost savings, aligning with the benefits of adopting improved environmental practices as noted by LANKOSKI (2000), REINHARDT (2000), and AMBEC & LANOIE (2008).

Table 5. Industry clusters: Pearson and Spearman correlation

Industry	EP FP	ROE_Net		ROA_Net		ProfitM	
		R-Pearson	R-Spearman	R-Pearson	R-Spearman	R-Pearson	R-Spearman
Manufacture of dairy products	EmissionsRev	-0,200	-0,091	-0,212	-0,309	-0,180	-0,184
	WaterRev	-0,436	-0,495**	-0,479**	-0,659*	-0,455	-0,703**
Other manufactures	EmissionsRev	-0,005	-0,049	0,237	0,036	0,112	0,026
	WaterRev	0,151	-0,027	0,169	0,142	0,004	0,106
Processing and preserving	EmissionsRev	0,114	-0,121	0,235	-0,096	0,391	-0,065
	WaterRev	0,655*	0,165	0,782*	0,179	0,960*	0,324

Notes: * p<0,05, ** p<0,1

In the Processing and Preserving sector of the food industry, water consumption intensity exhibits a significant relationship with financial performance indicators, but with the opposite signal. This suggests that companies that consume water less efficiently tend to exhibit better financial performance. This sector encompasses companies involved in processing and preserving fish, meat, or fruits/vegetables. The results are primarily driven by fish processors; as they process more fish, greater water consumption is required. For instance, in aquaculture, regulations stipulate the minimum volume of water required per fish, in line with standards set by the Food and Agriculture Organization (FAO, 2020). In contrast, fruit and vegetable producers operate differently, with larger producers benefiting from economies of scale.

The Manufacturers cluster didn't reveal a clear relationship, given its mix of varied production processes. Indeed, when these production types are analysed individually, distinctions emerge. Some, like manufacturers of cocoa, chocolate, and sugar confectionery, show that lower water use intensity correlates with stronger financial performance (GARCÍA-BUSTAMANTE ET AL., 2018). Meanwhile, sectors such as the bakery and farinaceous products

suggest greater financial performance aligns with heightened water consumption efficiency. Thus, the second hypothesis (H2) is supported for specific sectors within the food industry. Research assessing the impact of environmental performance (EP) on financial performance (FP) within the food industry has produced varied outcomes, a reflection of the industry's inherent diversity.

These results align with GRAHAM & POTTER'S (2015) findings, which highlighted how different UK food industry sectors exhibit varied relationships with environmental performance. Similarly, consistent with LI ET AL. (2017), our study underscores that the influence of different EP variables on FP indicators varies based on the specific industry segment being analysed.

4.2.2. Regional cluster

In this section, data were categorized into three regions—Northern, Central, and Southern Europe—based on the location of each company's headquarters. SALEM (2019) and ESTY & PORTER (2001) inspired the examination of these clusters, suggesting that countries with varying development levels have different sustainability performances.

Northern Europe has a better Sustainable Development Goal (SDG) index, and scores better for the Environmental Regulatory Regime Index when compared with countries in the South (SDGINDEX, 2020). Furthermore, countries with higher GDP per capita, such as Germany, Sweden, and France (located in North and Central Europe), exhibit a stronger environmental regulatory regime than Southern countries like Italy, Spain, and Portugal (SDGINDEX, 2020).

The goal was to determine if variations in regulations, economies, and development stages influence the EP and FP relationship. Thus, a correlation analysis was performed to evaluate the EP and FP relationship within each region (as shown in Table 6). Regarding emission efficiency, both Northern and Central European regions do not show significant and conclusive data to explain EP and FP relationships. Among these regions, only France recorded a significant correlation between EmissionRev and Financial indicators.

Table 6. Regional clusters: Pearson and Spearman correlation

Europe Region	EP FP	ROE_Net		ROA_Net		ProfitM	
		R-Pearson	R-Spearman	R-Pearson	R-Spearman	R-Pearson	R-Spearman
North	EmissionsRev	-0,080	-0,263	0,095	-0,195	0,199	-0,063
	WaterRev	0,471**	0,218	0,711*	0,068	0,610	0,015
Central	EmissionsRev	0,045	0,081	0,157	0,092	0,085	0,093
	WaterRev	-0,024	-0,124	0,066	-0,040	0,046	0,018
South	EmissionsRev	-0,100	-0,335	0,314	-0,121	0,509*	0,001
	WaterRev	-0,117	-0,502*	0,083	-0,326	0,087	-0,150

Notes: * p<0,05, ** p<0,1

In Southern Europe, there is substantial evidence suggesting that companies with less efficient CO_2 emissions achieve a higher Profit Margin. However, Spain and Italy, the two predominant countries in this cluster, display contrasting patterns. Spain reveals a correlation between these metrics but with the opposite signal (meaning that companies with less efficient CO_2 emissions achieve a higher Profit Margin), whereas Italy exhibits an association between WaterRev and ProfitM with impact: Italian companies with more efficient CO_2 emissions achieve a higher Profit Margin.

Thus, the first hypothesis, H1—Companies with a lower CO_2 emissions intensity achieve better financial performance—remains inconclusive for the regional clusters, mirroring findings from the industry clusters.

Furthermore, it can be inferred that in Northern countries, companies less efficient in water usage experience a decline in financial performance. This trend is primarily attributed to the dominant industries in this region, many of which are involved in processing and preserving fish (demanding more water as production scales). In contrast, water-efficient firms in Southern Europe display a significantly improved ROE, though this was the sole financial metric showing notable results.

For Northern countries, while evidence seems to support H2—Companies with a lower water consumption intensity achieve superior financial performance—the key determinant might not be the region but rather the industry type. For instance, Finland, a Northern country in this sample, demonstrated results contradictory to its regional counterparts.

These findings align with ARAS ET AL. (2010), who analyzed a collective group of countries without differentiating by sector, leading to ambiguous outcomes. In contrast, research focusing on individual countries and sectors typically yields more definitive findings (as observed in ALEXOPOULOS ET AL., 2018; SONG ET AL., 2017; LI ET AL., 2017; and NISHITANI ET AL., 2017).

4.3. Theoretical and practical implications

This study enabled us to enrich the existing literature by further exploring the EP-FP relationship within a specific industry. It is the first time that a study investigated the food industry in Europe, a very relevant one to this region. We further explore the sub-industries and European regions to discern the underlying causes of the observed differences.

Sustainability is currently a paramount concern, especially among the younger generations. However, businesses and governments are facing difficulties when trying to tackle this issue. The food industry is predominantly composed of smaller enterprises, which often face challenges in sustainability reporting. Therefore, governments should assist these companies in creating these reports and support their efforts to achieve environmental objectives in line with the Sustainable Development Goals set by the United Nations (UN, 2020). The food industry not only lies at the heart of environmental debates (e.g., palm sugar, beef production), but it's also pivotal to issues such as hunger and poverty. This underscores the importance of efficient resource management in this industry for the benefit of current and future generations.

Governments, in collaboration with international organizations, should develop a strategic plan tailored for each sector, outlining clear objectives for pertinent environmental KPIs specific to that sector and country. Such KPIs might encompass metrics used in this research, like water consumption intensity or CO_2 emissions intensity, among others. Concurrently, corporate leaders must assume responsibility for these environmental challenges and address them proactively. Governments should incentivize companies that adhere to these guidelines and impose sanctions on those that don't. This approach would not only strengthen corporate engagement in environmental matters but also return tangible results in the near to mid-term. Furthermore, it would underscore for businesses that environmental performance directly influences their financial standing.

5. Conclusion

Years of research on the relationship between Environmental Performance (EP) and Financial Performance (FP) have yet to yield a definitive conclusion. The food industry has been under-represented in these studies, and existing results remain mixed.

The food industry in general cannot explain the relationship between EP and FP. Initial investigations yielded inconclusive results for both quantile regression and cluster correlation. Yet, certain countries have shown strong correlations between these variables, which may stem more from the predominant sectors in these countries than their regulatory practices. Geographical factors, such as seaboard, climate, weather, and soil, further complicate matters by making certain food sectors more prominent in specific countries.

The study produced mixed findings for our second hypothesis. The quantile regression highlighted a positive relationship between water consumption intensity and ROA, prompting us to reject the hypothesis. However, subsequent cluster analysis supported the hypothesis for dairy product manufacturers. For those in the Processing and Preserving sector, results contradicted the hypothesis, aligning with the quantile regression by indicating lower financial performance for companies with reduced water consumption intensity. The 'Other Manufacturers' cluster underscored the need to differentiate between production processes. Without this distinction, drawing meaningful conclusions becomes challenging.

Furthermore, it can be inferred from this study that water consumption intensity appears to correlate more clearly with financial performance than CO_2 emissions do. This divergence could arise because water is a direct input in production, influencing costs, whereas CO_2 emissions typically serve as an output measure. CO_2 emissions could have been taken as an input if energy consumption were chosen as a variable instead of CO_2 emission. Curiously, despite CO_2 emissions being a prevalent metric in environmental performance rankings, sustainability reports, and performance evaluations, its relationship with financial performance isn't as evident.

Many authors highlight reputation as a key factor that can enhance financial performance. In the food industry, CO_2 emissions may not affect a company's reputation as significantly as they do in other industries. While emissions are heavily regulated, it doesn't necessarily mean they represent the most valued environmental initiative for stakeholders in this sector.

In essence, this study reveals that different food sectors exhibit varied EP-FP relationships, driven by their distinct production processes. It accentuates the significance of selecting sector appropriate environmental KPIs to yield meaningful results.

Of over 300 companies surveyed, a mere 93 offered consistent environmental indicators. Therefore, future studies might benefit from larger datasets or environmental rankings if available.

Future investigations should delve deeper into specific food industry subsectors or other industries. Our findings underscore the importance of sector-based analysis, given that different manufacturing processes face unique challenges. Introducing other environmental metrics, such as waste food, wastewater, water recycling, or energy consumption, could further illuminate the EP-FP relationship. Input metrics, which directly affect company costs, might yield clearer results, though output metrics remain crucial for understanding reputation effects.

Many studies utilize aggregate EP scores from databases or rankings, which can obscure the specific impacts of individual EP variables on FP. Adopting a more granular approach, as our study has done, offers richer insights. Future research should also consider longitudinal analysis of the EP-FP relationship, examining the influence of annual environmental performance metrics on FP.

References

Albertini E. 2013. Does environmental management improve financial performance? A meta-analytical review. *Organization & Environment*, 26(4): 431–457.

Alexopoulos I., Kounetas K., Tzelepis D. 2018. Environmental and financial performance. Is there a win-win or a win-loss situation? Evidence from the Greek manufacturing. *Journal of Cleaner Production*, 197(1): 1275–1283.

Allouche J., Laroche P. 2005. A meta-analytical investigation of the relationship between corporate social and financial performance. *Revue de Gestion des Ressources Humaines,* 57: 18–41.

Ambec S., Lanoie P. 2008. Does it pay to be green? A systematic overview. *The Academy of Management Perspectives*, 22(4): 45–62.

Aras G., Aybars A., Kuthu O. 2010. Managing corporate performance: investigating the relationship between corporate social responsibility and financial performance in emerging markets. *International Journal of Productivity and Performance Management,* 59(3): 229–254.

Broadstock D.C., Collins A., Hunt, L.C., Vergos K. 2018. Voluntary disclosure, greenhouse gas emissions and business performance: Assessing the first decade of reporting. *The British Accounting Review*, 50(1): 48–59.

Clarkson M.E. 1995. A stakeholder framework for analyzing and evaluating corporate social performance. *Academy of Management Review*, 20(1): 92–117.

Cohen M., Fenn S., Naimon J. 1995. *Environmental and Financial Performance.* Washington, DC: Investor Responsibility Research Center, Environmental Information Service.

Cordeiro J.J., Sarkis J. 1997. Environmental proactivism and firm performance: evidence from security analyst earnings forecasts. *Business Strategy and the Environment,* 6(2): 104–114.

Dangelico R.M. 2015. Improving firm environmental performance and reputation: the role of employee green teams. *Business Strategy and the Environment,* 24(8): 735–749.

Dixon-Fowler H, Slater D, Johnson J, Ellstrand A, Romi A. 2013. Beyond 'does it pay to be green?' A meta-analysis of moderators of the CEP–CFP relationship. *Journal of Business Ethics,* 112(2): 353–366.

Dragomir V.D. 2018. How do we measure corporate environmental performance? A critical review. *Journal of Cleaner Production*, 196: 1124–1157.

Earnhart D., Lizal L. 2007. Effect of pollution control on corporate financial performance in a transition economy. *European Environment*, 17(4): 247–266.

Ecochain, 2020. *Scope 1, 2 and 3 Emissions: Overview to Direct and Indirect*. Retrieved from https://ecochain.com/knowledge/scope-1-2-and-3-emissions-overview-to-direct-and-indirect-emissions, accessed on August 7th, 2020.

Esty D., Porter M. 2001. Ranking national environmental regulation and performance: a leading indicator of future competitiveness? *The Global Competitiveness Report 2001–2002: 78–101.*

European Commission, 2020. *EU Standing Committee on Agriculture Research (SCAR)*. Retrieved from https://scar-europe.org/ accessed on August 7th, 2020.

FAO, 2020. *FAO Code of Conduct for Responsible Fisheries*. Retrieved from https://www.fao.org/documents/card/en/c/e6cf549d-589a-5281-ac13-766603db9c03, accessed on August 7th, 2020.

Fernández-Cuesta C., Castro P., Tascón M.T., Castaño F.J. 2019. The effect of environmental performance on financial debt. European evidence. *Journal of Cleaner Production*, 207: 379–390.

Filbeck G., Gorman R.F. 2004. The relationship between the environmental and financial performance of public utilities. *Environmental and Resource Economics*, 29(2): 137–157.

FoodDrinkEurope, 2018. *Data & Trends of the European Food and Drink Industry 2018*. Retrieved from https://www.fooddrinkeurope.eu/publication/data-trends-of-the-european-food-and-drink-industry-2018/, accessed on August 04th, 2020.

Friedman M., 1970. *The social responsibility of business is to increase its profits.* New York Times Magazine.

García-Bustamante C.A., Aguilar-Rivera N., Zepeda-Pirrón M., Armendáriz-Arnez C. 2018. Development of indicators for the sustainability of the sugar industry. *Environmental & Socio-Economic Studies*, 6(4): 22–38.

Gatimbu K.K., Ogada M.J., Budambula N., Kariuki S. 2018. Environmental sustainability and financial performance of the small-scale tea processors in Kenya. *Business Strategy and the Environment*, 27(8): 1765–1771.

George G. 2005. Slack resources and the performance of privately held firm. *Academy of Management Journal*, 48(4): 661–676.

Gonenc H., Scholtens B. 2017. Environmental and financial performance of fossil fuel firms: A closer inspection of their interaction. *Ecological Economics*, 132(C): 307–328.

Graham S., Potter A. 2015. Environmental operations management and its links with proactivity and performance: A study of the UK food industry. *International Journal of Production Economics*, 170(Part A): 146–159.

GRI, 2020. *Sustainable Disclosure Database, Data Legend.* Retrieved from https://www.globalreporting.org/media/m22dl3o0/gri-data-legend-sustainability-disclosure-database-profiling.pdf, accessed onAugust 24th, 2020.

Hang M., Geyer-Klingeberg J., Rathgeber A.W. 2019. It is merely a matter of time: A meta-analysis of the causality between environmental performance and financial performance. *Business Strategy and the Environment*, 28(2): 257–273.

Hart S.L. 1995. A natural-resource-based view of the firm. *Academy of Management Review*, 20(4): 996–1014.

Horváthová E. 2010. Does environmental performance affect financial performance? A meta-analysis. *Ecological Economics*, 70(1): 52–59.

International Organization for Standardization, 2013. *Environmental management - Environmental performance evaluation – Guidelines*. Retrieved from https://www.iso.org/obp/ui/#iso:std:iso:14031:ed-2:v1:en, accessed on November 24th, 2019.

Iwata H., Okada K. 2011. How does environmental performance affect financial performance? Evidence from Japanese manufacturing firms. *Ecological Economics*, 70(9): 1691–1700.

Jackson L.A., Singh D. 2015. Environmental rankings and financial performance: An analysis of firms in the US food and beverage supply chain. *Tourism Management Perspectives*, 14: 25–33.

Jacobs B.W., Singhal V.R., Subramanian R. 2010. An empirical investigation of environmental performance and the market value of the firm. *Journal of Operations Management*, 28(5): 430–441.

Jaggi B., Freedman M. 1992. An examination of the impact of pollution performance on economic and market performance of pulp and paper firms. *Journal of Business Finance Accounting*, 19(5): 697–713.

Jeswani H.K., Burkinshaw R., Azapagic A. 2015. Environmental sustainability issues in the food–energy–water nexus: Breakfast cereals and snacks. *Sustainable Production and Consumption*, 2: 17–28.

King A.A., Lenox, M.J. 2001. Does it really pay to be green? An empirical study of firm environmental and financial performance. *Journal of Industrial Ecology,* 5(1): 105–116.

Konar S., Cohen M.A. 2001. Does the market value environmental performance? *Review of Economics and Statistics*, 83(2): 2814–2890.

KPMG, 2020. *The time has come. The KPMG Survey of Sustainability Reporting 2020*. Retrieved from https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2020/11/the-time-has-come.pdf, accessed on August 13th, 2023.

Lankoski L. 2000. *Determinants of environmental profit. An analysis of firm-level relationship between environmental and economic performance*. Helsinki University of Technology Institute of Strategy and International Business Doctoral Dissertation.

Li S., Ngniatedema T., Chen F. 2017. Understanding the impact of green initiatives and green performance on financial performance in the US. *Business Strategy and the Environment*, 26(6): 776–790.

Liu Z. 2020. Unraveling the complex relationship between environmental and financial performance-A multilevel longitudinal analysis. *International Journal of Production Economics*, 219: 328–340.

Maqbool S. 2019. Does corporate social responsibility lead to superior financial performance? Evidence from BSE 100 index. *Decision*, 46(3): 219–231.

MarketLine Theme Report, 2019. *Global Agriculture - Global population to reach 10bn in 2050, dramatic changes to food supply are needed*. Retrieved from https://www.marketresearch.com/MarketLine-v3883/Global-Agriculture-population-reach-10bn-12603111/, accessed on November 26th, 2019.

McGuire J.B., Schneeweiss T., Branch B. 1990. Perceptions of firm quality: a cause or result of firm performance. *Journal of Management*, 16(1): 167–180.

Moneva J.M., Cuellar B. 2009. The value relevance of financial and non-financial environmental reporting. *Environmental and Resource Economics*, 44(3):441–456.

Ngniatedema T., Li S., Illia A. 2014. Understanding the impact of green operations on organizational financial performance: an industry perspective. *Environmental Quality Management*, 24(1): 45–59.

Nishitani K., Jannah N., Kaneko S. 2017. Does corporate environmental performance enhance financial performance? An empirical study of Indonesian firms. *Environmental Development*, 23: 10–21.

Nizam E. Ng A., Dewandaru G., Nagayev R., Nkoba M.A. 2019. The impact of social and environmental sustainability on financial performance: A global analysis of the banking sector. *Journal of Multinational Financial Management*, 49: 35–53.

One World in Data, 2020. *Food: greenhouse gas emissions across the supply chain,* Retrieved from https://ourworldindata.org/grapher/food-emissions-supply-chain, accessed on November 26th, 2019.

Peña E.A., Slate E.H. 2006. Global validation of linear model assumptions. *Journal of the American Statistical Association*, 101(473): 341–354.

Pesqueux Y., Damak-Ayadi S. 2005. Stakeholder theory in perspective. *Corporate Governance: The International Journal of Business in Society,* 5(2): 5–21.

Porter M.E. 1991. Towards a dynamic theory of strategy. *Strategic management journal*, 12(S2): 95–117.

Porter M.E., Van Der Linde C. 1995. Green and competitive: Ending the stalemate. *Harvard Business Review*, 73 (5): 120–134.

Posit, 2019. *RStudio Desktop*. Retrieved from https://posit.co/download/rstudio-desktop/ accessed on July 30th, 2019.

Qian W., Xing K. 2018. Linking environmental and financial performance for privately owned firms: Some evidence from Australia. *Journal of Small Business Management*, 56(2): 330–347.

Quazi H.A., Khoo Y.K., Tan C.M., Wong P.S. 2001. Motivation for ISO 14000 certification: Development of a predictive model. *Omega*, 29(6): 525–542.

Reinhardt F.L. 2000. *Down to earth: Applying business principles to environmental management.* Cambridge: Harvard Business School Press.

Ritchie H. 2020. Environmental impacts of food production. Retrieved from https://ourworldindata.org/environmental-impacts-of-food, accessed on July 30th, 2020

Rokhmawati A., Sathye M., Sathye S. 2015. The effect of GHG emission, environmental performance, and social performance on financial performance of listed manufacturing firms in Indonesia. *Procedia-social and Behavioral Sciences*, 211: 461–470.

Russo M.V., Fouts P.A. 1997. A resource–based perspective on corporate environmental performance and profitability. *Academy of Management Journal,* 40(3): 534–559.

Salama A. 2005. A note on the impact of environmental performance on financial performance. *Structural Change and Economic Dynamics*, 16(3): 413–421.

Salem M.A. 2019. Structural equation modelling of the impact of environmental capabilities on competitiveness. *International Journal of Productivity and Performance Management*, 68(1): 127–147.

Schultze W., Trommer R. 2012. The concept of environmental performance and its measurement in empirical studies. *Journal of Management Control*, 22(4): 375–412.

SDGIndex (2020) *Europe Sustainable Development*, Retrieved from https://www.sdgindex.org/reports/europe-sustainable-development-report-2020/, accessed on December 18th, 2020.

Song H., Zhao C., Zeng J. 2017. Can environmental management improve financial performance: An empirical study of A-shares listed companies in China. *Journal of Cleaner Production*, 141: 1051–1056.

Statista Market Forecast, 2020. *Food Europe*. Retrieved from https://www.statista.com/outlook/40000000/102/food/europe?currency=eur, accessed on August 6th, 2020.

Trinks A., Mulder M., & Scholtens B. 2020. An efficiency perspective on carbon emissions and financial performance. *Ecological Economics*, 175: 106632.

Trumpp C., Guenther T. 2017. Too little or too much? Exploring U-shaped relationships between corporate environmental performance and corporate financial performance. *Business Strategy and the Environment*, 26(1): 49–68.

Tzouvanas P., Kizys R., Chatziantoniou I., Sagitova R. 2019. Environmental and financial performance in the European manufacturing sector: an analysis of extreme tail dependency. *The British Accounting Review*, 52(6): 100863.

UN, 2020. *United Nations, Department of Economic and Social Affairs, Sustainable Development*. Retrieved from https://sdgs.un.org/partnerships/sdgs-business-index-sdgbi accessed on November 20th, 2020.

Vincent O., Yusuff K. 2020. Role of Industry Context in The Firm Environmental-Financial Performance Link: Evidence from the Extractive Sector. *The Journal of Developing Areas*, 54(1): 135–148.

Waddock S.A., Graves S.M. 1997. The corporate social performance–financial performance link. *Strategic Management Journal*, 18(4): 303–319.

Wagner M. 2001. *A review of empirical studies concerning the relationship between environmental and financial performance. What Does the Evidence Tell Us?* Center for Sustainability Management.

Wagner M. 2005. Sustainability and competitive advantage: Empirical evidence on the influence of strategic choices between environmental management approaches. *Environmental Quality Management*, 14(3): 31–48.

Walley N., Whitehead B. 1994. It's not easy being green. *Harvard Business Review*, 72: 46–52.

Wernerfelt B. 1984. A resource-based view of the firm. *Strategic Management Journal*, 5(2): 171–180.

Wilmshurst T.D., & Frost G.R. 2000. Corporate environmental reporting—A test of legitimacy theory. *Accounting, Auditing & Accountability Journal*, 13(1): 10–26.

Yi Y., Zeng S., Chen H., Shi J.J. 2023. When does it pay to be good? A meta-analysis of the relationship between green innovation and financial performance. IEEE Transactions on Engineering Management, 70(9): 3260–3270.