Sustainability, ESG Ratings and Corporate Performance in the Manufacturing Sector: A Research Review

Consuela-Elena POPESCU
University of Economic Studies, Faculty of International Business and Economics, Bucharest, Romania
consuela.popescu@rei.ase.ro

Alma PENTESCU
"Lucian Blaga" University of Sibiu, Faculty of Management, Marketing and Business Administration, Sibiu, Romania
alma.pentescu@ulbsibiu.ro

Aleksandar SHIVAROV
Varna University of Economics, Faculty of Management, Varna, Bulgaria
a.shivarov@ue-varna.bg

Abstract

The objective of this study is to provide insight into the broad topic of sustainability, as encompassed by ESG ratings and scores, and its influence on the performance of companies at a global scale, with a focus on the manufacturing sector. This study involves a thorough examination of existing literature and a detailed bibliometric analysis, providing valuable insights about the progression of scientific papers related to this subject matter. The bibliometric technique refers to a quantitative examination of publications that is primarily concerned with the utilization of information functions in relation to the advancement of research within a specific field. The present study utilizes the Scopus database and the VOSviewer visualization tool to show the outcomes derived from a comprehensive analysis of pertinent literature and bibliometric evaluation of scholarly publications pertaining to the relationship between sustainability, ESG ratings, and business value. The work shows that although the concept of ESG has been around for decades, businesses and institutions have begun to take issues related to it seriously in the 2010s. Since 2009 there was an exponential increase in the number of papers published until 2023.

Keywords: Sustainability; ESG score; corporate performance; manufacturing;

JEL Classification: M14; O16; F63; L60

DOI: https://doi.org/10.24818/ejis.2023.24

1. Introduction

The climate change crisis, a result of global warming, has brought about several events over the past 20 years, including rising temperatures that have caused extreme weather and the breaking of Antarctic ice, longer than usual wildfire seasons that last for months at a time, coral reefs that have lost their colour (Environmental Defense Fund, 2023).

The EU committed to reduce greenhouse gas emissions in the EU by at least 40% below 1990 levels by 2030 when it signed the Paris Agreement in 2015. Subsequently, the goal was adjusted to achieve climate neutrality by 2050 and a minimum 55% decrease by 2030 (Horobet et al., 2022; Tudor et al., 2023). As a result, by 2020, emissions have decreased

Received: 19 October 2023; Revised: 1 December 2023; Accepted: 15 December 2023

by 31%, mostly because of the Covid-19 epidemic, from 24% in 2019. In 2021, The EU set the target of zero net emissions by 2050, known as climate neutrality, legally enforceable. In addition, the EU is trying to save biodiversity, develop a sustainable food system, and establish a circular economy by 2050 (an action plan which includes: packaging and plastics, sustainable textiles, electronics, construction and buildings, batteries and vehicles, the food chain, raw materials and repairing and reusing goods) – (European Parliament, 2023). The Green Deal's goal of making the EU carbon neutral by 2050 necessitates reevaluating a product's whole life cycle in addition to encouraging sustainable consumption and the circular economy. This ought to result in less waste, reduced greenhouse gas emissions, and a decrease in resource use.

The last UN Climate Change Conference which took place in Sharm el-Sheikh (2022) emphasized accountability when it comes to the commitments made by businesses and institutions in the path to combat climate change. As the UN Climate Change Executive Secretary stated, the agreement must be turned into concrete action, therefore, the Conference in Sharm el-Sheikh shifted the action to actual implementation. Thus, not incorporating sustainability into business strategies is no longer an option. The United Nations Principles for Socially Responsible Investment Organization (UN-PRI) adopted for the first time, in 2006, ESG (Environment, Social, Governance) factors as important indicators to measure sustainability.

According to Spiliakos (2018), sustainability represents the effects that companies have on the environment or society among which there are: climate change, income inequality, human rights issues, fair working conditions, pollution, racial injustice, gender inequality, depletion of natural resources. Another definition from literature regards sustainability as "*a systematic approach to link environmental and social aspects of management with governance (economic governance) and competitiveness on the one hand, and on the other hand, it tends to integrate environmental and social information with information about economic performance*" (Schaltegger and Wagner, 2006). As stated by the Global Sustainable Investment Review (Global Sustainable Investment Alliance, 2021) sustainable investing assets reached $35 trillion at the beginning of 2020, a 15% increase in two years. Thus, green investments' goal is to support businesses that contribute positively to the environment, helping to combat climate change and promote sustainable development. Among the ways that green investments are being valued is by investment funds that invest in a diversified portfolio of green assets (like green bonds, ETFs, green private equity and venture capital) in renewable energy companies and sustainable infrastructure projects (Horobet and Belascu, 2012; Raut et al., 2023).

In the path to achieving sustainability performance improvements but also in response to rising investor and community interest, companies utilize environmental, social, and governance (ESG) reporting frameworks to provide information about company operations, opportunities, and risks pertaining to these areas. Thus, companies set ESG targets and report on their performance. Many institutions, including governments, stock exchanges, business associations, nonprofits, and nongovernmental organizations, developed ESG reporting systems.

The ESG framework is founded on three basic hypotheses when it comes to long-term sustainability. The first is the legitimacy thesis, which states that the corporation must adhere to societal norms and principles (Deegan et al., 2000). As a result, global investors seek to consider value in addition to typical financial measures. In their portfolio management, they include relevance and ESG transparency. The second idea is the

stakeholder theory, which is a mix of the legitimacy theory and the values of stakeholders. According to stakeholder theory, businesses must take responsibility for their stakeholders, which include employees, suppliers, and local communities at large (Freeman, 1984). Sustainable management practices, according to stakeholder theory and legitimacy theory, improve stakeholders' perceptions of corporate social responsibility, corporate image, and brand value, which in turn improves enterprises' financial success. The resource-based view theory (RBV) is the third philosophy in the ESG framework. This hypothesis holds that resources are valuable, difficult to reproduce, and cannot be replaced. According to RBV, sustainable initiatives such as ESG practices in resource selection and production contribute to a long-term profitable business model (Bhandari et al., 2022).

ESG ratings, also known as Environmental, Social, and Governance ratings, measure a company's performance in terms of its environmental impact, social responsibility, and governance practices These ratings are used by financial institutions and stakeholders to assess a company's practices in sustainability. Furthermore, ESG ratings can establish a good social image of the enterprise thus strengthening the relationship with all stakeholders but also reduce the enterprise cost of financing by decreasing the information asymmetry and agency problems (Yoon et al., 2018).

Worrying trends in environmental issues, such as global warming and water pollution, as well as social issues, such as human rights abuses, poverty, and wealth disparity, place enormous responsibility on corporations in relation to the environment and society. As a result, a firm's fulfilment of environmental and societal duties has become an important factor for determining its sustainability. Thus, research on sustainability has steadily risen. Although past research has contributed to the theoretical development of sustainable management, empirical findings on the links between sustainable management activities and financial performance appear to be inconsistent, if not contradictory. While it may appear counterintuitive that a company spending money on sustainability practices can increase a company's profitability, research shows that ESG information positively affects firms' valuation and performance (Giese et al., 2019; Khan et al., 2016; Sang and Kim, 2021; Whelan et al., 2021; Mattera and Soto, 2023). However, in other cases ESG seem to affect negatively financial performance as demonstrated by Duque-Grisales et al. (2021), Ruan et al. (2021), Pokharel and Chandrashekar (1999) or even not affect it at all (Atan et al., 2018; Haryono and Iskandar, 2015; Servaes and Tamayo, 2013).

Manufacturing has, historically and generally, a high ecological footprint, therefore pressure from governments, boards, investors and consumers is mounting on the firms operating in this sector manufacturers to meet sustainability standards. Large manufacturers demand that their suppliers adhere to the same standards in order to ensure that goods are produced sustainably, and employees are treated fairly. As a result, small manufacturers who do not adhere to the same principles may risk losing customers to competitors who have already followed the recent trends.

Our paper contributes to the existing literature by summarizing the main papers discussing ESG scoring and its effect on company performance for the manufacturing sector but also conducted a thorough bibliometric analysis using Scopus database to gain a better understanding of ESG and company performance in scientific studies.

The remainder of the paper is structured in several parts. First, we provide an overview of the most important ESG ratings and their providers, revealing the main commonalities and differences between them, which are relevant for the findings in the empirical literature. Second, we drew bibliographical information from Scopus using specific keywords to get

an evolution and statistics on empirical work regarding ESG ratings and company performance. Third, we provide an in-depth analysis of the most relevant literature review for the relationship between ESG scores and performance in the manufacturing sector. We present our main findings in the conclusion part.

2. An Overview of ESG Ratings and Providers

There are several ESG rating providers in the market that offer these to investors and other interested parties. Some of the prominent ESG rating providers include:

Sustainalytics (16,000 companies assessed): Sustainalytics provides ESG research and ratings to help investors integrate sustainability factors into their investment decisions. They cover over 13,000 companies and assess a wide range of ESG issues, including climate change, human rights, and corporate governance.

Carbon Disclosure Project – CDP (15,000 companies assessed): CDP is a non-profit organization that focuses on measuring and disclosing companies' environmental impact, particularly related to carbon emissions. They provide companies with a score based on their environmental data disclosure and initiatives to address climate change.

Vigeo Eiris - Moody's (15,000 companies): Moody's, a well-known credit ratings agency, acquired Vigeo Eiris, a leading ESG data and research provider, to strengthen its ESG expertise and offerings. Vigeo Eiris assesses and rates the performances of companies according to the Equitics methodology based on 38 criteria, divided into six key areas of ESG and on a scale from 0 to 100.

Refinitiv (Thomson Reuters) ESG Data (12,500 companies): Refinitiv, formerly known as Thomson Reuters ESG Research Data, is another prominent provider of ESG scores. Refinitiv ESG scores are presented on a scale of 0 to 100, with higher scores indicating better environmental, social, and governance performance. The scores are percentile-ranked—for example, a score of 80 would indicate that a company performs better than 80% of its peers in the same industry. Refinitiv also calculates a combined ESG score by aggregating the individual environmental, social, and governance scores. This composite score enables investors to assess a company's overall ESG performance across all three dimensions.

Bloomberg ESG Data (12,000 companies assessed): Bloomberg provides a variety of data and proprietary scores that investors can use to assess company or government disclosure and performance on a wide range of ESG and thematic issues. Bloomberg's ESG and thematic scores can integrate into company research and portfolio construction. Bloomberg's proprietary quant model is informed by sustainability and industry frameworks, research, and analysis to reduce noise, normalize data, address size bias, and reduce disclosure gaps.

S&P Global (10,000 companies): S&P Global ESG scores are also presented on a scale of 0 to 100, with higher scores indicating better ESG performance. The scores are designed to be comparable within an industry, allowing investors to evaluate a company's ESG performance relative to its peers. Like other ratings agencies, the scores are broken down into three main categories: Environmental, Social, and Governance, each with its own score on the same 0–100 scale.

MSCI ESG Ratings (8,500 companies, 14,000 issuers assessed): MSCI is a leading provider of ESG ratings and has a comprehensive set of ESG research and data. Their ratings cover over 12,000 companies globally and assess various ESG factors such as carbon emissions, labor practices, and board diversity.

ISS-Ethix ESG (7,800 companies): Institutional Shareholder Services (ISS) Quality Scores focus on the "G", or governance. The ISS Quality Score rating system employs a scale from the 1st to the 10th decile, where a score in the 1st decile signifies superior governance practices and reduced governance risk, while a score in the 10th decile denotes increased governance risk. This methodology examines over 200 elements, which are categorized into four key pillars: board structure, compensation/remuneration, shareholder rights, and audit and risk oversight. Each factor is assigned a specific weight based on regional governance standards, ISS voting policies, and the influence on governance practices.

Corporate Knights Global 100 (6,000 companies assessed): Corporate Knights has been ranking the world's 100 most sustainable corporations since 2005, based on a rigorous assessment of public companies around the world with revenue of at least $1 billion.

FTSE Russell (7,200 companies assessed): FTSE Russell is a leading index and data provider that also offers ESG ratings and indices. Their ESG ratings assess companies on various environmental, social, and governance factors and are used in the creation of ESG-themed indices.

RobecoSAM (4,700 companies): RobecoSAM is an investment firm that specializes in sustainable investing. They provide ESG ratings and assessments based on their proprietary Corporate Sustainability Assessment, which covers various ESG dimensions.

Climetrics (23,000 funds): CDP, in collaboration with ISS-Ethix, also introduced Climetrics scores, the world's first climate impact rating system for investment funds. This innovative rating system enables investors to make climate-conscious investment decisions by assessing the climate impact of various funds. Climetrics ratings use a scale of one to five green leaves, with one leaf representing a low climate impact score and five leaves indicating the highest climate impact score.

RepRisk (245,000 companies): While RepRisk is not a ratings company and does not assign ratings or scores to individual companies, they are an ESG data provider that produces The RepRisk Index (RRI). The RRI dynamically captures and quantifies reputational risk exposure related to ESG issues, and the corresponding RepRisk Rating (RRR) is a letter rating (AAA to D) that facilitates benchmarking and integration of ESG and business conduct risks. In addition, RepRisk features the United Nations Global Compact (UNGC) Violator Flag, which identifies companies that have a high risk or potential risk of violating one or more of the 10 UNGC principles.

These are just a few examples of ESG rating providers in the market. Each provider has its own methodology and criteria for assessing ESG performance, so it is important for investors and other users to understand these differences when comparing ratings but also that the ratings align to the investor's own views on ESG.

Li et al. (2020) divided these evaluations into three categories so that investors may better grasp the differences. First, the fundamental ratings include Refinitiv (Thompson Reuters) and Bloomberg ESG Data as they collect data from public sources, do not have a ratings methodology behind them and do not provide overall company ESG scores. Second, the comprehensive ratings include most ratings like Sustainalytics, Vigeo Eiris, MSCI ESG

Ratings, ISS Ethix-ESG, RepRisk that gather both objective and subjective data comprising all ESG segments. They use a methodical process to calculate an organization's overall ESG score, which also considers debates on company-specific topics that may be found in newspapers and online media. Third, the last category is useful for investors that want to address a specific problem like environmental / carbon scores, human rights, gender diversity as the ratings specialize in particular areas of ESG. Examples include Carbon Disclosure Project (CDP) and Equileap (gender equality data).

Pursuant with the central points of sustainability, green innovation, corporate performance in the manufacturing sector and ESG in the following sections a consistent literature review tackling these different aspects will be discussed.

3. A General View of ESG Ratings and Corporate Performance

The research on corporate performance in connection to sustainability has experienced substantial growth over the past few decades, driven by scholars' interests in investigating the behaviors of corporations that contribute to the advancement of a more environmentally friendly economy. Furthermore, the growth of the ESG ratings sector has stimulated empirical investigations aiming to examine the relationship between business sustainability and performance. This relationship is often evaluated from many viewpoints, primarily those of accounting and investors.

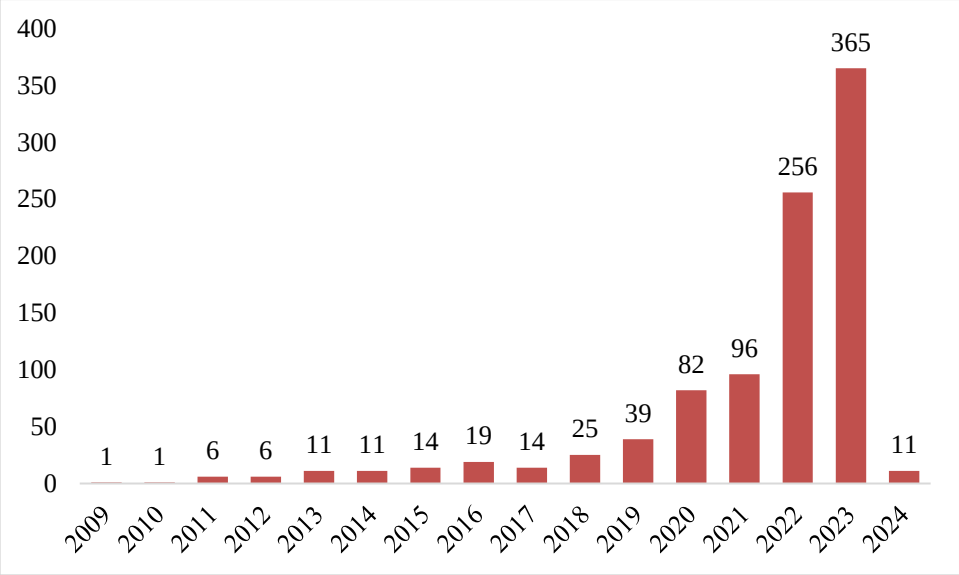
For a comprehensive view on the literature on ESG ratings and corporate performance, we have drawn bibliographical information from Scopus, a wide database of scholarly works that covers more than 7,000 publishers that generated over 28,000 active serial titles, 327,000 books and 93 million records (as of November 2023). Scopus carefully selects the titles that are covered by the database applying criteria referring to publication quality and transparency of information related to published records. We follow other studies that relied on Scopus for their bibliographical analyses – see, in this respect, Kipper et al. (2020), Farooq (2023) or Shahrour et al. (2023), among many others.

Data retrieval from the Scopus database took place on November 10, 2023, and considered four main categories of keywords: (i) "ESG" OR "Environmental, social, governance" OR "Environmental-social-governance" OR "Environmental, social and governance"; (ii) "rating*" OR "score*" OR "measure*" OR "indicator*"; (iii) "firm*" OR "compan*" OR "business*" OR "industr*"; and (iv) "performance" OR "profitability" OR "liquidity" OR "efficiency" OR "solvency". All these were search in the titles, abstracts and keywords of Scopus documents (TITLE-ABS-KEY).

We obtained 1,004 documents, of which most (957) were articles, 83 were conference papers, 57 were book chapters, 26 were reviews and the remaining were conference reviews (3), editorials (2), books (2) and one note. We decided to proceed with the analysis of articles, since they provide research that went through the peer-review process. After a careful revision of the results, we obtained 957 articles published between 2009 and 2024. Of these, 866 were in the final publication stage in journals and the remaining 91 were articles in press. Most of the articles were written in English (943) and the remaining were written in Russian and Korean (4 papers in each language), Spanish (3 articles), and Lithuanian, German, French and Bosnian (1 paper in each language).

As expected, there was a clear increase (almost exponential) in the number of articles that addressed ESG scores in relation to corporate performance, from 1 in 2009 and 2010 each to 365 in 2023 (see ***Figure 1***). 11 articles are also signalled as being published in 2024. Although not included in the analysis, we have also used a newer feature of Scopus that shows preprints from 2017 onwards from several repositories (arXiv, ChemRxiv, bioRxiv, medRxiv, SSRN, TechRxiv, and Research Square). The search identified 196 works as Preprints, most of them from the Social Science Research Network (SSRN). These figures suggest that the global interest on sustainability issues, building on the climate change threats and the international agreements that address them (most importantly the Paris Agreement in 2015), has incentivized scholarly research on business performance correlated with or driven by actions and strategies in sustainability. At the same time, increased data availability and the growth of the open access publishing have also forcefully fuelled this field of research.

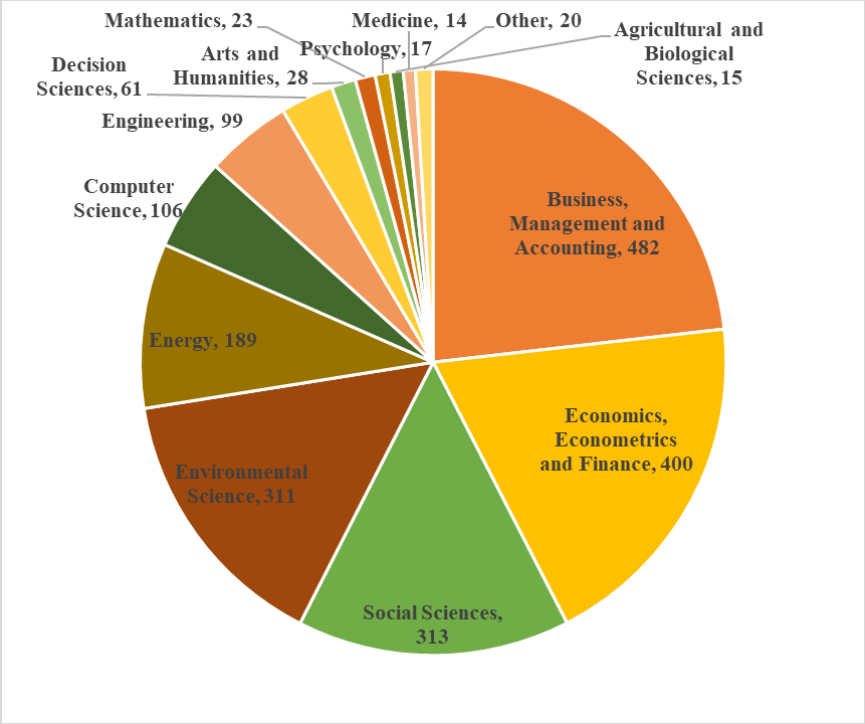
Figure 1. Evolution of number of articles per year, 2009-2024



Source: Authors' work using Scopus data

When observing the subject areas associated with the journals where these studies were published, ***Figure 2*** shows that Business, Management and Accounting included most articles (482, or 50.4% of articles), followed by Economics, Econometrics and Finance (400, or 41.8%), Social Sciences (313, or 32.7%), Environmental Science (311, or 32.5%), and Energy (189, or 19.7%). As a note, the percentage go beyond 100% because a journal may correspond to one or more subject areas. Besides these five areas, other important subject areas that hosted papers on the link between ESG ratings and corporate performance (at least 14) were Engineering, Decision Sciences, Arts and Humanities, Mathematics, Psychology, Agricultural and Biological Sciences, and Medicine. Other domains included less papers, varying between 1 and 13. This diversity of subject areas is a proof that the interest on sustainability encompasses more domains than Economics or Business or the environment. At the same time, the concentration of papers in Economics and Business is natural, given that this research direction focuses on firms' sustainability actions.

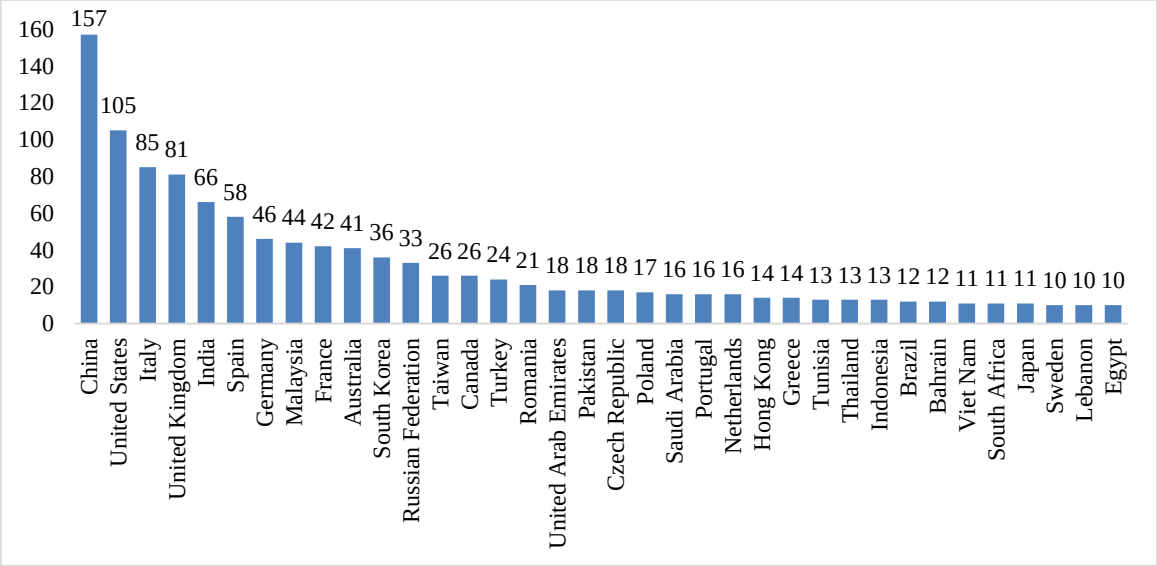
Figure 2. The most important subject areas



Source: Authors' work using Scopus data

Authors from all over the world have contributed to the development of this research field. ***Figure 3*** presents the countries with most contributions over the 2009-2024 period – 36 countries with more than 10 papers each. China is on the first place, with 157 articles, followed by the United States (105 articles), Italy (85 articles), United Kingdom (81 articles) and India (66 articles). Overall, scholars from 86 countries were interested in the relationship between ESG ratings and business performance, which shows the global scope of concerns related to the sustainable practices.

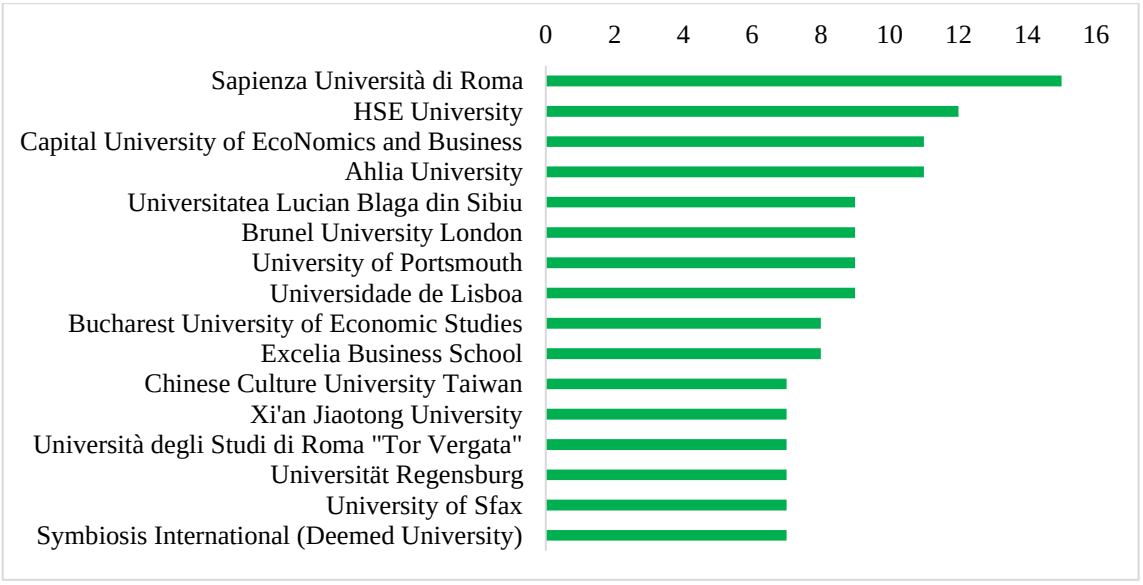
Figure 3. Countries with most articles



Source: Authors' work using Scopus data

Going from countries to institutions, we note 171 universities, research institutes, companies and other bodies that scholars authoring the 957 articles are affiliated with (***Figure 4***). On the first place is the Sapienza Università di Roma (Italy) – 15 articles, followed by HSE University (Russia) - 12 articles, Capital University of Economics and Business (China) – 11 articles, and Ahlia University (Bahrain) – 11 articles. Several universities contributed to this field with 9 articles each - "Lucian Blaga" University of Sibiu, Brunel University London, University of Portsmouth, and Universidade de Lisboa, while the Bucharest University of Economic Studies and Excelia Business School contributed each with 8 articles to the development of this research field. Again, the high number of institutions where scholars are affiliated demonstrates a widespread interest in sustainability and its connections to business opportunities and risks.

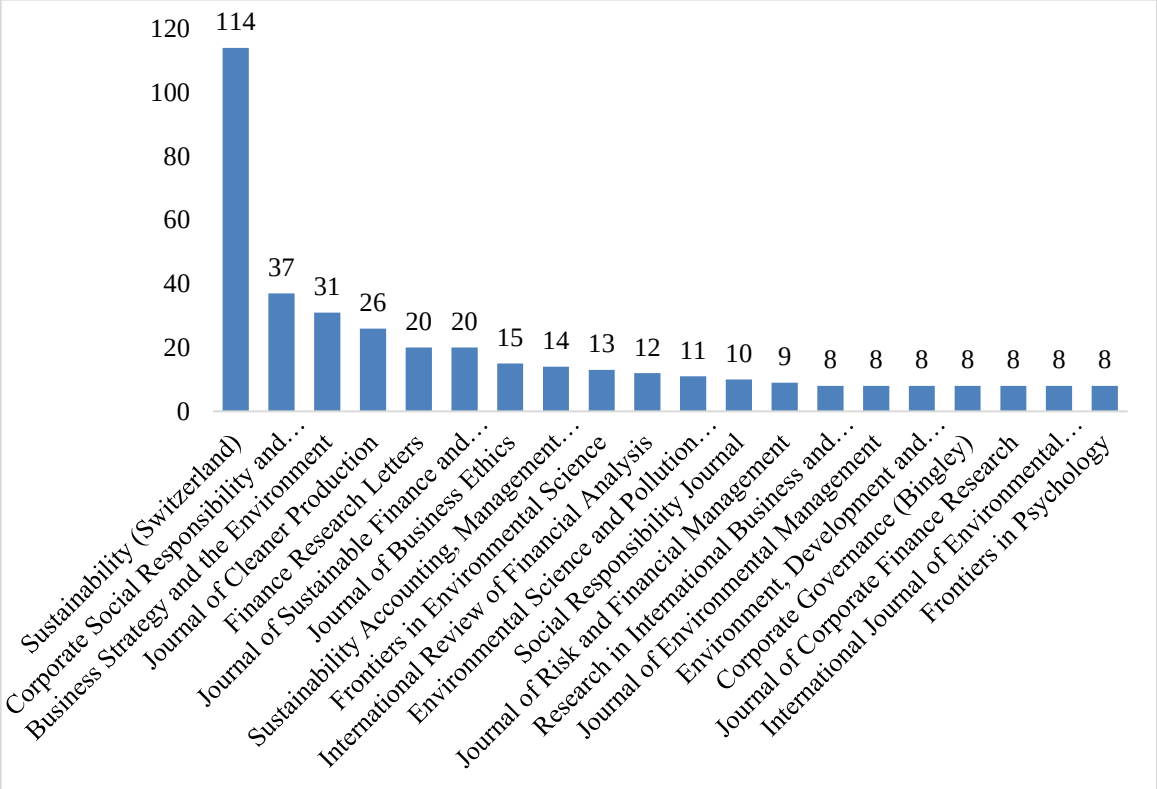
Figure 4. Institutions with most articles contributed to the research on ESG ratings and corporate performance



Source: Authors' work using Scopus data

Scholarly works on the association between business sustainability as reflected in ESG ratings and performance were hosted by 352 journals. ***Figure 5*** presents the 20 journals with the highest number of papers published on the topics. Overall, publication outlets are numerous, strengthening the broad multidisciplinary interest towards this topic revealed by the number of countries and authors' affiliations. It is no surprise that Sustainability records the highest number of contributions (114, or 11.9% of all papers), as the journal specializes in research on sustainability (also suggested by its name). The second and third places are occupied by the journals Social Responsibility and Environmental Management (37 papers) and Business Strategy and the Environment (31 papers), but at an appreciable distance from Sustainability. At least 20 papers were also published each on Journal of Cleaner Production (26), Finance Research Letters (20) and Journal of Sustainable Finance and Investment (20).

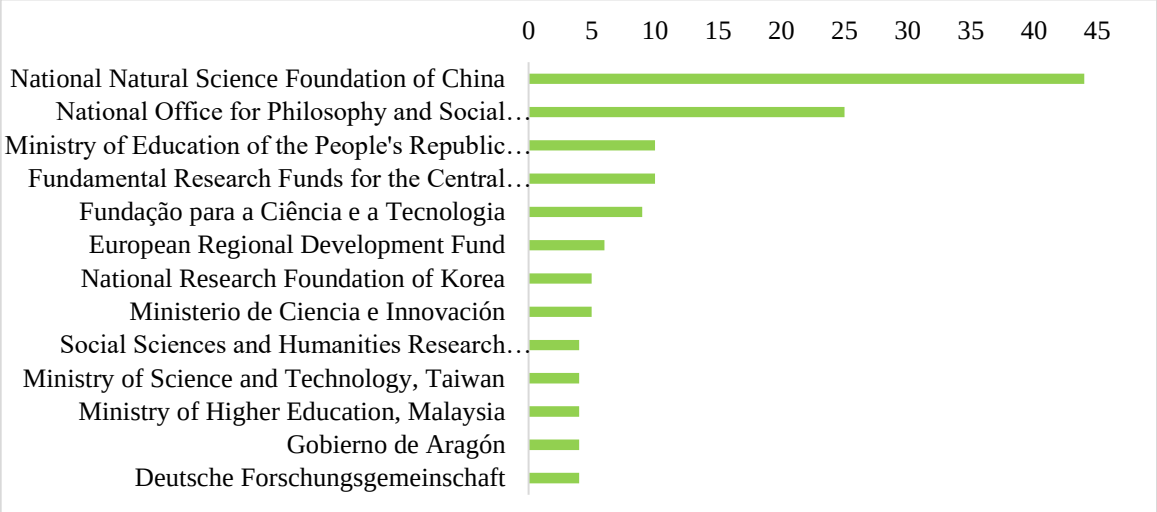
Figure 5. The most important journals on ESG ratings and corporate performance



Source: Authors' work using Scopus data

Before discussing the most important research avenues within the topic of interest, we believe it is of interest to briefly look at the most important public and private funders or sponsors of the research pertaining to ESG, sustainability and corporate performance. The Scopus database has information about 148 funders, of which the most important in terms of papers are shown in ***Figure 6***.

Figure 6. The most important funders/sponsors of works on ESG ratings and corporate performance



Source: Authors' work using Scopus data

It is also worth noting that several papers report two or more funders, while in 673 papers no mention of a founder or sponsor was made by the authors. The first four most important founders of papers on the topic are Chinese, being mentioned 89 times by the authors. This is explained by the massive funding of research in China in the last years, which led to a huge increase in the number of publications authored and co-authored by Chinese authors (Gao et al., 2019). European Union countries are present in the top funders ranking in five positions, of which three are Spanish funding bodies (Fundação para a Ciência e a Tecnologia, Ministerio de Ciencia e Innovación and Gobierno de Aragón, which funded research presented in 18 papers). The other two European funders reported are the European regional Development Fund (6 papers) and Deutsche Forschungsgemeinschaft (4 papers).

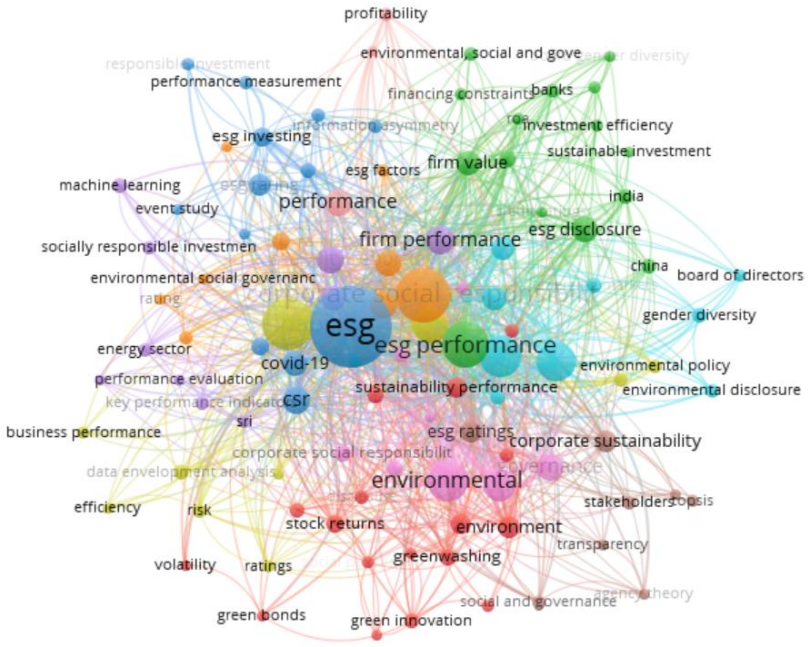
With the aim of identifying the most approached aspects of the interrelationship between ESG ratings and business performance we have used one of the literature mapping tools available, VOSviewer, version 1.6.20 (van Eck and Waltman, 2010). The software is highly used in bibliometric analysis in various fields (Ding and Yang, 2022; Kuzior and Sina, 2022; Achim et al., 2022). With the help of VOSviewer we create maps of research directions using the information provided by Scopus on author-provided keywords – we prefer to use these and not the keywords added by the journals and/or publishers because they tend to be closer to the content of the papers; the latter are usually inserted to improve paper discovery, which helps in the citation process. Each keyword receives a strength, which is weighted by the software using the number of occurrences across papers (van Eck and Waltman, 2010). Further, the map shows the keywords with most occurrences and the relationship between the keywords using clusters of different colours. In the map, the circles surrounding the keywords indicate the number of occurrences – the bigger they are, the more frequently used the keyword is -, and the thickness of the lines connecting the keywords represents the strength of the links between the keywords (i.e., the thicker the line, the more often the two keywords show up in research papers together).

Figure 7 shows the keywords mapping for the works on ESG ratings and corporate performance based on Scopus information for 957 papers. To obtain the map we conditioned the software to work with keywords with at least 6 occurrences (the default number is 5, but we considered 6 a more appropriate number given the high number of

papers), which resulted in 103 keywords. The keyword "ESG" was most used in the research (292 occurrences), followed by "corporate social responsibility" (129 occurrences), "sustainability" (118 occurrences), "environmental" (74 occurrences) and "financial performance" (80 occurrences). These are also the keywords with the highest link strengths, which means that they were mostly found together with the other keywords in extant research on this topic.

When we consider the clusters of topics, we identified 10 of them, visible with different colouring in ***Figure 7***. The presence of keywords in a cluster indicates that they were frequently used together by scholars in their papers, thus signalling a research sub-topic. The largest by number of keywords included is coloured in red and contains 17 items, showing research focused on ESG ratings/scores connected to digital transformation, green finance and innovation, stock returns, financial constraints, and volatility. The second most populated cluster, represented in green, includes 15 keywords, and focuses on banks, credit ratings, firm value and financial measures of performance (Return on assets and Tobin's q), but also on board gender diversity. For the remaining clusters, the number of keywords included varies between 13 and 3.

Figure 7. Mapping of keywords used in research on ESG ratings and corporate performance



Source: Authors' work in VOSviewer using Scopus data

Table 1 presents the top ten keywords used by scholars, jointly with their occurrences and total link strength.

Table 1. Keyword occurrences and link strengths

Keyword	Occurrences	Total link strength
ESG	292	492

Corporate social responsibility	129	246
Sustainability	118	221
Environmental	74	190
Financial performance	80	166
Corporate governance	69	158
Social	47	156
ESG performance	97	156
Governance	35	115
Sustainable development	58	107

Source: Authors' work in VOSviewer using Scopus data

Of significant interest for our paper objective is the presence of research on the manufacturing sector as signalled by the keywords. Therefore, we searched among keywords for those potentially related to manufacturing. Very interesting, the only sector that shows up as a separate keyword is the energy sector (in cluster 5, in mauve color). We have changed the search parameters to 5 and 5 common occurrences of keywords and no keywords related to manufacturing were identified. We interpret this finding as a significant research gap in ESG ratings related to business performance in the manufacturing sector. The next section of the paper addresses this gap by providing an in-depth analysis of the existing literature with a focus on the manufacturing sector.

4. ESG Ratings and Corporate Performance in Manufacturing

Several studies discuss ESG practices and their influence over corporate performance either via a moderating factor or not, both at global level or only at country level. As nearly half of the global carbon emission comes from emerging countries operating in manufacturing sector (Crippa et al., 2022) but also because of the fact the sustainability management practices have a lower adoption rate in developing countries there appeared the need for a study on this particular topic hence the focus of several papers on this topic.

Table 2. Summary of the existing literature on environmental, social and governance (ESG), firm performance and sustainability in manufacturing

Authors	Period and coverage	Empirical model	Main input variable(s)	Output(s)
Hassan, Y., Roychowdhury, S. (2019).	2010-2016; emerging countries	Panel data (Granger causality and regression analysis)	Thomson Reuter ESG score; Return on Equity; Return on Assets; Debt to Equity; Price to Book Value	Causal relationship between sustainability and financial performance for manufacturing sector
Saini, N., Anjuman, A., Angappa, G., Kunjana, M., Suganya, B. (2022)	2012-2020; India	Panel data (GMM)	Return on Assets; Tobin's Q; ESG score; Foreign ownership; Age; Size; Capital Expenditure; Research & Development; Capital expenditure	Impact of ESG disclosure on financial performance
Li, H., Guo, H., Xinyao, H., Xuan, Z. (2023)	2015-2022; China	Panel data (two-way fixed effects)	Stock returns; ESG ratings; Volatility; Market Value; Shareholder's equity; Ratio of fixed assets to total assets; Beta coefficient; Book-to-market;	Impact of ESG ratings of firms on a specific firm's ESG rating and its effect on the stock return

			Momentum	
Buallay, A. (2019)	2008-2017; worldwide	Pooled data (multivariate model)	ESG; Return on Assets; Return on Equity; Tobin's Q; Leverage; Total Assets; GDP; Governance	Effects of sustainability reporting on firm performance
Ye, J., Moslehpour, M., Tu, Y.-T., Vinh, N.T., Ngo, T.Q., Nguyen, S.V. (2022)	China	Cross-sectional data	Investment on Environmental Issues; Investment on Governance Issues; Investment on Social Issues; Organizational Effectiveness; Sustainable Development Goals	Effects of ESG activities on achieving sustainable development goals via organizational effectiveness in the case of manufacturing companies
Lestari, K.C., Soewarno, N. (2023)	2016-2020; Indonesia	Panel data	Tobin's Q; Female Directors/Total Number of Directors; Green Innovation; Firm Size; Firm Age; Leverage; Foreign Ownership; Board Size; Board Independence	Influence of female directors on firm value via green innovation in the case of manufacturing companies
Zanin, L. (2021)	2017-2019; worldwide	Multivariate ordinal logit model	Refinitiv ESG score; Total assets; Return on Assets; Leverage; Current ratio; Beta coefficient	Effects of ESG scores on corporate credit ratings in manufacturing, mining and quarrying, wholesale and retail trade, information and communication, real estate
Liu, Y., Kim, C.Y., Lee, E. H. (2022)	China	Cross-sectional data (Moderated mediation model)	Overall performance; Market share; Average growth rate of annual sales; Return on sales; ESG activities; Non-financial performance; Institutional environment; Industry type; Firm size; Firm age; Research & Development	Effect of non-financial performance and institutional environment on the relationship between firms' ESG activities and their financial performance
Wu, Y., Tham, J. (2023)	China	Cross-sectional data (structural equation model)	Top management team characteristics; Executive green incentives; ESG performance; Corporate value	Impact of green incentives and management characteristics on corporate value for manufacturing firms
Khan, U., Liu, W. (2023)	2012-2020; China	Panel data	ESG return; Tobin's Q; Return on Assets; Reputation; Green innovation; Firm size	Impact of ESG on firm performance with green innovation as mediating factor for manufacturing sector
Guo, X., Guo, K., Kong, L. (2023)	2005-2020; China	Panel data	Industrial agglomeration; ESG performance; Assets size; Capital structure;	Impact of industrial agglomeration on corporate ESG

			Cash flow; Growability; Board size; Board independence; Equity structure; Property rights; Accounting information quality	performance for manufacturing sector
Xu, X., Zizhen, L. (2023)	2014-2021; China	Panel data (fixed effects and moderated effects)	Return on Assets; ESG of Huazheng Index Information Service; Cultural Distance; Market capitalization; Leverage ratio; Capital expenditures; Research & Development; Intangible Assets; Foreign Institutional Ownership; State Owned Enterprises	Impact of ESG on corporate profitability for manufacturing sector
Jianqiang, G, Rong, L., Juan, X. (2022).	China	Cross-sectional data (structural equation model)	ESG investment; External data element embedding; Organizational agility; Environmental uncertainty; Enterprise performance	Effects of ESG investment and data element embedding on manufacturing enterprises performance
Zhou, S., Rashid, M., Zobair, S., Sobhani, F., Siddik, A. (2023)	Bangladesh	Cross-sectional data (partial least squares structural equation model)	Corporate governance performance; Environmental performance; Innovation performance; Social performance; Sustainability performance	Impact of ESG and innovation performance on sustainability performance in the manufacturing sector
Zhao, Q., Li, X., Li, S. (2023)	China	Cross-sectional data	ESG scores; Business digitalization; Platform digitalization; Green process innovation; Green product innovation	Digital transformation impact on ESG via green innovation in case of manufacturing companies
Sreepriya, J., Suprabha, K.R. (2023)	2010-2019; India	Panel data (GMM model)	Corporate sustainability disclosure; GRI compliance of the firm; Turnover; Tobin's Q; Enterprise value added; Research and Development expenditure; Debt to equity ratio; Size; Liquidity ratio; Environmentally sensitive industries	Effects of GRI compliance on manufacturing enterprises performance

Source: Authors' work

Looking at the global manufacturing sector, Hassan and Roychowdhury (2019) used the Thomson-Reuters ESG scores to assess the sustainability performance of the firms together with ROA, ROE as profitability indicators and debt to equity and price to book value as measures of financial performance for the years 2010-2016. Their findings show ESG indicators negatively impact the financial performance of the firms. Additionally, because small businesses are prevalent in emerging nations, they are less inclined to engage in CSR because of their limited resources and lack of visibility. Similar to Udayasankar (2008), the low visibility prevents them from predicting the higher long-term positive outcome

associated with sustainability practices. According to the authors, the absence of severe penalties has hindered the progress made by proponents of corporate social responsibility (CSR) movements. As a result, it is imperative to create components that encourage firms to embrace CSR voluntarily by governments.

Generating different results, Saini et al. (2022) find that ESG disclosures are positively and substantially associated to performance indicators (results similar with those of Saini and Singhania, 2019; Abdi et al., 2022a; Abdi et al., 2022b). Such disclosures not only come at a cost to the firm in a developing country, but they also help to increase profits by building a solid reputation (Saini and Singhania, 2019; Hui and Matsunaga, 2014). Supply chain practices, which are primarily social and environmental in nature, have a positive and considerable influence on short-run performance metrics. Another aspect that might contribute to enhanced overall performance is enterprises' capacity to adopt both socially and environmentally responsible supply chain activities in a mature system and this maturity enables them to benefit from the development benefits of higher payoffs. Authors explain further that ESG-rated organizations are more likely to be profitable since their broad customer base prioritizes loyalty and value generation. In contrast, a poor perception of the firm leads to lawsuits, revenue loss, significant financial risk, and rising debt costs. Such controversies may harm the firm's reputation and raise agency expenses. In today's difficult circumstances, ESG measures are viewed as a life jacket for enterprises considering downsizing. However, if the business engages in greenwashing methods, the firm's reputation in the eyes of stakeholders may suffer. As a result, ESG standards help to control the link between financial success and company reputation (results similar to Mohammad and Wasiuzzaman, 2021; Porter et al., 2019).

Furthermore, and following the path of reporting disclosure, Sreepriya et al. (2023) use signaling theory (which states that organizations aim to transmit information to less knowledgeable persons in order to lessen information asymmetry (Spence, 1973) to investigate and decipher the black box of GRI (Global Reporting Initiative) compliance's moderating function in the link between CSD (corporate sustainability disclosure) and corporate value. In case of the Indian manufacturing sector, CSD and GRI compliance positively affects firm value. These findings corroborate the theoretical hypothesis that GRI-compliant enterprises have greater market value despite the costs involved and that the investors value much more the companies which disclose GRI and adhere to GRI standards more than does who do not. Thus, implementing sustainability initiatives benefits firms, stakeholders and society overall. Extending the analysis of sustainability reporting to a worldwide sample comprising both manufacturing and services, Buallay (2019) draws the conclusion that ESG has a favorable impact on the manufacturing sector's operational, financial, and market performance but the opposite happens in case of the services sector. The author claims that these findings suggest that the services sector is still a long way from implementing sustainability policies that would best serve their needs and increase investor confidence.

Next, the effects of ESG scores on credit ratings of enterprises in North America, Europe, and Asia engaged in manufacturing, mining and quarrying, wholesale and retail trade, information and communication, and real estate activities show that environment ESG score had the greatest impact on Credit Rating Agencies ratings for mining and quarrying activities. In other words, the positive effects of the environmental score on ratings imply that firms that manage environmental issues better than their industry peers are perceived as more resilient to long-term risks and opportunities to transition to a low-carbon economy and are rewarded by credit rating agencies (Zanin, 2021). In the same vein, Li et al. (2023)

study the influence of ESG ratings on stock performance for Chinese A-share listed companies from January 2015 to May 2022 and the spillover effect of the average ESG rating scores of firms located in the same city to the ESG rating score of one firm. Authors discover that businesses in the same region receive peer pressure from other firms' ESG ratings, and that stock performance is inversely connected to ESG ratings. More specifically, the impact of ESG ratings on stock return is greater for non-manufacturing, non-SOE enterprises, and firms situated in prefecture-level cities.

Among the moderating variables employed in literature to study the relationship between ESG and company performance there are cultural distance, green innovation, institutional environment, green incentives, organizational agility, etc. Using legitimacy theory on a sample of Chinese manufacturing companies, Xu et al. (2023) find that ESG has a positive and significant relationship with corporate profitability, but the effect is moderated by cultural distance. Thus, corporations are more likely to enhance their ESG when establishing subsidiaries in host countries with a greater cultural distance from China in order to achieve legitimacy and so boost corporate profitability. Among the recommendations pointed out by the authors are firstly, the positive impact of ESG to corporate profitability implies that growing ESG is one of the ways for firms to increase profits. As a result, it is critical to enhance corporate understanding of ESG engagement and investor awareness of ESG investments. The government should encourage enterprises to engage in ESG practices in such a manner that they no longer perceive ESG as a method to earn a 'green label' at an additional expense, but rather as an instructive instrument to support their long-term green development and progressively enhance corporate profitability. Secondly, because cultural distance influences the relationship between ESG and corporate profitability, multinational corporations should be more proactive in developing ESG when establishing subsidiaries in a host country with a greater cultural distance from their home country. By providing more ESG incentives to multinational firms that undertake outbound investments in a host country with a wider cultural distance, the government may strengthen the relevant incentive mechanism and maintain steady corporate development.

Khan et al. (2023) confirmed the link between Chinese firms' ESG activities and the effect of each component on the company's financial and non-financial performance via the moderating effect of green innovation. There is a negative relationship between ESG activities and financial performance, relationship explained by enterprises performing ESG activities as a result of the Chinese government's heavy intervention and pressure which increases expenses and reduces earnings. On the contrary, active social responsibility initiatives will play a significant part in establishing stakeholder confidence, boosting the external image and having a positive overall effect on the non-financial dimension of the company. Last but not least, green innovation proves to mitigate the unfavorable effect of a company's ESG environmental dimension on financial performance.

Parting from stakeholder theory, legitimacy theory and institutional theory, Liu et al. (2022) analyze the role of non-financial performance as measured by stakeholder satisfaction level, employee satisfaction level, social reputation, brand value and external image as a mediator between ESG and financial performance. Additionally, they look at how different institutional environments influence the link between corporate performance and decision-making. Findings show that ESG activities for sustainable management may have a major influence on financial performance by boosting non-financial performance such as business reputation, image, employee happiness, and loyalty. Furthermore, social activities have the greatest influence on financial performance, whereas environmental activities have the

greatest impact on non-financial success. Moreover, when government and competitor pressure increases, the beneficial impact of environmental efforts on financial success via non-financial performance grows stronger. The favorable influence of social activities on financial success via non-financial performance is greater as competitive and consumer demands increase. Institutional pressure, on the other hand, has no effect on the favorable impact of governance activities on financial performance via non-financial performance. These findings are consistent with the literature on institutional theory, which suggests that high levels of institutional pressure from the government, consumers, and competitors may be a major driving factor in strengthening enterprises' sustainable management practices, which in turn improves their performance.

Wu et al. (2023) fill a gap in the literature by providing pathways and recommendations for sustaining economic development during corporate green transformation while also serving as a theoretical exploration toward maximizing stakeholders' interests. They examine the viability of selecting top management teams that contribute to the characteristics of corporate transformation toward sustainability in order to address the limited rationality dilemma using principal-agent theory, stakeholder theory, upper echelon theory, and tournament incentive theory. Hence, implementing ESG practices increases corporate value and opens the door for translating company's social value into economic value. Executive green incentives and top management team features improve a company's ESG performance. Notably, driving ESG adoption through executive green incentives has a greater partial mediation impact than driving ESG implementation through top management team characteristics.

Using the same country as studying material, Jianqiang et al. (2022) research the way in which ESG investment and data element embedding affect firm performance for the manufacturing sector. Organizational agility is found to be the mediating factor between these three variables. In other words, managers should consider data elements and ESG investments when making strategic decisions to enhance organizational agility, which ultimately improves business performance. While environmental uncertainty does not significantly change the external data element embedding, it does demonstrate that environmental uncertainty has a negative moderating influence on the impact of corporate ESG investment on organizational agility. Meanwhile, the study's conclusions show that the impact of data element embedding on organizational agility changes according on how unpredictable the surrounding environment is. Specifically, the more unpredictable the environment, the less of an influence ESG investment has on organizational agility.

Lestari et al. (2023) use upper echelons theory (which states that firms decisions and policies depend on the structure and cognitive performance of the executive board – Hambrick and Mason, 1984) and natural resource-based view (NBRV) (which states a firm's competitive advantage comes from its resources which are unique, valuable, rare, irreplaceable and difficult to imitate – Hart, 1995) to study how green innovation can mediate the influence of female directors on firm value. Authors part from the hypothesis that female directors may not be able to influence the firm value directly, but female directors will first influence green innovation which in turn affects the firm value. Results show that having a diverse mix of genders on a company's board of directors will directly boost the value of the company. The study's findings are consistent with those of Hoobler et al. (2018), Agyemang-Mintah and Schadewitz (2019), and Perryman et al. (2016). Also, women are more environmentally sensitive than males are (Elmagrhi et al., 2019; Glass and Cook, 2018), so having more women on the board will encourage green innovation. According to research, women are more likely than men to take the effects of climate

change seriously, to adopt more eco-friendly lifestyles, to take the initiative in environmental reform initiatives, and to be critical of the policies that are currently in place (Horbach and Jacob, 2018). The findings of the study indicate that environmentally friendly innovation improves resource productivity and operational efficiency in addition to having a positive influence on the environment. Therefore, by speaking up for actions that are focused on environmental sustainability and improving firm value, female directors can encourage green innovation.

By giving ESG concerns top priority, organizations may evaluate economic risks and opportunities while managing their environmental and social impact. Furthermore, as the corporate environment increasingly prioritizes environmental, social, and governance (ESG) factors, the Sustainable Development Goals (SDGs) created by the United Nations are becoming acknowledged as a useful framework for responsible investing. Nevertheless, there are not many studies examining how business ESG performance relates to the UN Sustainable Development Goals (SDGs) or how firm ESG indicators contribute to sustainability, which is the subject of the following discussion.

The manufacturing sector's agglomeration—defined as "a form of spatial organization in which the same industry or related enterprises are relatively concentrated within a specific geographic scope" (Wang et al., 2023) significantly improves corporate ESG performance by reducing financial constraints and raising investment levels, according to a significant paper linking ESG performance to SDG goals written by Guo et al. (2023). Agglomeration externalities include knowledge spillover, pool of workers and input share. Also, the agglomeration of producer services sector has a “U-shaped” relationship with corporate ESG performance and the influence that the former has on the latter is done through market competitiveness and internal control. Depending on the characteristics of the enterprise, the degree of industrial agglomeration has varying effects on corporate ESG performance. In addition to this, manufacturing agglomeration primarily promotes the fulfilment of corporate environmental and social responsibility, while producer services agglomeration primarily affects the fulfillment of corporate environmental and governance responsibility. In conclusion, good ESG performance has a significant positive impact on the economic, socio-economic, and governance economic consequences of enterprises.

Another study focusing on factors that influence company ESG performance stresses that the higher the degree of digital transformation the better the enterprise ESG performance in large manufacturing enterprises (Zhao et al., 2023). Enterprise green innovation plays a critical role in this process. Corporate digital strategy might accomplish "quality enhancement" of green innovation and support the consistent growth of corporate ESG performance by integrating "process" and "product" innovation. Therefore, to foster an environment that is conducive to attaining sustainable growth, businesses should make clear the course of their digital transformation plan, place a strong emphasis on green innovation, and consistently enhance their ESG performance. Similarly, Zhou et al. (2023) confirm that ESG performance significantly affects firms’ sustainability performance and innovation performance plays a mediating role between them. They advise managers of firms in manufacturing to take into account eco-friendly initiatives and embrace new technologies and tactics, according to the report. Innovation in product design helps businesses reduce their environmentally harmful practices, such as the production of solid waste and greenhouse emissions, while also helping them please their consumers. What is more, companies should make the required efforts to train staff, maintain occupational health and safety, improve job security and pay, and attend to community and stakeholder issues in order to improve their reputation. Last but not least, authors claim that to

encourage green innovation and sustainable performance and eventually safeguard the environment, regulatory agencies and stakeholders at all levels should keep an eye on how industries are adhering to environmental laws and regulations.

Moving forward and exactly to the ESG-SDG paradigm via organizational effectiveness as moderating factor, Ye et al. (2022) investigate how investing strategies, such as those that address social, governance, and environmental challenges, affect the accomplishment of the SDGs with organizational effectiveness (as the source for the rise in profitability) as a mediator in the case of Chinese manufacturing companies. Their results demonstrate a positive correlation between investment strategies in social and environmental issues and the accomplishment of sustainable development goals. Thus, organizations which allocate sufficient funds for projects aimed at mitigating environmental problems such as pollution, global warming, waste disposal, ocean acidification and biodiversity loss enhance the quality of the environment hence achieves SDG. In a similar vein, the SDGs' focus on social concerns, economic challenges, public health difficulties, age discrimination, inequality, education issues, and employment issues are all eliminated by investing in social issues. Therefore, funding social concerns ensures that the SDGs will be met. Additionally, increased investment in social and ecological issues raises organizational effectiveness, which in turn raises the likelihood of achieving the SDGs.

5. Conclusions

This study has offered a thorough analysis of the research on the relationship between ESG ratings and company performance, with a special emphasis on the manufacturing sector. According to the bibliometric investigation, interest in this research topic has increased significantly since 2009, across a wide collection of journals and geographic locations. Scholars throughout the world are looking into how business sustainability actions and ESG indicators relate to various financial and non-financial performance factors.

The results paint a complex picture, with evidence pointing in both ways. Many studies have demonstrated a positive ESG-performance relationship, supporting the idea that sustainable practices can boost performance by improving reputation, risk management, long-term thinking, and stakeholder involvement. Other research, however, has found a minimal or even negative relationship between ESG scores and performance, demonstrating that sustainability measures do not always transfer into corporate profits, particularly in the short term. The manufacturing industry has its own quirks, as large manufacturers face higher demand for transparency and environmentally responsible operations, while small suppliers may lack the capacity to spend extensively on ESG actions.

Green innovation, cultural distance, and institutional factors have all been identified as crucial moderators in understanding the different ESG-performance relationships between nations and industries. A recent study also links ESG actions to attaining SDGs, improving organizational effectiveness, and digital transformation. The research concludes that ESG investing and sustainability practices are here to stay, however, implications may vary depending on industry, geography, and business characteristics.

This study makes several contributions. It does a thorough bibliometric study to chart the evolution of this research topic, finding significant themes such as CSR, environment, governance, and green finance. A detailed literature evaluation focusing exclusively on manufacturing fills a gap identified by conceptual keyword analysis. However, there are

limitations due to the subjectivity inherent in any review and the search for relevant literature. Further studies might improve on this work by investigating high-impact moderators, addressing causality difficulties using panel data, and making use of advances in ESG assessment. Attention could be paid to research in emerging markets and less "visible" industries other than manufacturing, investigating the potential of integrating sustainability into business success.

References:

Abdi, Y., Li, X., & Camara-Turull, X. (2022a). How financial performance influences investment in sustainable development initiatives in the airline industry: The moderation role of state-ownership. *Sustainable Development*, 30(5), 1-16. https://doi.org/10.1002/sd.2314

Abdi, Y. Li, X., & Camara-Turull, X. (2022b). Exploring the impact of sustainability (ESG) disclosure on firm value and financial performance (FP) in airline industry: the moderating role of size and age. *Environment, Development and Sustainability*, 24(4), 5052-5079. https://doi.org/10.1007/s10668-021-01649-w

Achim, M. V., Safta, I. L., Văidean, V. L., Mureșan, G. M., & Borlea, N. S. (2022). The impact of covid-19 on financial management: evidence from Romania. *Economic Research-Ekonomska Istraživanja*, 35(1), 1807-1832. https://doi.org/10.1080/1331677X.2021.1922090

Agyemang-Mintah, P. & Schadewitz, H. (2019). Gender diversity and firm value: evidence from UK financial institutions. *International Journal of Accounting and Information Management*, 27(1), 2-26. https://doi.org/10.1108/IJAIM-06-2017-0073

Atan, R., Alam, M. M., Said, J., & Zamri, M. (2018). The impacts of environmental, social, and governance factors on firm performance: Panel study of Malaysian companies. *Management of Environmental Quality*, 29 (2), 182–194. https://doi.org/10.1108/MEQ-03-2017-0033

Bhandari, K.R., Ranta, M., & Salo, J. (2022). The resource-based view, stakeholder capitalism, ESG and sustainable competitive advantage: The firm's embeddedness into ecology, society and governance. *Business Strategy and the Environment*, 31 (4), 1525-1537. https://doi.org/10.1002/bse.2967

Buallay, A. (2019). Sustainability reporting and firm's performance: comparative study between manufacturing and banking sectors. *International Journal of Productivity and Performance Management*, 69(3), 431-445. https://doi.org/10.1108/IJPPM-10-2018-0371

Crippa, M., Guizzardi, D., Banja, M., Solazzo, E., Muntean, M., Schaaf, E., Pagani, F., Monforti-Ferrario, F., Olivier, J.G.J., Quadrelli, R., Risquez Martin, A., Taghavi-Moharamli, P., Grassi, G., Rossi, S., Oom, D., Branco, A., San-Miguel, J., & Vignati, E. (2022). CO2 emissions of all world countries. *Publications Office of the European Union*. https://doi.org/10.2760/07904

Deegan, C., Rankin, M., & Voght, P. (2000). Firms' disclosure reactions to social incidents: Australian evidence. *Accounting forum*, 24(1), 101-130. https://doi.org/10.1111/1467-6303.00031

Ding, X., & Yang, Z. (2022). Knowledge mapping of platform research: a visual analysis using VOSviewer and CiteSpace. *Electronic Commerce Research*, 22, 787-809. https://doi.org/10.1007/s10660-020-09410-7

Duque-Grisales, E., & Aguilera-Caracuel, J. (2021). Environmental, social and governance (ESG) scores and financial performance of multilatinas: Moderating effects of geographic international diversification and financial slack. *Journal of Business Ethics,* 168, 315–334. https://doi.org/10.1007/s10551-019-04177-w

Elmagrhi, M.H., Ntim, C.G., Elamer, A.A., & Zhang, Q. (2019). A study of environmental policies and regulations, governance structures, and environmental performance: the role of female directors. *Business Strategy and the Environment*, 28(1), 206-220. https://doi.org/10.1002/bse.2250

Environmental Defense Fund (2023). This is why fighting climate change is so urgent. https://www.edf.org/climate/why-fighting-climate-change-so-urgent

European Parliament (2023). EU measures against climate change. https://www.europarl.europa.eu/news/en/headlines/society/20180703STO07129/eu-measures-against-climate-change?&at_campaign=20234-Green&at_medium=Google_Ads&at_platform=Search&at_creation=RSA&at_goal=TR_G&at_audience=climate%20change&at_topic=Climate_Change&at_location=RO&gclid=EAIaIQobChMIjqnCrtHAggMVsURBAh0n0wbsEAMYASAAEgJHC_D_BwE

Farooq, R. (2023). Knowledge management and performance: a bibliometric analysis based on Scopus and WOS data (1988–2021). *Journal of Knowledge Management*, 27(7), 1948-1991. https://doi.org/10.1108/JKM-06-2022-0443

Freeman, R.E. (1984). *Strategic management: a stakeholder approach*. Pitman.

Gao, J. P., Su, C., Wang, H. Y., Zhai, L. H., & Pan, Y. T. (2019). Research fund evaluation based on academic publication output analysis: The case of Chinese research fund evaluation. *Scientometrics*, 119, 959-972. https://doi.org/10.1007/s11192-019-03073-4

Giese, G., Lee, L.E., Melas, D., Nagy, Z., & Nishikawa, L. (2019). Foundations of ESG Investing: How ESG Affects Equity Valuation, Risk, and Performance. *The Journal of Portfolio Management*, 45 (5), 69-83. https://doi.org/10.3905/jpm.2019.45.5.069

Glass, C., & Cook, A. (2018). Do women leaders promote positive change? Analyzing the effect of gender on business practices an diversity initiatives. *Human Resource Management*, 57(4), 823-837. https://doi.org/10.1002/hrm.21838

Global Sustainable Investment Alliance (2021). Global Sustainable Investment Review 2020. https://www.gsi-alliance.org/wp-content/uploads/2021/08/GSIR-20201.pdf

Guo, X., Guo, K., & Kong, L. (2023). Industrial agglomeration and corporate ESG performance: empirical evidence from manufacturing and producer services. *Sustainability*, 15, 1-23. https://doi.org/10.3390/su151612445

Hambrick, D.C., & Mason, P.A. (1984). Upper echelons: the organization as a reflection of its top managers. *The Academy of Management Review*, 9(2), 193-206. https://doi.org/10.2307/258434

Hart, S.L. (1995). A natural-resource-based view of the firm. *The Academy of Management Review*, 20(4), 986-1014. https://doi.org/10.5465/amr.1995.9512280033

Haryono, U., & Iskandar, R. (2015). Corporate social performance and firm value, *International Journal of Business and Management Invention*, 4(11), 69-75.

Hassan, Y., & Roychowdhury, S. (2019). Nexus between sustainability management and financial performance – study on manufacturing firms from global emerging market. *International Journal of Environment, Workplace and Employment*, 5(3), 206-2019. https://doi.org/10.1504/IJEWE.2019.10025138

Hoobler, J.M., Masterson, C.R., Nkomo, S.M., & Michel. E.J. (2018). The business case for women leaders: meta-analysis, research critique, and path forward. *Journal of Management*, 44(6), 2473-2499. https://doi.org/10.1177/0149206316628643

Horbach, J., & Jacob, J. (2018). The relevance of personal characteristics and gender diversity for (eco) innovation activities at the firm-level: results from a linked employer-employee database in Germany. *Business Strategy and the Environment*, 27(7), 924-934. https://doi.org/10.1002/bse.2042

Horobet, A., & Belascu, L. (2012). Corporate Social Responsibility at the Global Level: An Investigation of Performances and Integration of Socially Responsible Investments. *Economics & Sociology*, 5 (2A), 24-44. https://doi.org/10.14254/2071-789X.2012/5-2a/4

Horobet, A., Mnohoghitnei, I., Dumitrescu, D. G., Curea, S. C., & Belascu, L. (2022). An Empirical Assessment of the Financial Development–Environmental Quality Nexus in the European Union. *Amfiteatru Economic*, 24(61), 613-629. https://doi.org/10.24818/EA/2022/61/613

Hui, K.W., & Matsunaga, S.R. (2014). Are CEOs and CFOs rewarded for disclosure quality? *The Accounting Review*, 90(3), 1013-1047. http://dx.doi.org/10.2139/ssrn.2285239

Jianqiang, G, Rong, L., & Juan, X. (2022). Data element embedding and firm performance: the influence of ESG investment. *Frontiers in Environmental Science*, 10:974399. https://doi.org/10.3389/fenvs.2022.974399

Khan, M., Serafeim, G., & Yoon, A. (2016). Corporate Sustainability: First Evidence on Materiality. *The Accounting Review*, 91(6), 1697-1724. https://doi.org/10.2308/accr-51383

Khan, U., & Liu, W. (2023). The link between green innovations, corporate performance, ESG activities, and sharing economy. *Environmental Science and Pollution Research*, 30(32), 1-13. https://doi.org/10.1007/s11356-023-27722-7

Kipper, L. M., Furstenau, L. B., Hoppe, D., Frozza, R., & Iepsen, S. (2020). Scopus scientific mapping production in industry 4.0 (2011–2018): a bibliometric analysis. *International Journal of Production Research*, 58(6), 1605-1627. https://doi.org/10.1080/00207543.2019.1671625

Kuzior, A., & Sira, M. (2022). A bibliometric analysis of blockchain technology research using VOSviewer. *Sustainability*, 14(13), 8206. https://doi.org/10.3390/su14138206

Lestari, K.C., & Soewarno, N. (2023). Do female directors influence firm value? The mediating role of green innovation. *Gender in Management*. https://doi.org/10.1108/GM-08-2022-0281

Li, F., & Polychronopoulos, A. (2020). What a difference an ESG ratings provider makes! *Research Affiliates*. https://www.researchaffiliates.com/content/dam/ra/publications/pdf/770-what-a-difference-an-esg-ratings-provider-makes.pdf

Li, H., Guo, H., Xinyao, H., & Xuan, Z. (2023). The ESG rating, spillover of ESG ratings, and stock return: evidence from Chinese listed firms. *Pacific-Basin Finance Journal*, 80 (C), 102091. https://doi.org/10.1016/j.pacfin.2023.102091

Liu, H., Kim, C. Y., & Lee, E. H. (2022). Relationship between sustainable management activities and financial performance: mediating effects of non-financial performance and moderating effects of institutional environment. *Sustainability*, 14 (3), 1168. https://doi.org/10.3390/su14031168

Mattera, M., & Soto, F. (2023). Dodging the bullet: overcoming the financial impact of Ukraine armed conflict with sustainable business strategies and environmental approaches. *The Journal of Risk Finance*, 24(1), 122-142. https://doi.org/10.1108/JRF-04-2022-0092

Mohammad, W.M.W., & Wasiuzzaman, S. (2021). Environmental, Social and Governance (ESG) disclosure, competitive advantage and performance of firms in Malaysia. *Cleaner Environmental Systems*, 2(4), 100015. https://doi.org/10.1016/j.cesys.2021.100015

Perryman, A.A., Fernando, G.D. & Tripathy, A. (2016). Do gender differences persist? An examination of gender diversity on firm performance, risk and executive compensation. *Journal of Business Research*, 69(2), 579-586. https://doi.org/10.1016/j.jbusres.2015.05.013

Pokharel, S., Chandrashekar, M. (1999). Revisiting rural energy analysis. *International Journal of Environment and Pollution*, 12(2-3), 179-190.

Porter, M., Serafeim, G., & Kramer, M. (2019). Where ESG fails. *Institutional investor*. https://www.institutionalinvestor.com/article/2bswdin8nvg922puxdzwg/opinion/where-esg-fails

Raut, R.K., Shastri, N., Mishra, A.K. & Tiwari, A.K. (2023), "Investor's values and investment decision towards ESG stocks", *Review of Accounting and Finance*, 22 (4), 449-465. https://doi.org/10.1108/RAF-12-2022-0353

Ruan, L., & Liu, H. (2021). Environmental, Social, Governance Activities and Firm Performance: Evidence from China. *Sustainability*, 13 (2), 767. https://doi.org/10.3390/su13020767

Saini, N., & Singhania, M. (2019). Performance relevance of environmental and social disclosures: the role of foreign ownership. Benchmarking: *An International Journal*, 26(6), 1845-1873.

Saini, N., Anjuman, A., Angappa, G., Kunjana, M., & Suganya, B. (2022). Environment-social-governance disclosure nexus between financial performance: a sustainable value chain approach. *Resources, Conservation and Recycling*, 186, 106571. https://doi.org/10.1016/j.resconrec.2022.106571

Sang, K., & Li, Z. (2021). Understanding the Impact of ESG Practices in Corporate Finance. *Sustainability*, 13 (7), 3746. https://doi.org/10.3390/su13073746

Schaltegger, S. & Wagner, M. (2006). Integrative management of sustainability performance, measurement, and reporting. *International Journal of Accounting, Auditing and Performance Evaluation*, 3(1), 1-19. https://doi.org/10.1504/IJAAPE.2006.010098

Servaes, H., & Tamayo, A. (2013). The impact of corporate social responsibility on firm value: the role of customer awareness. *Management Science*, 59(5), 1045-1061. https://doi.org/10.1287/mnsc.1120.1630

Shahrour, M.H., Arouri, M. & Lemand, R. (2023), "On the foundations of firm climate risk exposure", *Review of Accounting and Finance*, 22 (5), 620-635. https://doi.org/10.1108/RAF-05-2023-0163

Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics*, 87(3), 355-374. https://doi.org/10.2307/1882010

Spiliakos, A. (2018). What does sustainability mean in business? *Harvard Business Review* https://online.hbs.edu/blog/post/what-is-sustainability-in-business

Sreepriya, J., & Suprabha, K.R. (2023). Does GRI compliance moderate the impact of sustainability disclosure on firm value? *Society and Business Review*, 18(1), 152-174. https://doi.org/10.1108/SBR-06-2022-0172

Tudor, C. D., Horobet, A., Mnohoghithei, I., Sova, R., & Belascu, L. (2023). Decarbonization through carbon intensity mitigation: evidence from global and income-based panels. *Economic Research-Ekonomska Istraživanja*, 36(3), 2188420. https://doi.org/10.1080/1331677X.2023.2188420

Udayasankar, K. (2008). Corporate social responsibility and firm size. *Journal of Business Ethics*, 83(2), 167-175. https://doi.org/10.1007/s10551-007-9609-8

United Nations Climate Change (2022). Five key takeaways from COP27. https://unfccc.int/process-and-meetings/conferences/sharm-el-sheikh-climate-change-conference-november-2022/five-key-takeaways-from-cop27

Van Eck, N., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523-538. https://doi.org/10.1007/s11192-009-0146-3

Wang, Y., Liu, J., Zhao, Z., Ren, J., & Chen, X. (2023). Research on carbon emission reduction effect of China's regional digital trade under the "double carbon" target—combination of the regulatory role of industrial agglomeration and carbon emissions trading mechanism. *Journal of Cleaner Production*, 405, 137049. https://doi.org/10.1016/j.jclepro.2023.137049

Whelan, T., Atz, U., Van Holt, T. & Clark, C. (2021). ESG and financial performance: Uncovering the relationship by aggregating evidence from 1,000 plus studies published between 2015-2020. *New York: NYU STERN Center for sustainable business*.

Wu, Y., & Tham, J. (2023). The impact of executive green incentives and top management team characteristics on corporate value in China: the mediating role of environment, social and government performance. *Sustainability*, 15, 12518. https://doi.org/10.3390/su151612518

Xu, X., & Zizhen, L. (2023). ESG, cultural distance and corporate profitability: evidence from Chinese multinationals. *Sustainability*, 15(8), 6771. https://doi.org/10.3390/su15086771

Ye, J., Moslehpour, M., Tu, Y.-T., Vinh, N.T., Ngo, T.Q., & Nguyen, S.V. (2022). Investment on environmental social and governance activities and its impact on achieving sustainable development goals: evidence from Chinese manufacturing firms. *Economic Research-Economska Istrazivanja*, 36(1), 333-356. https://doi.org/10.1080/1331677X.2022.2076145

Yoon, B., Lee, J., & Byun, R. (2018). Does ESG performance enhance firm value? Evidence from Korea. *Sustainability*, 1010 (10), 1-18. https://doi.org/10.3390/su10103635

Zanin, L. (2021). Estimating the effects of ESG scores on corporate credit ratings using multivariate ordinal logit regression. *Empirical Economics*, 62, 3087-3118. https://doi.org/10.1007/s00181-021-02121-4

Zhao, Q., Li, X., & Li, S. (2023). Analyzing the relationship between digital transformation strategy and ESG performance in large manufacturing enterprises: the mediating role of green innovation. *Sustainability*, 15 (13), 9998. https://doi.org/10.3390/su15139998

Zhou, S., Rashid, M., Zobair, S., Sobhani, F., & Siddik, A. (2023). Does ESG Impact Firms' Sustainability Performance? The Mediating Effect of Innovation Performance. *Sustainability*, 15 (6), 1586. https://doi.org/10.3390/su15065586