UNIVERSITA' DEGLI STUDI DI PADOVA

DIPARTIMENTO DI SCIENZE ECONOMICHE ED AZIENDALI
"M. FANNO"

CORSO DI LAUREA MAGISTRALE IN

BUSINESS ADMINISTRATION

TESI DI LAUREA

"EXPLORING ESG RATINGS FOR NON-LISTED COMPANIES"

RELATORE:

CH.MO PROF. ANTONIO PARBONETTI

LAUREANDA: LUDOVICA SCARSATO

MATRICOLA N. 1238387

ANNO ACCADEMICO 2021 – 2022

Dichiaro di aver preso visione del "Regolamento antiplagio" approvato dal Consiglio del Dipartimento di Scienze Economiche e Aziendali e, consapevole delle conseguenze derivanti da dichiarazioni mendaci, dichiaro che il presente lavoro non è già stato sottoposto, in tutto o in parte, per il conseguimento di un titolo accademico in altre Università italiane o straniere. Dichiaro inoltre che tutte le fonti utilizzate per la realizzazione del presente lavoro, inclusi i materiali digitali, sono state correttamente citate nel corpo del testo e nella sezione 'Riferimenti bibliografici'.

I hereby declare that I have read and understood the "Anti-plagiarism rules and regulations" approved by the Council of the Department of Economics and Management and I am aware of the consequences of making false statements. I declare that this piece of work has not been previously submitted – either fully or partially – for fulfilling the requirements of an academic degree, whether in Italy or abroad. Furthermore, I declare that the references used for this work – including the digital materials – have been appropriately cited and acknowledged in the text and in the section 'References'.

Firma (signature) Ludovica Scarsato

TABLE OF CONTENTS

INTRODUCTION

Nowadays global warming is becoming a hot topic, not only from an environmental point of view but also from an economic one. Companies are increasingly involved with environmental, social and governance (ESG) issues as they are particularly affected in terms of revenue and profitability by this important emergency that has been characterising the world in recent years. It is in this context that there is a growing awareness of the importance to integrate ESG into their business model to better address the challenge of managing the consequences of climate change and mitigation strategies. It is therefore important to find a methodology to measure how sustainable a company is, which is why ESG rating agencies have sprung up. In particular, they assign an ESG score and/or rating to companies based on their commitment to implement activities that respect environmental, social and governance issues. However, nowadays this is only possible for listed companies that, thanks to non-financial reporting indications provided by various organisations, publish information about their activities from which the agencies derive the ESG data needed to construct the rating. Although private companies have a great potential in the dissemination of sustainability practices as they present the most suitable environment for incorporating and implementing sustainable investment approaches, there is no measurement methodology aimed at them since, as the word suggests, they keep their documentation private, thus making it difficult to collect the necessary data. For this reason, this thesis is focused on exploring an indicator on the basis of some easily available economic variables that is able to reflect the level of sustainability of private companies. In particular, the work is structured in three distinct chapters.

The first chapter represents the theoretical part and firstly provides an overview of sustainable development and specifically of corporate sustainability, focusing on the difference with Corporate Social Responsibility (CSR), an aspect with which it is easily confused, and on the reasons why companies should be interested in sustainability. It then explores the topic of sustainability from two different perspectives: the corporate perspective and the perspective of investors interested in investing in sustainability. In the first case, the tools most used by companies to transform their traditional business model into a sustainable business model that incorporates sustainability-oriented concepts, principles, and objectives through the process of business model innovation are presented and the relationship between sustainability and financial performance is analysed as it is a controversial topic much debated over the years by various authors due to the significant importance it assumes. In the second case, the focus is on sustainable investing, whose origins and

evolution over the years and the strategies adopted by investors for its implementation are reported. In this regard, the ESG factors, the undisputed protagonists of sustainability today, are presented. The chapter concludes with a paragraph on a question much debated in the literature: how much is it worth investing in companies with a high level of sustainability?

Sustainable investment is based on ESG ratings, which serve as indicators of a company's level of sustainability and are the main focus of the second chapter. First, the most widely used standards for non-financial reporting, which underlies the collection of ESG data, are explored and in particular the new approach developed by the WEF is presented, whose aim is to provide a set of standardised and globally usable metrics. The focus then shifts to ESG rating agencies and assessment methodologies, dwelling on the process adopted by MSCI ESG Research, Sustainalytics and Refinitiv as they are the most important agencies in terms of the number of companies assessed. It then discusses issues relating to the reliability of ESG ratings, due to differences between ratings referring to the same company, lack of transparency in the data and other biases, which is why investors are required to pay particular attention when interpreting them. Finally, the criticalities for which current ESG rating methods cannot be used for private companies are shown.

The third chapter presents the construction and analysis of a possible indicator able to reflect the level of sustainability of private companies. In particular, the analysis focuses on the construction sector as it is particularly sensitive to ESG issues. At first, the indicator is created on the basis of a set of variables calculated using only publicly available data directly related to ESG. Then, after selecting the companies with the best and worst indicator values, an ESG score is determined and assigned to them, calculated on the basis of the ESG information they report in their financial statements and websites. The effectiveness of the indicator is then tested by analysing its correlation with the ESG scores obtained from the sub-sample. If the analysis shows a positive correlation, i.e. the companies deemed best by the indicator show a higher ESG score and the worst companies show a lower ESG score, then the calculated indicator reflects the company's level of sustainability and represents a valuable tool that can be used in the future by investors without the need for time-consuming manual research and analysis.

CHAPTER 1 - CORPORATE SUSTAINABILITY AND SUSTAINABLE INVESTING

1.1 Sustainable development and corporate sustainability: definition and main aspects

Over the last 50 years, there has been a growing awareness that the natural resources exploited for economic growth so far are of limited availability and thus may be depleted, and consequently, that limits must be placed on their uncontrolled use in order to undertake sustainable and environmentally friendly economic growth. This has given rise to the concept of sustainability, understood as the characteristic of a process or state that can be maintained at a certain level indefinitely. There is no single definition of sustainability as it is adapted to different contexts and points of view, however, there is the universally accepted definition of *Sustainable Development* published in the Brudtland Report (1987) by the World Commission on Environment and Development (WCED), an entity of the United Nations, according to which sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". This concept puts carrying capacity first, i.e. the "maximum number of organisms that can be supported by a given habitat, based on the amount of resources available (such as food, nutrients, shelter, and space)" (Shorrocks, 2001), in a perspective of intergenerational equity so that future generations may have the same opportunities. This concept focuses only on the ecological aspect of sustainability, but it will later be extended to include economic and social aspects, since the only form of sustainable progress is one that considers these three interconnected aspects at the same time, as well as the three pillars of sustainability also known as the 3Ps - profits, planet and people - which will be discussed later.

Very often the concepts of ‘sustainability’ and ‘sustainable development’ are used interchangeably, however, they refer to two different aspects, as sustainable development is understood as the process through which sustainability is achieved, seen as the ultimate goal (Diesendorf, 1999).

From the general definition, more than 300 definitions have emerged in relation to different actors and contexts. Corporations are only one of many actors as they contribute to the sustainability or unsustainability of the planet through certain business choices such as the use of raw materials and suppliers, geographical locations, manufacturing processes, employment and labour practices etc. (Diesendorf, 1999). For this reason, the so-called ‘corporate sustainability’ is particularly important. As Linnenluecke and Griffiths (2009) report, definitions vary depending on which aspect organisations choose to focus on when classifying corporate sustainability and on the

development of the concept itself over the years. In the past, Shrivastava considered it to be primarily an ecological issue and suggested four different methods to achieve it: total quality environment management, ecological sustainable competitive strategies, technology for nature swaps, and corporate population impact control; for Carroll, it was an organisational social responsibility; Dyllick and Hockerts integrated corporate economic activities with organisational concern for the natural and social environment. Finally, a more recent definition is given by Lozano (2013) according to whom corporate sustainability refers to "business activities that proactively seek to contribute to sustainability balances, including today's economic, environmental, and social dimensions, as well as their interrelationships within and across the time dimension (i.e., the short, long, and long-term), by addressing business systems" (p. 33). Some scholars, such as Berger, Cunningham, & Drumwright, use the term 'corporate social responsibility' to describe the integration of the three aspects of sustainability into an organisation's decision-making, strategy and operations, however, these two concepts should not be confused as there are some differences.

The large number of definitions and the different theories associated with them developed over the years have caused ambiguity and uncertainty even regarding their relationship, despite the unsuccessful attempt of some scholars to resolve this confusion. However, for the concept of Corporate Social Responsibility (CSR) we can stick to Carroll's 1979 definition, the most famous and quoted, according to which "the social responsibility of business encompasses the economic, legal, ethical, and discretionary expectations that society has of organisations at a given point in time" (Montiel, 2008, p. 252). Although CSR and Corporate Sustainability (CS) share the aspect of balancing economic, social and environmental aspects and are both considered 'voluntary business activities' (Lo, 2010), CSR is considered a process to manage social problems with stakeholders, while CS is understood as a method to achieve ecological balance (Kleine & Hauff, 2009). From the literature review conducted by Ivan Montiel in 2008, it appears that: the three aspects are considered independent when dealing with CSR, interconnected when talking about CS; CSR gives a use value useful to humankind, while CS gives an intrinsic value for its own sake; finally, CSR is limited to stakeholder theory, while CS is associated with resource-based view, motivation and institutional theory paying attention to the whole value chain. Considering the vision, CSR looks backward and reflects on the contribution made to society as opposed to CS which looks forward and develops a sustainable strategy for the future, while the motivation behind CSR is rooted in the reputation of the company as opposed to the motivation of CS which is the creation of new opportunities for emerging markets. There are different perspectives on the

relationship between the two concepts: for some scholars, corporate sustainability is a supplementary approach used to understand CSR (Garriga and Melè, 2004), while for others, as reported in the paper by Sarvaiya and Wu (2013), CSR can be integrated into corporate sustainability as a transitional phase that a company goes through in its implementation path towards corporate sustainability (Lo, 2010), or it can be considered a real pillar representing the dimension of a broader concept such as corporate sustainability, despite the fact that the latter tends to focus on environmental issues (Sharma and Rudd, 2003).

In their essay *Beyond the Business Case for Corporate Sustainability* (2002), Dylick and Hockerts present three key aspects of corporate sustainability that are necessary to achieve the needs of the company's stakeholders without compromising the ability to meet the needs of future stakeholders as well. The first is the integration of ecological, economic and social aspects, considered to be the three pillars of sustainability, into a 'triple bottom line' approach, a method for measuring sustainability coined by Elkington in 1994, as focusing on just one dimension is not sufficient to achieve overall corporate sustainability. However, these three aspects are not universal even if commonly used, indeed other pillars are allowed such as institutional, cultural, and technical. The second aspect concerns the integration of the short-term vision with the long-term one. Many times, companies prefer to focus on short-term profits going against the spirit of sustainability that requires meeting stakeholders' needs also in the future. Finally, the third and last aspect regards the consumption of income and not capital as a condition to achieve long-term sustainability. In this respect, it should be pointed out that there are different types of capital to be managed, each associated with one of the above-mentioned pillars: natural, economic and social capital. Ecological sustainability is usually the one that gets the most attention and concerns the protection of the ecosystem and the renewal of natural resources. It is based on the idea that natural capital, consisting of renewable and non-renewable natural resources and ecosystem services, will be depleted at some point if industrial organisms consume natural capital at a rate above the rate of natural reproduction or development of substitutes, cause emissions to accumulate in the environment at a rate above the capacity of the natural system to absorb them, and undertake activities that damage ecosystem services (Ayres, 1995). Economic sustainability can be defined as the ability of an economic system to generate sustained growth in economic indicators and requires the management of different types of capital, such as financial, tangible and intangible. It is achieved when the company is able to provide sufficient cash flows at all times to ensure liquidity while producing a persistent above-average return for its shareholders. Finally, social sustainability

is the ability to ensure that conditions of human well-being are equitably distributed. Equity is understood to be both intragenerational, implying equal access to resources for all inhabitants of the planet, and intergenerational, ensuring the same development opportunities for future generations. It is achieved when the company is able to add value to the community within which it works by increasing the human capital of individual partners, such as skills, motivation and loyalty, and by promoting the social capital of communities, such as the quality of public services and infrastructure.

1.1.1 Sustainable Development Goals (SDGs)

In order to achieve sustainable development, in 2015 the United Nations (UN) adopted 17 Sustainable Development Goals to be reached by 2030, also known as the 2030 Agenda, named after the document that states them, *Transforming our world: the 2030 Agenda for Sustainable Development*. The 17 goals are divided into 169 targets, which "will stimulate action over the next 15 years in areas of critical importance to humanity and the planet" (UN 2015), and 230 indicators, useful for monitoring progress against the goals. In their paper *The Sustainable Development Goals and the systems approach to sustainability* (2017), Barbier and Burgess analyse the relationship between the 17 goals and the systems approach to sustainability, i.e. the approach that "depicts sustainable development as an intersection of the goals attributed to three interconnected systems: environmental, economic and social" (p. 3) that takes up the concept of the triple bottom line, mentioned above, and they associate each goal with one of the three dimensions that best suits it. They thus identify seven goals of the economic system, five environmental system goals and five social system goals. The objectives of the economic system are represented by goal 1-*No poverty*, 2-*Zero hunger*, 3-G*ood health and well-being*, 6-C*lean water and sanitation*, 7-*Affordable and clean energy*, 8-*Good jobs and economic growth* and 9-*Industry, innovation and infrastructure*; those of the social system by number 4-*Quality education*, 5-*Gender equality*, 10-*Reduced inequalities*, 16-*Peace, justice and strong institutions* and 17-*Partnerships for the goals*; and finally those of the environmental system by number 11-*Sustainable cities and communities*, 12-*Responsible consumption and prosecution*, 13-*Climate action*, 14-*Life below water* and 15-*Life on land*. Although some objectives may belong to more than one system at the same time, the authors chose to proceed with this subdivision in order to better understand them from the perspective of the system approach. However, this approach has some limitations in terms of applicability. Although Barbier (1987) points out that sustainable development can only be achieved by balancing the trade-offs between the various objectives of different systems, he adds that it is

inevitable that some trade-offs will be accepted because "it is not possible to maximise all these objectives all the time" (p. 4), yet the approach offers no guidance on how to manage these trade-offs. A solution is suggested by Holmberg and Sandbrook (2019), who state that "it is therefore necessary to choose which objectives should be given higher priority. Different development strategies will assign different priorities" (p. 24).

1.1.2 Reasons why companies should care about sustainability

As mentioned above, sustainability is becoming increasingly important to all companies and, as a result, expectations of corporate responsibility are increasing, as is transparency. Companies are therefore recognising the need to act with sustainability in mind. But why should a company take the time and effort to implement changes to its business model in order to achieve sustainability?

First of all, sustainability is now seen as a strategic element that can be the basis for a lasting competitive advantage, indeed companies that build strong relationships with all their stakeholders tend to be longer-lived and more successful in the long run. This thought is also confirmed by a survey conducted by Nielsen, a leading market research company, according to which companies should focus on sustainability to increase their value as the new generations, such as Millennials but especially Generation Z, are very attentive to this issue and are increasingly willing to change their habits in order to reduce their environmental impact.

Another driver of sustainability is the reduction of production costs through a more efficient and rational use of materials and energy that are very often reused and transformed into inputs or marketable products. Companies must be able to protect finite resources to avoid an increase in their cost due to scarcity, or they must find alternative resources. A sustainable business reduces the risks of litigation and boycotts resulting from the perception of bad practices by consumers (Diesendorf, 1999), whose expectations will be exceeded by the new sustainability-oriented practices adopted by the company. This leads to an improvement in customer loyalty and in the bond with the company from a commercial and value perspective, which results in the creation of brand value and in the improvement of the company's reputation. Consequently, an improved reputation attracts new customers interested in sustainability, which creates new revenues. By adopting sustainable practices, it is possible to gain a market advantage and product differentiation obtained through an environmentally friendly and socially just product and to better understand the market by being ready for change thanks to the drive towards innovation that characterises the sustainable company. Being sustainable also increases the productivity and loyalty of workers who

are more motivated to work as they see the value in what the company is doing and attracts 'talent', i.e. workers of the younger generation who are willing to accept a lower salary in order to work in a company that is responsible with regard to sustainability.

According to Metzger, a senior associate at the World Resources Institute, while companies initially adopted sustainable strategies to comply with regulations, they now do so to have a voice in the conversation about environmental policy. In addition, according to Area Development, in some countries the government offers tax incentives to companies that decide to undertake sustainable programmes, such as property tax reductions, sales tax exemptions, income tax credits, and accelerated depreciation for certain capital expenditures. These incentives together with the economic and strategic benefits mentioned above can make sustainability more financially feasible. Finally, there is a growing trend towards responsible investment, which will be discussed in more detail in section 1.3, as investors are increasingly attracted to companies with a high sustainability rate.

1.2 Transformation of traditional business models into sustainable business models

In order to achieve certain sustainable goals, the company has to adopt a business model that is suitable for the ultimate goal and thus move from a traditional business model to a sustainable business model, changing its way of creating and adding value (Bocken et al., 2014), not only financial but also non-financial, through the integration of environmental and social aspects to economic ones. This requirement stems from the fact that the main purpose of a business model, i.e. profit generation, is actually also linked to social and environmental issues. Confirming this, the research conducted by Comin et al. (2019) reports that sustainable business models are a viable alternative for solving social and environmental problems, as they contain high levels of economic, social, and environmental innovation and create inclusive value. Although some businesses develop incremental innovations to approach sustainability, this is not sufficient to achieve a successful green transformation. The company must therefore take a sustainable perspective that must be included in the traditional business model through an integrative approach, it must pay special attention to all stakeholders and not only the end consumer, as collaboration, sharing and networking can benefit the achievement of sustainability, and it must set up new governance models. The results achieved will not only be relevant for the company itself but also for government and society as the company will be more aware of and involved in society's needs.

The concept of business model has been defined in various ways by different authors who have not found a general agreement, however, the commonly accepted definition describes the business model as a tool that reports the logic of how a company does business and how it creates, delivers and captures value, thus reflecting the company's strategy and its position within the value chain. Moreover, it is the means that supports the transformation process both in the case of the introduction of an innovation and a change in the organisation. It can be described through nine basic building blocks presented by Osterwalder and Pigneur in their paper *Business Model Generation* (2010) and divided into the four main areas of a business: the customer area includes the Customer Segments building block that defines the different groups of people a company serves, the Channels building block that describes how a company communicates and reaches its customers, and the Customer Relationships building block that identifies the type of relationships the company establishes with its customers; to the supply area belongs the Value Proposition building block that describes the set of products and services that meet the customer's needs; to the infrastructure area the Key Resources, Activities and Partnership building blocks that describe respectively the most important assets and things to do, and the network of suppliers and partners that make the business model work; finally, the area of financial feasibility includes the Revenue Streams building block that represents the money the company generates and the Cost Structure building block that defines the costs incurred to operate the business. These nine building blocks form the basis for the Business Model Canvas, a strategic management template used for developing new business models and documenting existing ones, which is useful thanks to its graphical representation in helping users to understand the relationships between the various elements of a business model and the impact they might have on value creation and facilitates the discussion and discovery of potential innovations. While Osterwalder and Pigneur argue that the use of the canvas can lead to more sustainability-oriented value creation through the alignment of purpose and profit, according to other scholars, environmental and social value is implicitly de-emphasised by the concept of 'profit first' or economic value orientation. Therefore, the development of a new tool that allows the explicit integration of social, environmental, and economic values into an overall vision of corporate sustainability is needed. The solution is given by Joyce and Paquin (2016) through the introduction of the Triple Layered Business Model Canvas, a tool born from the integration of the Triple Bottom Line concept to the traditional business model canvas. However, it will be presented in detail in section 1.2.3.

Sustainable business models are therefore considered a modification of the traditional business model in that they incorporate concepts, principles or objectives that aim at sustainability and integrate sustainability within the value proposition, value creation and delivery activities and/or value capture mechanisms (Evans et al., 2017). In this regard, Boons and Lüdeke-Freund (2013) present four characteristics that distinguish a sustainable business model from a traditional business model: the value proposition is an ecological or social value in accordance with an economic one, indeed the sustainable business model is considered a tool for delivering social and environmental sustainability to industrial systems; in the supply chain, suppliers also feel a responsibility towards stakeholders; sustainable business models encourage sustainable consumption (customer interface); finally, the financial model of sustainable business models must also take into account the ecological and social impacts of the company in addition to the distribution of costs and economic benefits.

1.2.1 Sustainable Business Model Innovation

The concept of Business Model Innovation (BMI) was born to understand and facilitate the analysis and planning of the transformation from one business model to another and the possession of this capability brings the company a sustainable competitive advantage as it is able to adapt to changes in the environment (Mitchell and Coles, 2003) without sustaining major difficulties. From this, the concept of Sustainable Business Model Innovation (SBMI) is developed, whose definition by Bocken et al. (2014) describes it as "innovations that create significant positive and/or significantly reduced negative impacts for the environment and/or society, through changes in the way the organisation and its value-network create, deliver value and capture value (i.e. create economic value) or change their value propositions." (p. 44). According to Schaltegger, Lüdeke-Freund and Hansen (2012), a company undertaking the process of sustainable business model innovation has to fulfil three requirements:

1. The company must contribute to the solution of social or environmental problems by carrying out voluntary or primarily voluntary activities that are not merely a reaction to regulations and law enforcement or part of the normal course of business;
2. The activity must contribute positively to the company's success by creating a positive economic effect, either directly or indirectly, such as cost savings, increased sales or competitiveness, improved profitability or customer reputation;
3. The management activity involving social, environmental and economic effects must be clearly and convincingly argued.

At this point, the company can adopt one of the four types of sustainable business model innovation presented by Geissdoerfer et al. (2018) to implement the transformation of its business model: sustainable start-ups allow the creation of a new organisation with a sustainable business model; through sustainable business model transformation the existing business model is changed into a sustainable business model; sustainable business model diversification does not imply a complete transformation but only some changes; finally, through sustainable business model acquisition, a sustainable business model is identified, acquired and integrated into the existing one.

1.2.2 Sustainable business model archetypes: an implementation strategy

These types of innovations should form the basis for the implementation of some useful strategies to identify different types of sustainable business models. Bocken et al. (2014) identified eight generic sustainable business model strategies, recently updated by Ritala et al. (2018) who added one, called 'archetypes'. The archetypes are classified into higher order groupings describing the main innovation model - technological, social or organizational - based on Boons and Lüdeke-Freund's (2013) classification of innovation types and taking up the triple bottom line concept by substituting 'environmental' for technological and 'economic' for organisational. Furthermore, they are defined on the basis of the components of the business model canvas (value proposition, value creation & delivery and value capture) and presented together with some examples which demonstrate how each component can lead to sustainable innovation.

The technological (environmental) cluster includes archetypes with a dominant technical innovation component such as production processes and product redesign, presented below. *Maximise material and energy efficiency* means "do more with fewer resources, generating less waste, emissions and pollution" (p. 48), a concept that focuses on trying to mitigate the environmental impact of industry through reduced demand for energy and resources and that should affect the whole company in order for an improvement in the value proposition to occur. This archetype is typical of the manufacturing industry, indeed it involves topics such as lean, eco-efficiency and cleaner production; however improvements in production efficiency may eliminate traditional manufacturing jobs and thus bring about social sustainability issues. *Create value from 'waste'* implies the transformation of what is considered waste into useful inputs for other productions, thus trying to reduce the environmental impact of industry by reducing the continuous demand for resources and improving their efficiency; however, the speed at which new products are introduced must be slowed down in order to achieve greater success. This archetype captures the idea of circular economy, which is considered the first of the four possible types of sustainable

business models defined by Geissdoerfer et al. (2018). Finally, *Substitute with renewables and natural processes* involves reducing environmental impact by decreasing the use of finite resources by replacing them with renewable resources and natural processes to create more environmentally friendly industrial processes.

The social grouping includes three archetypes with a dominant social innovation component such as innovations in consumer offerings and changes in consumer behaviour. *Deliver functionality, rather than ownership* means satisfying consumer needs through services that do not presuppose the possession of the physical product, a concept that underlies Product Service Systems and Servitisation, another possible type of sustainable business model; the product remains important, but the customer experience becomes fundamental to the value proposition. The archetype allows the breaking of the link between profit and production volume, the reduction of resource consumption, the improvement of efficiency, product longevity and material reuse. The archetype *Adopt a stewardship role* ensures the long-term health and well-being of all stakeholders in order to maximise the company's social and environmental impacts in society but achieves the greatest benefits in combination with other archetypes. *Encourage sufficiency* refers to solutions that attempt to reduce consumption as well as production, which is the only way to achieve a sustainable future, including the appropriate use of advertising, sales and growth targets that could consequently reduce material and energy flows.

Finally, the organisational (economic) grouping includes two archetypes with a dominant organisational innovation component, such as the change in the fiduciary responsibility of the firm, and the archetype introduced by Ritala et al. in the following review. The archetype *Re-purpose the business for society/environment* shifts the focus from maximising economic profit to achieving social and environmental benefits through a close relationship with stakeholders, thus helping to drive the fundamental purpose of business and consequently a global change in the economy. Social enterprises, considered by Geissdoerfer et al. (2018) to be one of the types of sustainable business models, are also given as examples. The last archetype of the eight developed by Bocken et al., *Develop scale-up solutions*, provides sustainable solutions on a large scale as sustainable business models are increasingly prevalent also in multinational corporations that could take a key role in the development of social and environmental sustainability globally. Finally, the *Inclusive value creation* archetype added later by Ritala et al., concerns the sharing of resources, knowledge, ownership and value creation and presents innovations to the last of the sustainable business model typologies among the examples, that of the bottom of pyramid business (Prahalad, 2009) which

involves the creation of value for customer segments that are little considered or in a situation of poverty.

These archetypes are a good starting point for the integration of sustainable value innovation; however, they do not provide detailed and concrete guidelines for its implementation.

1.2.3 The Triple Layered Business Model Canvas: an interesting tool for BMI

Joyce and Paquin (2016) propose another tool, anticipated in section 1.2, that the organisation can use to assess the opportunities and directions to follow to make a business model sustainable: the Triple Layered Business Model Canvas (TLBMC). It is an extension of the traditional Business Model Canvas (Osterwalder and Pigneur, 2009) that allows to take a more general view through the addition of two layers, the environmental layer based on the life cycle perspective and the social layer based on the stakeholder perspective. The triple layered structure allows users to better understand the relationship between the actions taken by an organisation and the economic, environmental and social impacts they have. The TLBMC is therefore presented in a triple bottom line approach, integrating economic, environmental, and social aspects into the creation of economic value. This creates a horizontal coherence within each stratum, which assesses each type of value individually, and a vertical coherence between the different strata, which identifies the connections between them, to create a more global vision that links different types of value creation into a single business model.

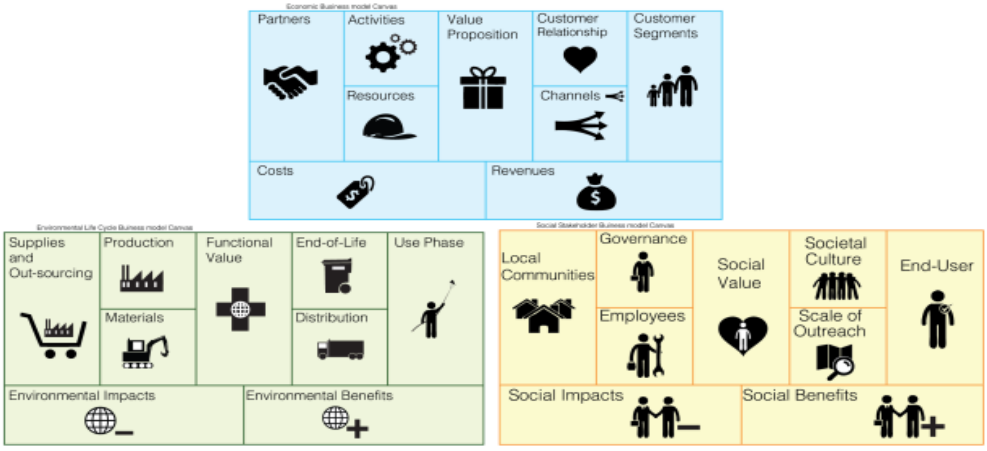


Figure 1. Triple layered business model canvas (Joyce & Paquin, 2016)

This tool offers help to organisations facing challenges related to sustainability-oriented change, now considered a key driver of innovation, thanks to a framework that facilitates the identification of different impacts in the business model and supports communication and collaboration for the development of more sustainable business models, according to Boons and Lüdeke-Freund (2013).

In the following, the environmental and social layers will be analysed, as the economic layer has already been discussed in the presentation of the Business Model Canvas in section 1.2.

The environmental layer assesses how the organisation generates more environmental benefits than negative impacts and makes it easier to identify which areas of the business are impacted by negative impacts and where more attention should be paid to creating environmentally oriented innovations. As can be seen from Figure 1, environmental impacts can be tracked by nine indicators:

- *Functional value* is the total value of outputs consumed by customers over a given period of time and is useful for understanding both the subject of environmental analysis and the impact of possible alternative business models;
- *Materials* represent the environmental extension of the 'key resources' presented in the traditional Business Model Canvas and include the bio-physical supplies used to generate functional value, particularly those that have a high environmental impact;
- *Production*, similar to materials, is the environmental extension of the 'key activities' of the original Business Model Canvas and includes the actions taken by the organization to capture value that have a high environmental impact;
- *Supplies and Out-sourcing* include all materials and activities that are not considered 'core' to the organization;
- *Distribution* involves the transportation of goods and is the combination of transport methods, distances covered and weights of what is shipped, as well as packaging and delivery logistics;
- *Use phase* evaluates the participation of the customer in the functional value through the use/consumption of the service/product;
- *End-of-life* has to do with issues related to the reuse of materials at the moment when the customer decides to end the consumption/use of the product/service. This allows the organisation to find new ways to manage the environmental impact it will have or new business models to adopt;
- *Environmental impacts* report the ecological costs of actions, in addition to the financial costs, measured through indicators such as CO2 emissions, impact on the ecosystem, depletion of natural resources etc.;
- *Environmental benefits* describe the ecological value that the organisation creates through the reduction of environmental impact and the positive regenerative ecological value and

provides an opportunity to discover innovations that can contribute positively to the environmental impact.

The social layer, as mentioned above, analyses the social impact of an organisation through a stakeholder-oriented approach aimed at balancing their interests rather than profit maximisation. Again, the canvas allows to find the areas most impacted by social aspects and those that offer an opportunity to innovate activities, or business model, to increase social value creation and presents nine components that constitute it:

- *Social value* concerns the creation of benefits for stakeholders and society as a whole, that is the mission especially of sustainability-oriented companies;
- *Employees* are considered one of the main stakeholders and therefore the most important aspects related to them are presented in detail, such as their amount and type, some demographics such as variations pay, gender etc. and some programmes oriented to them to increase the vitality and long-term success of the organisation;
- *Governance* refers to the organisational structure and decision-making policies on the basis of which organisations differentiate themselves and identifies the stakeholders involved;
- *Communities* refer to the social relationships with suppliers and local communities whose development and maintenance of mutual benefit influences the success of an organisation. Different communities constitute different stakeholders with different cultural needs if the organisation has facilities in different countries;
- *Societal culture* relates to the impact the organisation has on society and is based on the concept of sustainable value because if society fails, the business cannot succeed;
- *Scale of outreach* describes the depth and breadth of stakeholder relationships over time, to be developed further if there are opportunities and how the organisation addresses social differences;
- *End-users* component describes how the needs of the end-user are met, i.e. the person consuming the value proposition, not necessarily the customer as in the traditional Business Model Canvas;
- *Social impact* component extends the financial costs and bio-physical impacts of the other two layers and includes the social costs of the organisation identified by working hours, cultural heritage, health and safety etc.;
- *Social benefits* relate to the social value created through the actions undertaken by the organisation and are measured through a wide range of indicators.

Although archetypes and the Triple Layered Business Model Canvas are two of the most widely used tools, there is no universally accepted method that provides the organisation with an approach towards sustainability. The practices covered in the literature are broad and include other approaches, such as those reported by Shakeel et al. (2020) in their review of the literature on business model innovation. Some of these include the framework for Strategic Sustainable Development developed by Rauter et al. and based on four components, such as product, customer interface, infrastructure management and financial aspects, to understand the drivers that lead to sustainable business model innovation; the Framework for Strategic Sustainable Development introduced by Franca et al. that instead combines the Business Model Canvas with additional concepts such as creativity techniques, value network mapping, life-cycle assessment and product-service systems for qualitative assessment; the visual model proposed by Upward and Jones based on the 'strongly sustainable business model ontology' provides a stakeholder-oriented modelling that identifies the main components such as the value proposition, value creation and delivery and value capture.

1.2.4 The sustainable business model pattern taxonomy: a classification of SBMs

The strategies and frameworks presented in the previous paragraphs should be useful for the implementation of different types of sustainable business models. The literature offers different classifications of the types of sustainable business models available, however, they are only partially overlapping and difficult to reconcile, preventing the creation of a single globally accepted model and therefore not being able to take advantage of the benefits that classification usually brings. In fact, a classification allows to store and in case retrieve information on value creation, delivery and capture logics employed by different organisations useful for the comparison of different SBMs (Lambert, 2015), reduces the complexity of cognitive processes and simplifies communication between actors involved in SBM development (Breuer and Lüdeke-Freund, 2017), provides the basis for understanding the various drivers of sustainability within business models and inspires managers and entrepreneurs to develop or imitate business models by combining existing models (Baden-Fuller & Morgan, 2010) guiding them towards a new wave of sustainable innovations.

For this reason, Lüdeke-Freund et al. (2018) decided to intervene by offering a new reference system that synthesises, consolidates and extends existing models starting from the notion of pattern as a problem-solution combination: the Sustainable Business Model Pattern Taxonomy. The authors define a sustainable business model pattern as "a sustainable business model pattern describes an ecological, social, and/or economic problem that arises when an organisation aims to create value, and it describes the core of a solution to this problem that can be repeatedly applied in a multitude of ways, situations, contexts, and do-mains. A sustainable business model pattern also describes the design principles, value-creating activities, and their arrangements that are required to provide a useful problem-solution combination" (p. 148). The classification presented by Lüdeke-Freund et al. follows a theoretical-empirical approach that starts from the definition of a global classification theory, in particular the authors adopt a 'sustainability triangle', as shown in Figure 2, based on that of Kleine and von Hauff (2009) whose corners represent a dimension of sustainability, the sides the combined contribution and the ten inner areas allow to identify problems concerning one or more aspects of sustainability and their solutions.

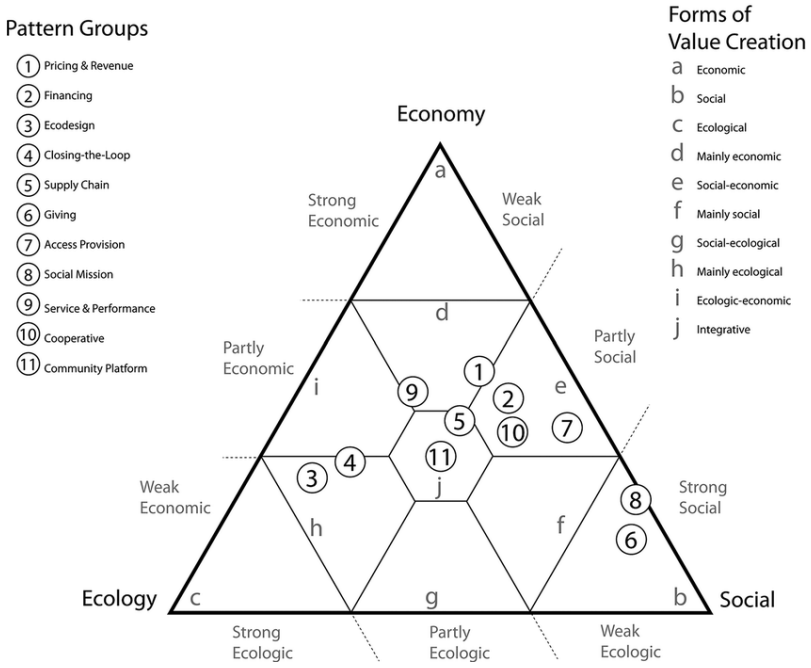


Figure 2. The sustainable business model pattern taxonomy at the group level (Lüdeke-Freund et al., 2018)

The result is a taxonomy on four levels: the first concerns the five major categories of value creation (mainly economic, social-economic, social, mainly ecological and integrative); the second comprises the 11 SBM pattern groups which are identified according to their position in the sustainability triangle and summarise the knowledge gained from the literature review conducted; the third presents the 45 SBM patterns which offer a more fine-grained view; finally, the fourth

presents the detailed associations to value creation which further describe the groups, patterns and benefits associated with their use.

Each of the 11 SBM pattern groups reports the context in which it is applied, the problem-solution combination and an example: *Pricing & Revenue* patterns refer to the way offers are priced and revenues generated; *Financing* patterns relate to the acquisition of equity, debt and operating capital; *Ecodesign* patterns describe the design of processes and offers in order to improve their ecological performance over their entire life cycle; *Closing-the-Loop* patterns report how materials and energy flow into, out of and back into a company and are associated with the concept of circular economy; *Supply Chain* patterns deal with the sourcing of inputs and the reaching of target groups; *Giving* patterns stimulate the donation of products or services to target groups in need; *Access Provision* patterns create and deliver value propositions adapted to target groups that would otherwise be neglected; *Social Mission* patterns define and integrate needy social groups both as customers and as production partners; *Service & Performance* patterns refer to the definition and delivery of value propositions; *Cooperative* patterns present the stakeholders and governance of the company; finally, *Community Platform* patterns allow the replacement of ownership of a resource or product by community-based access and shared or collaborative use.

As reported by Lüdeke-Freund (2018), "the taxonomy can offer practical guidance based on its heuristic function" (p. 159) as it provides a comprehensive synthesis and consolidation of the different practices present in the literature and is broader, more detailed and inclusive thanks to the use of a transparent and rigorous methodology that allows replicability, extensions and critiques of the model. Moreover, the introduction of the concept of pattern in the field of sustainable business model opens up new avenues for future research. However, the authors point out that its potential as a design tool will only emerge in combination with business modelling tools such as the Triple Layered Business Model Canvas presented in section 1.2.3.

1.2.5 ESG and Corporate Financial Performance (CFP)

An important aspect to consider when analysing sustainability is the relationship between the sustainable activities adopted by the company and its corporate financial performance (CFP). There is a widespread idea that the adoption of sustainable practices within the business model may lead to a deterioration in performance compared to that which would be obtained by following a traditional business model. Actually, as the literature has shown in recent years, there is a positive, or at least not negative, relationship between ESG activities and financial performance.

This uncertainty goes back to different lines of thought in the past. On the one hand, according to Porter Hypothesis (Porter & van der Linde, 1995), CSR activities, and especially environmental activities, were considered a source of innovation that could generate extra revenues to cover the additional cost due to the adoption of these activities, thus implying a positive relationship between CSR strategy and CFP. On the other hand, Friedman (1970) argued that these kinds of activities only bring additional costs caused by agency problems and inefficient allocation of resources which reduces profitability and positions the firm unfavorably in the market, thus showing a negative relationship between CSR and CFP. A third and minor line of thought concerns the neutrality of the relationship between CSR and CFP and was found by McWilliams & Siegel (2001).

The uncertainty arising from the literature still leaves some questions unresolved, not allowing the achievement of a common consensus regarding this relationship due to several aspects (Xie et al.. 2018). The first concerns the presence of a wide range of metrics used to measure financial performance, ranging from market-based metrics, such as share price or market value, to accounting-based metrics, i.e. ROA or ROE, and making it difficult to determine the extent of the relationship as the repeated use of a single metric may not capture some CSR implications and thus suggest a biased result. Indeed, as reported by Huang (2019), accounting measures might aggregate more of the firm's assets than ESG activities while market measures might be confounded by the valuation of current and future earnings against other investment opportunities. Therefore, the solution is the use of operational measures for CFP, which show a stronger relationship with ESG performance measures from studies, as they can be directly related to ESG issues. The second is due to the multidimensional nature of CSR and the presence of numerous definitions which consequently imply different conclusions about the CSR-CFP relationship. Finally, Barnett and Salomon (2006) noted that the relationship is neither strictly positive nor negative, as it had been noted in past studies perhaps due to the limited presence of usable SRI strategies, but is curvilinear, i.e. it shows an initial deterioration in financial performance as the use of ESG practices increases, and then improves when the company reaches maximum use of ESG practices.

It is to avoid the problems involved in using a single metric in the analysis of the CSR-CFP relationship that Xie et al. (2018) have adopted ‘corporate efficiency’ as an indicator of financial performance and then compare the single effect of the three main aspects of corporate sustainability using 26 ESG activities, specifically 11 environmental, 6 social and 9 of governance, with the aim of determining the type of relationship that exists. Regarding the environmental dimension, the result of the analysis confirms the hypothesis that the authors had stated, namely that

"environmental activities that are cost cutting are positively related to corporate efficiency (CFP)" (Xie et al., 2018, p. 289). To be specified is that not all environmental policies will improve performance, but only those whose profit will be higher than the additional costs incurred in accordance with the Porter Hypothesis, for example no significant result was found between climate change policies and CFP. Also as regards the social dimension, additional costs due to the implementation of social activities are significant in the case of health and safety policies and CSR training of employees, thus implying a negative relationship between CSR and CFP; on the contrary, social activities that can improve corporate reputation and attract capable employees with few additional costs are positively related to corporate efficiency and tend to provide an advantage to the company over its peers. Finally, most governance activities, which consist of both stakeholder and shareholder oriented management activities, show a non-negative relationship with corporate efficiency, in particular the presence of a certain percentage of independent directors on the board shows the strongest positive relationship as it allows a reduction in agency costs and maximisation of shareholder value, as well as the presence of women on the board shows a strong positive relationship with ROA and market value.

The following year, Huang (2019) confirms the theory of Xie et al. (2018), by which there is a positive and statistically significant relationship between ESG performance and financial performance, but he finds that the dimension that can establish a stronger relationship with CFP is the environmental one and not the governance one as argued by colleagues the previous year. However, why environmental performance has a stronger relationship than the others has yet to be answered, as have other questions that have emerged from this finding.

DasGupta (2021) goes one step further and through research conducted on 27 countries over the period 2010-2019 he analyses whether companies with poor financial performance can seek to improve their ESG performance as an alternative to other more problematic means of implementation such as R&D investments. The result shows a strong and positive influence of financial performance shortcomings on ESG performance, making it possible to implement this alternative; however, companies usually do not adopt higher ESG practices when bound by ESG controversies as this action could be detrimental and further weaken the shortcomings already present.

Finally, it is necessary to distinguish between companies operating in developed countries and those operating in emerging countries as this fact affects their performance and leads to opposite

results. As reported by Garcia and Orsato (2020), in companies in developed countries there is a positive and statistically significant relationship between ESG performance and financial performance as socio-environmental investments often generate operational gains, while the opposite is true in emerging countries whose companies show a negative relationship as, influenced by institutional weaknesses, they prioritise capital accumulation without recognising the potential strategic benefits of SRI, in line with the Institutional Difference Hypothesis (IDH). In addition, the authors found that companies in developed countries that operate in controversial sectors such as alcohol, tobacco, and gambling have better ESG performance as they gain public approval by demonstrating their efforts towards mitigating the socio-environmental impact they cause with their activities, as opposed to companies in emerging countries that do not care enough about this aspect.

Although the majority of studies reveal a positive relationship between ESG and financial performance, further work is needed to identify and understand the various aspects of ESG activity and the reasons for the results achieved.

1.3 Sustainable investing: an increasingly important concept

In section 1.1.2 it was mentioned the importance that sustainable investment has been gaining in recent years, i.e. investments that not only consider financial objectives but also environmental, social and governance aspects based on ESG factors, which will be presented later. Sustainable investment assets have grown to tens of trillions of dollars in recent years, representing 36% of total professionally managed assets, and look set to grow further. According to Credit Suisse, this rapid rise could be attributed to the convergence of four different factors: the need to close the UN-estimated financing gap of the SDGs, discussed in section 1.1.1, has led to the mobilisation of funds for the implementation of climate action plans; Millennials, but especially Generation Z, who are starting to take over previous generations, prefer to invest in line with personal values involving environmental and social causes and for this reason fund managers are increasingly trying to target this emerging client segment through the development of new products; thematic investments directly linked to the SDGs mobilise capital towards projects that generate significant financial returns and produce benefits for the environment and/or society as well as making societies resilient in facing future challenges; finally, funds investing in companies with ESG policies have outperformed their benchmark indices for several years[1] due to positive shocks affecting one of the

[1] MSCI Europe, Emerging and US equity indices data vs. corresponding MSCI ESG Leaders indices of the same regions YTD, over 1 year, 2 years, 3 years, 5 years as of 05/05/2020

ESG factors. Indeed, as Pàstor et al. (2020) argue, green assets in an equilibrium situation have low expected returns because they help protect the investment portfolio from climate-related risks thanks to continuous monitoring by financial institutions that provide a high degree of information to the investor, who considers them particularly attractive for this reason and for the possibility of gaining in the event of positive environmental, social or governance changes. The result of sustainable investments is a positive social impact that makes companies increasingly green and encourages a shift of real investment towards these companies.

1.3.1 Definition and historical evolution of sustainable investing

Traditional investment involves the investment of a sum of money in a company with the aim of generating a positive benefit/return in the future that is commensurate with the risk taken by the investor. Sustainable investing can be seen as an evolution of traditional investing; indeed, it is an investment discipline that integrates environmental, social and corporate governance (ESG) criteria into the process of research, analysis and selection of securities in the investment portfolio (Schoenmaker, 2018), whose goal is to generate competitive long-term financial returns and promote positive social impact. According to Stobierski (2021) of Harvard Business School, "sustainable investing ensures that firms aren't judged solely on short-term financial gains but on a broader picture of what and how they contribute to society at large". The CFA Institute, a global association of investment professionals, emphasises a number of key aspects of sustainable investing: firstly, it is complementary to asset management and not at odds with traditional investment concepts; it is a useful means to develop deeper insights into how value will be created in the future; and finally, it considers and involves multiple stakeholders, consistent with one of the requirements of the transformation from a traditional to a sustainable business model.

There is no single approach or term to describe sustainable investing, which instead takes on a variety of titles depending on the aspect being emphasised, the different realities and the needs of the client, including ‘ethical investing’, ‘impact investing’, ‘responsible investing’, ‘socially responsible investing’ and ‘ESG investing’. Although these terms are often used interchangeably, some of them refer to different stages of evolution or different investment selection and management strategies that will be explored in more detail in the next section.

The different names it takes on are also the result of an evolutionary process that has gained importance in recent decades. Indeed, it is not a current fashion, but its origins emerge from Jewish, Christian and Islamic traditions. On the one hand, Jewish laws forbade treating employees unfairly

and being unfair in purchases and sales; on the other hand, the Koran required people to donate part of their wealth to charity and forbade interest-bearing loans and financial support for immoral or sinful activities (Renneboog et al., 2008). In the 17th century, the first example of 'ethical investing', or "investment philosophy guided by moral values, ethical codes or religious beliefs" (Mercer, 2017 p. 5), was recorded. The Quakers, members of a Christian movement that originated in England, rejected profits from the arms trade and slave trade while John Wesley, the leader of the Methodists, an expression of 18th century Protestantism, argued that investors should avoid business practices or companies that could be socially harmful (DB Climate Change Advisors, 2012). A few centuries later, during the 1920s, a group of clergymen in Boston created the Pioneer fund, the first screened investment fund that excluded gambling, tobacco and alcohol from investment. Until the mid-twentieth century, therefore, there existed two ends characterising the 'capital spectrum', as Trelstad (2016) defines it: the fiduciary end, which assumed the investment of capital to maximise gain while neglecting environmental or social consequences, and the philanthropic end, which implied the donation of capital for maximum social or environmental benefit without considering financial return.

But the real changes began in the late 1960s and early 1970s with the occurrence of the first movements led by students and trade unions demanding investment policies to shield what they considered unethical investments and with the introduction of the Pax World Fund, the first modern mutual fund, which marked the emergence of a new practice called Socially Responsible Investing (SRI) that departed from the purely religious sphere. This fund was created in 1971 in the United States as an investment alternative for investors opposed to the production of nuclear and military weapons. A couple of years later, the South African movement against Apartheid was the cause of the spread of the Sullivan Principles, a screening tool that defined acceptable business practices for companies working in South Africa. This satisfied the wishes of socially responsible investors who did not want tobacco, guns and companies doing business in South Africa in their investment portfolios at the time, as a protest against widespread racism. The oil crises of the 1970s and, later, the environmental disasters of the 1980s of Chernobyl, Bhopal and Exxon Valdez in Alaska developed a greater awareness of ecological problems that should not be neglected, which is why the first green funds were launched. This earlier period from the 1960s to the mid-1990s can be attributed the name 'Early Socially Responsible Investing' which refers to an investment approach based on supporting companies committed to CSR or exclusion that mainly took into account the social, ethical and environmental behaviour of companies, very similar to ethical investing in that

it allowed a certain trade-off between the social and financial performance of companies when making investment decisions.

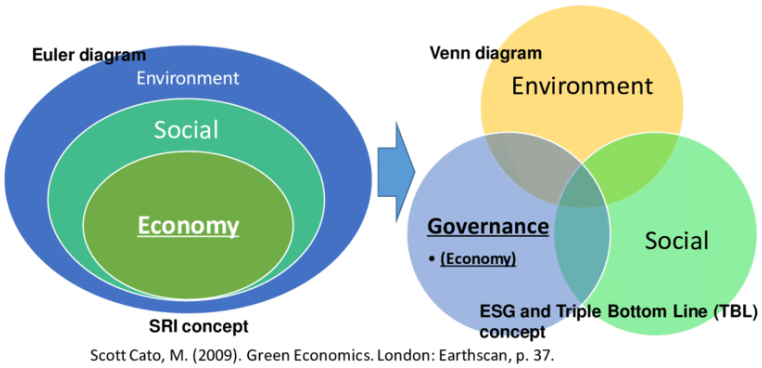
Modern SRI differs from early SRI, from the late 1990s to the present, in that it abandons ethical thinking and incorporates environmental, economic and social factors into investment decisions using the Triple Bottom Line approach, with the aim of explicitly seeking a return, using a mix of negative (values-driven) and for the first time positive (risk and return driven) screening techniques, which will be presented in the next section. It was during this period that it experienced strong growth especially in the United States and Europe and the idea that "investing was not just about doing less harm through one's investments, but that one might be able to allocate capital to create more social or environmental benefits" (Trelstad, 2016, p. 7) became increasingly widespread.

The need for a greater focus on risk and return for this type of investment led in the 2000s to the establishment of a new form of SRI called ‘Responsible Investing’ that balances the importance of environmental and social aspects of sustainability and financial objectives. These were the years when international initiatives contributing to the development of the SRI investment sector became widespread and the first ESG rating agencies were established. In 2006, the UN launched the Principles for Responsible Investment (PRI), which provides guidance for integrating ESG factors into investment practices with the intention of further spreading sustainable and responsible investment among institutional investors, of which more than 1,200 responded to the call. The 2008 crisis further changed the situation, leading to an evolution of SRI and the introduction of new principles to be taken into account. The ESG approach was born in the 2010s out of a desire to refine the definition of SRI by introducing corporate governance among the aspects to be considered when choosing an investment, such as environmental, social and economic/financial. Investors were particularly interested in this new field because they believed that a good return associated with a certain risk also depends on good corporate governance. One of the latest steps taken was the definition of the 17 SDGs and the 2030 Agenda, which aim to contribute to a more sustainable future.

Nowadays, the term sustainable investing is therefore used generically to group all forms of sustainable investment that have evolved in recent years and addresses the long-term challenges related to sustainable development that includes social, environmental and economic aspects.

1.3.2 SRI and ESG: differences and similarities

In the previous paragraph, it was said that the lack of standardization in terminology has created confusion about how strategies differ and what is the best action to take for investors, an aspect confirmed by the generalization that is having more and more the term 'sustainability' which is losing its original meaning and is referred many times to ESG practices. For the sake of greater clarity, the main differences between the two best-known and most widely used terminologies – socially responsible investing (SRI), which is more associated with the concept of sustainability in general, and ESG investing – and the relationship between them in order to understand whether they are really interchangeable will be presented below.



Scott Cato, M. (2009). Green Economics. London: Earthscan, p. 37.

Figure 3. Concept of Euler (SRI) and Venn (ESG) diagram

Shimizu (2018) analyzes the two concepts (Figure 3) through two diagrams presented by Cato (2008). From the Euler diagram, an interlocking three-circle diagram, it can be seen that the original idea of SRI was focused on environmental issues, as the environmental dimension is represented in the outer circle, followed by the social dimension and finally the economic dimension. This shows how the economy and the society depend on the environmental aspect and, in particular, on the availability, or rather the scarcity, of resources. The Venn diagram, on the other hand, presents a structure similar to that of the ESG concept and shows the interconnections between the three dimensions – environment, social and governance – despite the fact that it was developed from the triple bottom line concept, which in turn was influenced by the SRI concept. Indeed, the governance dimension has taken the place of the economic dimension when it became clear that economic activities are substantially judged by corporate governance which is based on stakeholder involvement. The three circles are represented as equal in size, indicating that all dimensions are equally important, however, Cato (2008) argued that "in reality the economy carries much more sway indecision making, with society bearing the cost and the environment paying the highest price of all" (p. 36).

Both SRI and ESG investing thus aim to address a range of environmental and social issues and receive a financial return (Shimizu, 2018), but SRI, and sustainability more broadly, can mean different things to different companies while ESG is about environmental, social, and governance criteria that through their specificity and measurability reflect the concern investors have with companies about adopting practices that reduce risk and ensure long-term sustainability.

However, as argued by Aberdeen Standard Investments (2021), the main difference lies in the investment field, specifically in the approaches taken to applying the principles followed to the investment portfolio. SRIs implement negative screening strategies based on client-imposed criteria or broader themes and consist of avoiding companies that are not in line with their non-financial ethical values and principles, e.g. tobacco, alcohol or gambling. SRI investors therefore engage in decision-making primarily on principle, and their selection falls on projects that have a positive social and environmental impact, their primary objective, while bearing a sacrifice on profits, which take a back seat. This technique is useful for creating sectoral rankings, however it risks not integrating all ESG criteria into the entire investment strategy, as the choice of generic moral issues to be respected or investment types to be avoided does not exhaust the issues found when embarking on the process of integrating ESG criteria. The move of sustainability to ESG metrics shows the evolution of SRI in that the integrated and more pragmatic ESG approach should analyze the ways in which the concrete risks and opportunities related to environmental, social, and the governance issues impact on the company's performance through a broader set of information, which allows for more accurate measurements that fit the increasingly sophisticated corporate sphere, and whose results along with the financial risk assessment go a long way in shaping the value of the investment. Investments have thus emerged as a competitive alternative to SRI and have proven to be the contemporary and exemplary choice.

Credit Suisse (2020) focuses on an additional layer of analysis developed in recent years following the introduction of the 17 SDGs, which adds to the existing SRI exclusion and ESG integration strategies and leads to the creation of new investment opportunities that are impact-aligned to the SDGs. Indeed, investors are shifting their focus from ESG criteria to the SDGs, taking them as a reference point for aligning investment and impact goals by investing in companies whose products directly contribute to achieving the SDGs. The SDGs can prove helpful as they are formulated to bring global consensus on environmental and social challenges, and are used as a common means of communication to shape corporate decision-making and investment strategies that allow for a more accurate and shared measurement of ESG criteria. A combined SDG and ESG approach is

possible as all 17 goals can be attributed to individual elements of ESG considerations and this could accelerate corporate contribution within the broader global goals space.

1.3.3 Sustainable investment strategies according to Eurosif

Among the fundamental steps of sustainable investing is the selection of the investment strategy based on the willingness of the sustainable and responsible investor to exclude (negative screening or exclusion) or include (positive screening or inclusion) certain types of assets in the investment portfolio. In the classification of strategies available today will be taken as a reference those presented in the latest report *European SRI study 2018*, but already introduced in 2012, by Eurosif, the leading European association for the promotion and advancement of sustainable and responsible investment across Europe, thus restricting the analysis to the European territory only. However, as shown in Figure 4, Eurosif provides an overview of all the strategies used by other organizations also at a global level.

Eurosif	GSIA-equivalent	PRI-equivalent	EFAMA-equivalent
Exclusion of holdings from investment universe	Negative/ exclusionary screening	Negative/ exclusionary screening	Negative screening or Exclusion
Norms-based screening	Norms-based screening	Norms-based screening	Norms based approach (type of screening)
Best-in-Class investment selection	Positive/ best-in-class screening	Positive/ best-in-class screening	Best-in-Class policy (type of screening)
Sustainability themed invest-ment	Sustainability-themed invest-ing	Sustainability themed investing	Thematic investment (type of screening)
ESG integration	ESG integration	Integration of ESG issues	-
Engagement and voting on sustainability matters	Corporate engagement and shareholder action	Active ownership and engage-ment (three types): Active ownership Engagement (Proxy) voting and shareholder resolutions	Engagement (voting)
Impact investing	Impact/community investing	-	-

Figure 4. Overview of strategies used by different organizations (Eurosif, 2018)

The seven strategies considered by Eurosif will be presented in detail below, followed by some data regarding their growth and use by sustainable and responsible investors and a view of what has happened globally over the last 3 years.

The first strategy, and one of the first to be used in the 18th century, is *Exclusion*, also known as Negative screening by other organizations. This is an approach that consists of excluding companies, industries, or countries from the investment portfolio if they are involved in certain

activities based on specific criteria. There are several reasons that push an investor to make this choice, but at European level there seems to be a certain level of unanimity, indeed among the most excluded industries, there are those involved in the production of controversial weapons and weapons in general, the tobacco industry, gambling, pornography, nuclear energy, alcohol, the use of GMOs and finally, animal testing. Although it is considered one of the easiest strategies to use and it is still the most used in absolute terms, in the last years it has been characterized by a slight decrease, whose reason is still to be verified.

The next six strategies can all be grouped under the macro-category of positive screening, which is the opposite approach to negative screening, introduced a few decades ago, and consists of selecting investments that meet the investor's personal goals and values. Although they are more complicated to use, they have experienced significant growth in recent years.

The *Best-in-class* strategy uses "an approach where leading or best-performing investments within a universe, category, or class are selected or weighted based on ESG criteria" meaning that it allows investors to compare and then select companies that have the best ESG score in a particular industry sector and usually also meet a financial rating.

The *Sustainability-Themed* strategy involves investments in themes or assets related to the development of sustainability in single- or multi-thematic funds that must first undergo an ESG analysis or screening. This provides insight into which areas investors place the most interest in, from the 2018 report climate change and water management, and enables to face social and environmental challenges such as climate change, eco-efficiency and health.

Norms-Based Screening allows investors to select companies based on their level of compliance with international standards or combinations of norms covering ESG factors such as environmental protection, human rights, labour standards and anti-corruption principles and is often used in combination with other strategies such as engagement or exclusion. Some examples of the most widely used standards are the UN Global Compact, OECD guidelines for multinational corporations and international treaties, and ILO Conventions.

In *Engagement and Voting* the investor is directly involved in the company in which he invests by establishing a relationship and dialogue with the management and exercising the voting rights attached to the shareholding with the aim of influencing the behavior of the shareholders' meeting by raising awareness of ESG issues in the long term. This strategy is still the second most used strategy after exclusion.

Impact Investing is an investment strategy in companies, organizations and funds characterized by the combined generation of a positive social and environmental impact and financial return that can be carried out in both emerging and developed markets. The investor who decides to implement this strategy considers in advance whether the company in which he wants to invest is committed to corporate social responsibility or whether he intends to obtain benefits for society as a whole. The elements that characterize impact investing and differentiate it from other strategies are indeed the investor's intention to generate a positive and measurable social and environmental impact in addition to the provision of private capital and the possibility of measuring it in a transparent manner. Impact investment includes microfinance, community investing and social business/entrepreneurship funds.

Finally, *ESG integration* is defined by Eurosif as "the explicit inclusion by asset managers of ESG risks and opportunities into traditional financial analysis and investment decisions based on a systematic process and appropriate research sources". This process analyzes the positive or negative impact that ESG issues have on financial data, which in turn can influence the investment decision, and the influence that a company's adherence to or lack of these standards has on market performance. It therefore allows the investor to select companies that best adopt a business model geared towards sustainable development. In particular, environmental issues (E) concern aspects of a company's activity that have an impact on the environment, social issues (S) vary from aspects related to the community to aspects related to the work role, finally governance issues (G) concern the quality of management, culture, risk profile and other characteristics of a company. In the next section, ESG factors will be presented specifically. Although this strategy seems apparently simple to apply, it is much discussed as it is sometimes considered a general proxy for the SRI sector and consequently oversimplifies a sector that is growing in complexity. In addition, Eurosif highlights the difficulty in measuring the comparability of strategies that fall under ESG integration due to

the lack of clarity in the parameters that drive it. However, it appears from the number of SRI analysts on the investment team that ESG integration is well anchored in the investment process.

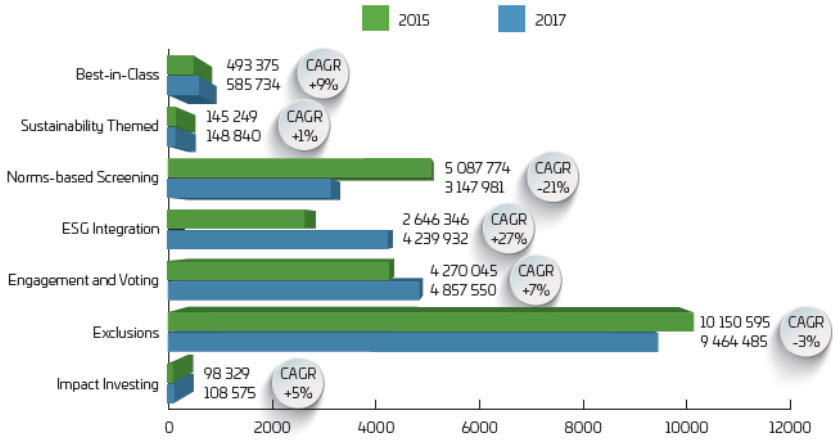


Figure 5. Overview of SRI strategies in Europe (Eurosif, 2018)

From Figure 5, which represents the evolution of the use of SRI strategies in Europe from 2015 to 2017, it can be seen that there are a few leading strategies in Europe despite Compound Annual Growth Rates (CAGR) are positive for most of them. Indeed, ESG integration experienced a considerable growth in CAGR of 27%, demonstrating that the integration of sustainability criteria in investments is increasingly important, as well as Engagement and Voting which instead grew with a positive CAGR of 7%, a modest growth justified by the already very high base in absolute terms, due to the increasingly explicit interest of investors to intervene in the active management of the company in which they intend to invest. This increase brings the amount of Exclusion even closer, which despite the slight decrease with a negative CAGR of 3% remains the most used strategy. The decrease of the Norms-based Screening is related to the last one, as well as the strategy that has suffered the most with a negative CAGR of 21% since the Exclusion strategy is often associated with it for a better result. Best-in-Class is confirmed as a safe strategy for investors that has continued to grow at a CAGR of 9%, while Sustainability Themed has remained more or less stable after having grown particularly since 2009 thanks to political discussions regarding climate change and the awareness of investors that water will be the protagonist, or rather antagonist, of this change. Finally, the growth of Impact Investing, although modest at a CAGR of 5%, shows that investors are increasingly aware of their potential to initiate change, taking advantage of the opportunity that sustainable investing offers to also earn some return.

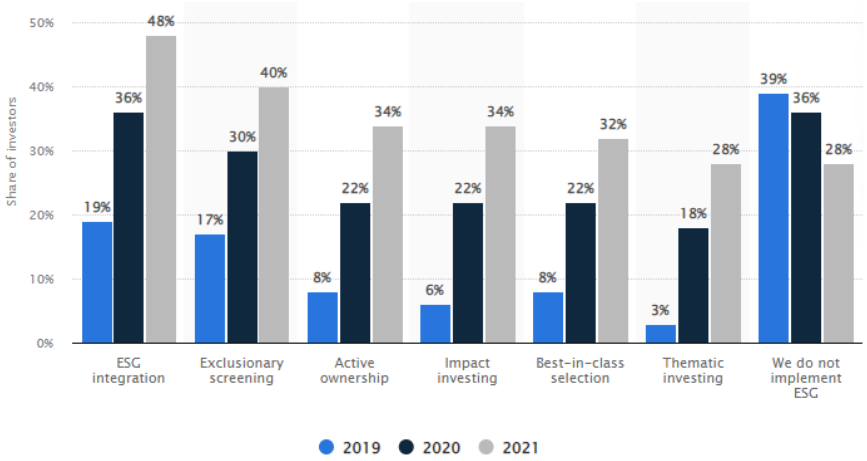


Figure 6. Most common method for ESG adoption among institutional investors worldwide from 2019 to 2021 (Statista, 2021)

A global and more recent perspective is provided by Statista, which presents the evolution of strategies selected by institutional investors over the past 3 years (Figure 6). ESG integration is shown to be the most widely used strategy, continuing its considerable growth such that shares using this method have more than doubled since 2019. However, all strategies have undergone significant increases, indicating that the adoption of ESG criteria is increasingly considered, a fact that can also be guessed from the decrease in shares that do not implement any sustainable strategy, which has gone from 39% in 2019 to 28% in 2021.

1.3.4 ESG factors

As has been reported in the previous paragraph, ESG integration is the strategy that has grown the most in recent years as a result of losses that companies have suffered due to environmental disasters, social controversies or shortcomings in good corporate governance and presupposes the integration of ESG factors into traditional financial analysis and investment decisions. But what are ESG factors?

Although numerous institutions, such as the Sustainability Accounting Standards Board (SASB) and the Global Reporting Initiative (GRI), are working to provide standards that can be used objectively, no comprehensive list exists today. However, it is possible to identify the most common ones based on three broad areas defined by the acronym ESG - namely environmental, social, and governance - although it is difficult to classify them into only one of the three areas because they are sometimes interconnected. ESG factors are used to measure the environmental, social and governance impact of companies, which are increasingly sustainability-oriented, and allow them to be ranked according to the ESG rating they take on due to their level of compliance with standards. It is therefore a useful tool for investors to assess the goodness of an investment,

no longer based solely on the financial return it produces. Below we will analyze the three dimensions that characterize ESG by referring to the theory presented by Fung, Law and Yau (2010) in their *Socially Responsible Investment in a Global Environment* and *Manuale per Promotori Finanziari e Addetti alla Vendita di Prodotti Finanziari – La finanza sostenibile e l'investimento responsabile* prepared by ANASF.

Environmental dimension (E)

The environmental dimension refers to environmental issues that have some impact on company performance and increase investor risk due to, for example, inadequate environmental standards, violation of safety standards or unsustainable business models that can subject the company to significant costs in terms of administrative sanctions, litigation, reputational risks and resource management. Although SRI investors are interested in long-term risk as indicative of a company's level of sustainability in the future, when selecting investments they must also pay attention to short-term risks as they may be symptomatic of a risk that continues into the future, that is an alarm for the investor who will need to place greater scrutiny in this area. Companies that manage environmental risk over the long term by integrating environmental factors into their business model have a competitive advantage in that they can differentiate themselves from their competitors and be more appreciated by investors.

Environmental factors reported in the ANASF manual include the following factors: pollution and climate change measure the amount of Green House Gas produced by the company and the use of renewable energy sources or new technologies that can reduce climate-changing emissions in order to determine how much the company threatens the climate; biodiversity, which is essential for certain sectors such as agriculture and food, real estate and infrastructure or extractive industries, assesses how much the company alters the surrounding ecosystem through its business activities; the management of natural resources as their depletion caused by their limited availability would become a major problem for the survival of humanity, and in particular the conservation of water, an indispensable element for life, which is assessed through technological innovations for sustainable use, potabilization, waste reduction; the company's commitment against deforestation; energy efficiency; waste management.

Fung et al. (2010) identified three categories within which to classify the aforementioned factors to conduct a more detailed analysis: eco-efficiency, environmental impact, and environmental management.

Eco-efficiency refers to the production of goods and services through the least possible use of natural resources, and as a result, less waste and pollution is produced, resulting in a reduction in related costs. This category includes minimal use of water and energy, minimal disposal of waste in landfills, minimal greenhouse gas emissions, minimal transportation during production and distribution, maximum use of sustainable, recycled and recovered materials and alternative or renewable energy, and finally production of durable products with high recyclability or reuse at the end of their life. *Environmental impact* describes the effect the company has on the environment during its operations and includes pollution of water, air, soil, and groundwater, loss of biodiversity and natural habitats and decrease in flora and fauna, impact on important natural resources such as forests, and license to operate in communities that have access to important natural resources. Finally, *environmental management* is about the commitment the company puts into managing environmental impacts through the implementation of robust environmental management systems that document environmental impacts, current and historical environmental responsibilities, commitment to the implementation of internal routines and independent environmental auditors, policy statements by company officials about their position on environmental issues, involvement with environmental non-governmental organizations in funding environment-related projects, certification by industry groups, awards and acknowledgements by independent organizations, establishment of environmental systems throughout the life cycle of products and services, and provision for employee training and promotion of environmental awareness.

Social Dimension (S)

The social dimension covers business activities that have a social impact, and thus on the community, and includes a broader spectrum of considerations than environmental issues. Again, Fung et al. (2010) identify three subcategories - labour, social development, and corporate governance - however, corporate governance will be treated as a separate category as it represents one of the three main dimensions. In addition, the authors include in this category the ethical and religious factors which ANASF prefers to include in a fourth dimension called ‘ethical sphere’.

The sub-dimension *Labour* concerns possible violations committed by the company with respect to the treatment of workers that could result in heavy fines as well as a very high reputational risk. Among the criteria that can be used are the following: adherence to labour laws and the preparation of health and safety protocols, which, as reported by ANASF, can be declined on the basis of worker involvement and participation, training policies or the design and organization of work; fair

and non-discriminatory treatment through the creation of equal opportunities, especially considering gender diversity, which would guarantee a serene environment free of sexual discrimination; fair wages and benefits for employees; fair trade with suppliers. *Social development*, on the other hand, refers to human rights and the concept of sustainable development and includes the following criteria: the violation of human rights, enshrined in the Universal Declaration of Human Rights (1948) and extended by the United Nations in 2008 with the introduction of three other key principles that concern the relationship between the business world and human rights since business activity can affect all forms of human rights, especially with regard to multinationals in developing countries; operations in foreign countries, social programs, and investments in developing areas; companies with foundations that help poor communities or developing nations; political contributions; engagement in areas of political or social unrest, or failure to adhere to international rights and laws. A company that engages in social aid may benefit financially through increased profitability, while the one that fails to respect human rights or has been sanctioned by the UN is considered particularly risky by investors.

The ANASF also includes among its criteria the development of human capital, since training and education, together with skill management and performance evaluation activities, are fundamental aspects for achieving excellence through employee satisfaction, talent attraction, responsible supply chain management, community involvement and relations, socio-economic development and, finally, philanthropy.

Since the main dimensions are those contained in the acronym ESG, the ethical sphere that ANASF separates will be presented below. The most common criteria are those used in the past to screen investments and include those sectors considered unethical that investors prefer to avoid such as the production and trade of alcohol, tobacco production, arms production, animal experimentation, the production and trade of furs, gambling and, finally, pornography.

Governance Dimension (G)

The governance dimension has been the last to be considered in sustainable investments, but this does not make it less important; on the contrary, it is fundamental not only to create economic value, as Page (2005) argued, but also to achieve sustainability-oriented objectives through which it is possible to build sustainable businesses in the long term, as a consequence of efficient allocation, growth and preservation of capital. This dimension examines corporate governance

issues and risk, revealing insights into corporate identity that are important for equity analysis, company valuation, and investor risk assessment.

Important issues associated with the investment decision-making process, reported by ANASF, concern independence, guaranteed by the presence of independent directors on the board, and remuneration, which is often subject to unequal treatment in that executives often receive large compensation that is more than commensurate with their performance compared to employees, which could affect their morale and productivity. The purpose of compliance, i.e., the process of ensuring that all company activities comply with external regulations and internal policies, is to protect the company from "the risk of incurring judicial or administrative sanctions, significant financial losses or reputational damage as a result of violations of mandatory (statutory or regulatory) or self-regulatory standards" (Bank of Italy, 2007), while risk management is an important governance process that includes coordinated activities to direct and control an organization with respect to its risks. Another risk that a company may incur is corruption, which should be countered through specific programs capable of strengthening reputation, consolidating the trust and respect of employees, and increasing credibility with stakeholders. Finally, the involvement of shareholders in corporate governance through the exercise of their rights is the last important issue proposed by ANASF as they can contribute to improving financial and non-financial performance and the discipline associated with them is regulated by the Shareholder Rights Directive (SRD II), which came into force in the EU in 2020 and which, by amending the 2007 discipline, strengthens the position of shareholders and encourages their long-term commitment to the company in which they have invested.

Therefore, it is possible to summarise the main criteria to be considered in four areas: level of shareholder rights and shareholder activism; structure of the board and its composition (qualitative and quantitative); internal regulations and risk management; finally, independent audit, transparency, disclosure.

Investors therefore make their investment choice based on their predominant interests since a company that meets the criteria in one dimension might not do so in another.

1.3.5 How appropriate is it to invest in companies with a high level of sustainability?

It has previously been reported that sustainable investment assets have been growing steadily in recent years, now accounting for 36% of total professionally managed assets and moreover, investors expect to increase the proportion of their assets invested sustainably, currently at 18%, to

37% by 2025 (BlackRock, 2020). Indeed, the coronavirus pandemic has brought greater awareness of the importance of environmental and social issues also among investors in the past year, 77% of whom realized even more strongly the importance of ESG issues, reconsidered ESG issues or considered the social component more important than in the past (Sustainable financing and investing survey 2020, p. 7). From the *Sustainable financing and investing survey 2021* (p. 7) published by HSBC, the main reason why investors consider ESG factors in their investment process is no longer the possibility of increasing investment returns and/or reducing risk, the main motivation of the year before which had already undergone a reduction in consensus, but the belief that it is right to care about the world and the society. In light of these facts, how much is it really worth for investors to invest in companies with a high level of sustainability?

The trade-off between ESG performance and investment returns is difficult to analyze theoretically but also empirically either because of the multiple dimensions that characterize the concept of ESG or because of the ambiguity in ESG ratings due to the existence of more than 600 measures provided by more than 70 rating agencies (Li and Polychronopoulos, 2020). This, in addition to the lack of research that properly analyzes the many measures, makes it difficult to determine the definition of a 'high' ESG rating, which is critical for trade-off analysis.

While the survey conducted by Statista estimates and the OECD (2021) on *Differences in return on investments in companies worldwide between 2009 and 2019, by environmental, social and governance (ESG because of their environmental, social and governance (ESG) score band and ESG framework provider* shows that all companies providing ESG scores showed a relationship between lower scores and higher returns, the issue becomes more complicated when companies with high ESG scores are the protagonists. Indeed, the literature presents various conflicting points of view. On the one hand, there is the belief that 'good' stocks associated with high ESG scores earn positive abnormal returns due to investors misjudging the value of ESG issues by underestimating ESG benefits or overestimating costs, the risk compensation, or the premium that is added for some missing risk factors; on the other hand, high ESG scores are associated with negative abnormal returns due to overestimation of benefits and underestimation of costs or because they are not subject to the risk of unsustainability, a risk for which low ESG score stocks are remunerated at a higher rate.

The first to notice a deep relationship supported by strong empirical evidence between low ESG scores and high expected returns were Hong and Kacperczyk (2009), according to whom so-called

'sin stocks', i.e. companies involved in the production of alcohol, tobacco, gambling, weapons and military and nuclear industries, have higher average returns than other comparable stocks. Indeed, they are part of a category usually avoided by investors as an effect of social norms that consider them unethical and unsustainable, and for this reason investors who hold them must be rewarded for the reputational cost associated with holding them through a 'negligence' premium. This is confirmed by the theoretical model developed by Heinkel et al. (2001) according to which the presence of regulatory constraints disinhibits investors to undertake ethically risky investments, a fact that causes an increase in the cost of equity capital, and thus higher expected returns, for shunned stocks (unsustainable firms) and a decrease in the cost of equity capital, and thus lower expected returns, for acceptable stocks (sustainable firms).

According to a certain logic, the opposite should be true for highly rated ESG stocks, for which investors have preferences, but it should be noted that the monetary benefits, which investors would receive in this case to a lesser extent than the average, are not equivalent to the total returns, which on the other hand may not be less by including social benefits, as Cornell (2020) explains and will be analyzed below.

As can be guessed from the title *ESG preferences, risk and return* (2020), in his article Cornell analyzes the relationship between these three factors, in particular he reports that the expected returns of companies with high ESG ratings are influenced mainly by two factors: the ESG preferences of investors and the risk of the investments. An investor who prefers to invest in companies with high ESG scores in order to improve their performance will be disappointed because its investment may have significant social benefits but not as high expected returns as he hoped. Indeed, investors' preferences for firms with high ESG ratings may decrease the cost of equity capital, and thus the expected return, according to the Heinkel et al. (2001) model mentioned above, but this encourages investment in green projects, resulting in higher market values for sustainable firms. Other companies, noticing high market values and low cost of equity capital, then decide to become greener by directing investments towards these types of companies and improving the society as a whole. In addition, high ESG ratings can function as a hedge against climate shocks and unexpected changes in environmental regulations, another benefit to society. However, as previously mentioned, these benefits come at a cost to investors, namely a lower expected return. In addition to investor preferences, the other factor that influences the trade-off between risk and return concerns the direct risks associated with ESG characteristics; however, the literature has not yet provided enough evidence due in part to the too short sampling period in

which ESG data are available. In line with conventional thinking, if there is an ESG risk factor, highly rated stocks which are less exposed to that risk should provide lower returns; instead, as reported in the study by Ashwin Kumar et al. (2016), ESG companies show lower volatility in their stock performance than their peers in the same industry, different influence of ESG factors based on the industry they are part of, and finally higher returns. This is especially the case for certain industries, such as energy, food & beverage and healthcare, which are not used to operating in an environmentally sustainable way and are therefore rewarded more for adopting good ESG practices.

This theory is also supported by La Torre et al. (2020), who through a research conducted on 46 public firms listed in Eurostoxx50 have calculated the correlation between monthly returns and ESG indices, constructed taking into account various ESG indicators (rating, scoring and opinions), for the period 2010-2018. The result again shows a positive effect of the index with respect to returns only for some industries, such as those mentioned above, due especially to their active role in the field of ESG investments and their belonging to a sector in which this type of investment has a significant bearing on corporate profitability. However, more generally, the analysis conducted shows that the selected 'ESG Overall' index still influences returns to a very small degree. Further research and testing are needed to investigate more specifically the correlation between indices and returns, as ESG factors belonging to different dimensions of sustainability may not all be relevant in the same way and have different, or even confounding, effects on returns, as analyzed by Manescu (2011).

However, the study conducted by Verheyden et al. (2016) reveals that a preliminary ESG screening benefits any investment strategy even if it is not aimed at achieving sustainability, as the application of an ESG filter leads to the creation of stocks with better returns than the traditional filters applied. This process should also be followed by investors who are completely disinterested in sustainability, who can improve the quality of their portfolio and earn better returns through the application of a low-threshold ESG filter that does not affect the diversification potential of the portfolio.

CHAPTER 2 - ESG VALUATION: ANALYSIS OF ESG RATING METHODOLOGIES

As investors became more interested in the world of sustainable investing, it became necessary to introduce some methodologies that could quantitatively assess a company's commitment to sustainable business practices and therefore provide a certain value to ESG performance in order to make it easier for investors to make investment decisions. Another reason addressed in the previous chapter why the attribution of a score to each company becomes essential is the possibility it offers to measure more specifically the correlation between ESG performance and financial/economic performance. While it is difficult to assess certain sustainable practices adopted by a company as it is not possible to associate a value to certain sustainability indicators, ESG factors have been introduced precisely to fill this gap, as they can be measured despite the fact that it is difficult to associate a monetary value and provide a more detailed measurement.

In the first case, sustainability can be assessed through indicators called KPIs which can be financial, non-financial or a combination of both and are derived from clear and agreeable methodologies aimed at achieving a degree of detail and concrete quantification. Indeed, the purpose of KPIs is to translate the aspects to be analysed into measurable data, because "you can't manage what you can't measure", as Peter Drucker said. The choice of indicators and methodologies to be adopted varies according to the sustainability focus that the company intends to pursue; however, the selection criteria should consider the ease, significance, comprehensiveness, comparability, controllability, continuity, and efficiency of the indicator itself (Baglieri&Fiorillo, 2014). In 2001, the Lowell Centre for Sustainable Production developed the hierarchy of indicators by identifying 5 levels that include compliance, material use and performance, effects, supply chain and product life cycle, and sustainable system and represent a kind of path towards sustainability. Among the methodologies used there are Material Flow Analysis (MFA) and Life Cycle Assessment (LCA). Material Flow Analysis focuses on monitoring the flow of raw materials or semi-finished products whose use raises sustainability concerns (Huang et al., 2012) and is therefore a method for assessing the sustainability of socio-economic development and environmental change through the use of material/substance flow diagrams or accounting tables that make the assessment results complete, comparable and verifiable. The procedure is developed in six steps such as the Definition of research objective and selection of monitoring indicators, the System definition including scope, boundaries, and time frame, the

Identification of relevant flows, processes, and stocks, the Design of material or substance flow chart, the Mass balancing and the Illustration and interpretation of results and conclusions. However, this methodology could be improved by integration with other assessment methods in order to improve sustainability indicators and provide more standardised methods. In this respect, the LCA is a versatile and flexible calculation method complementary to the use of the MFA that allows to assess the direct environmental impact of innovative products and processes, considering also the indirect impacts associated with the supply chain (upstream), the use phases (core) and the end-of-life (downstream) and is composed of four stages similar to the MFA that include the Definition of the goal and scope to define the specific criteria and timeframe for the comparison of the system, the Inventory analysis describing material and energy flows within the system and the impact on the environment, the Impact assessment and finally the Life cycle interpretation which involves determining the sensitivity of the data and presenting the results (Muralikrishna & Manickam, 2017). Both methods have material type as their focus; different analytical perspectives for sustainability assessment are provided by additional methods that are classified by analytical scope, chemical ingredient and research purpose.

In the second case, ESG rating agencies come into play, associating an ESG rating or ESG score to the company in question on the basis of its commitment to implement activities that respect the environment, society and governance issues, which will be discussed in more detail in the following paragraphs. In addition, in recent years further approaches have been developed that also consider SDG-related indicators in the assessment; specifically, the project developed by the WEF in agreement with KPMG, Deloitte, PWC and EY will be presented as it represents for the first time an attempt to achieve a universal metric to measure sustainability in the same way at a global level.

2.1 Sustainability reporting: leading framework

Before understanding how scores and ratings are determined, it is important to understand where the information that underpins the measurement and contributes to the investment selection process comes from. Indeed, one of the most important tools for institutional investors and other stakeholders to gather information about the sustainable performance a company undertakes is sustainability reporting, which is a general non-financial report issued by the company that provides information about the company's activities related to environmental, social and governance issues, either as a stand-alone report or as part of an integrated report.

Disclosure of information related to environmental and social practices is not mandatory in most countries, however, the growing importance of sustainable investments in recent years has led companies to adapt to market demand on their own. In the early 1990s, indeed, less than 30 listed companies were issuing reports with ESG data (Serafeim, 2014), which then became more than 50% of global companies 20 years later until it reaches 80% of global companies in 2020 (KPMG Impact, 2020). Italy is among the countries and jurisdictions with a higher rate of sustainability reporting than the global average showing 86% last year compared to 80% in 2017.

There are many ways for companies to integrate sustainability reporting, varying between international, European or national guidelines, chosen according to company characteristics or business context. However, as reported in *The KPMG Survey of Sustainability Reporting 2020*, GRI standards remain the dominant global standard for sustainability reporting showing an increase in their application compared to 2017, followed by the Sustainability Accounting Standards Board (SASB) framework and International Standards Organization (ISO) standards.

The Global Reporting Initiative (GRI) is an independent international organisation that since 1997 - it was the first in the field - has been helping companies communicate the impact of their business by providing them with internationally recognised GRI guidelines and standards for sustainability reporting. The GRI Standards are aimed at any organisation, large or small, private or public, and provide an inclusive picture of an organisation's material issues, their impacts and how they are managed as their main objective is to maintain transparency about the risks but also the opportunities offered by activities. However, GRI provides only general suggestions rather than guidelines for assessing materiality. They are also useful for a wide range of stakeholders and other information users, including investors, to assess how a company integrates sustainable development into its business. They are divided into Universal Standards, applicable to all organisations, which explain their purpose and principles for use, provide guidance for disclosing information about the organisation and steps for determining material topics, Sector Standards, developed for 40 sectors, which enable more consistent reporting on sector-specific impacts by providing a list of material topics for each sector and the disclosures to be made, and Topic Standards, which contain disclosures to provide information on specific topics.

Sustainability Accounting Standards Board (SASB), on the other hand, provides 77 Industry Standards that are complementary to GRI, as the scopes to be met and the definition of materiality are different. The SASB standards identify the subset of ESG issues that are expected to have a

financially significant impact on the company for each of the 77 identified sectors, as not all sustainability issues are equally important for each sector and the same sustainability issue may manifest itself differently across sectors. In particular, the Conceptual Framework standards cover issues related to five dimensions of sustainability, such as environmental, social capital, human capital, business model and innovation, and leadership and governance, and each includes an average of 6 disclosure topics and 13 qualitative and quantitative accounting metrics. The aim is to primarily meet the needs of investors and other providers of financial capital, unlike the GRI standards which target a wider range of users. The SASB (2017), according to the U.S. Supreme Court, defines that "information is material if there is a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the 'total mix' of information made available." (p. 9), thus using a different approach than the GRI in that it is based on the provisions of US federal law. Due to their differences, as stated by SASB and GRI, their standards can be used individually or together to provide a more comprehensive sustainability report.

International Standards Organization (ISO) is an independent international non-governmental organisation that has developed more than 24125 International Standards covering a wide range of activities, from making a product to providing a service or materials. Some standards can be used to promote sustainable growth and enable transparency on products to limit their impact. For each goal, ISO has identified the standards that make the most significant contribution, as shown in the Figure 7.

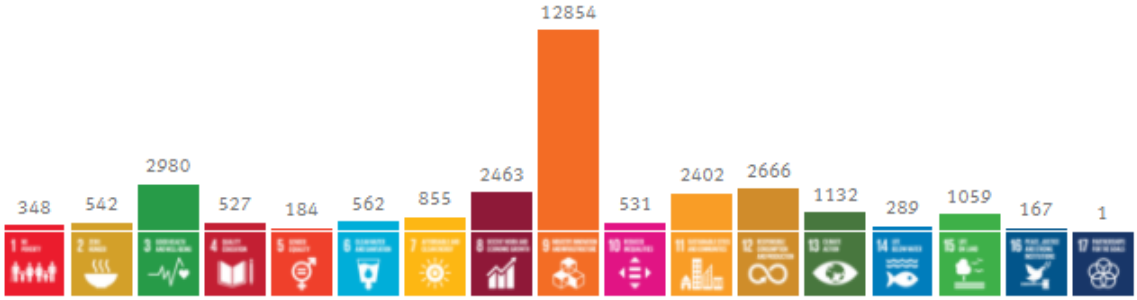


Figure 7: the number of ISO standards that are directly applicable to each Goal (ISO website)

Among these, there are the standards belonging to the ISO 26000 *Social Responsibility* family whose objective is to promote common understanding by integrating tools and initiatives aimed at social responsibility, the ISO 9001 *Quality management systems* that help any organisation regardless of the type of activity to ensure that customers get consistent and good quality products and services, as well as being the only ones in the family that can be certified, and the ISO 14001 *Environmental management systems* that help to reduce environmental impacts, reduce waste and

be more sustainable. Despite the attempt to provide useful tools for companies to contribute to the SDGs, the SDGs themselves are often unbalanced and disconnected from corporate goals. SDGs related to economic growth, climate change and responsible consumption are the most frequently considered in corporate reports, in contrast to those related to biodiversity protection (KPMG, 2020).

Other consistent guidelines for measuring and reporting especially environmental performance compatible with the standards developed by GRI and SASB are the Carbon Disclosure Project (CDP), the Climate Disclosure Standards Board (CDSB), The Task Force on Climate-Related Financial Disclosures (TCFD) and Streamlined Energy and Carbon Reporting (SECR).

Further developments will take place in the coming years thanks to international initiatives aimed at the convergence of reporting standards, which will further strengthen the focus of non-financial reporting on investors' needs, and they will allow for more harmonised reporting based on common metrics and consequently a coalition towards a global system. In September 2020, as mentioned earlier, the World Economic Forum (WEF) published *Measuring Stakeholder Capitalism: Towards Common Metrics and Consistent Reporting of Sustainable Value Creation*, defining 21 key metrics for achieving the SDGs, which will be discussed in more detail in section 2.1.1. Later in September 2020, the five leading non-financial reporting organisations (GRI, SASB, IIRC, CDSB and CDP) published a Statement of Intent in which they declare their commitment to work together towards comprehensive corporate reporting that includes both financial accounting and sustainability disclosure, linked through integrated reporting. In April 2021, the European Commission presented a proposal for a Corporate Sustainability Reporting Directive (CSRD) whose aim is to improve sustainability reporting by large companies by adapting standards to EU policies and at the same time to international standard-setting initiatives to contribute to the transition towards a sustainable and inclusive economic and financial system in line with the UN SDGs. Finally, in November 2021, the IFRS Foundation Trustees announced three significant developments to provide further disclosures regarding sustainability, such as the formation of a new International Sustainability Standards Board (ISSB) to provide comprehensive and global sustainability disclosure standards, a commitment by leading sustainability disclosure organisations to consolidate into a new board, and finally the publication of prototype requirements for climate and sustainability-related disclosure as preparatory work for the ISSB.

2.1.1 Stakeholder Capitalism Metrics: a new unified approach to sustainability reporting

A further tool for assessing ESG performance with more accurate and shared benchmarks aimed at achieving the SDGs and informing financial markets, investors and society was introduced in September 2020 by the World Economic Forum in collaboration with Bank of America and the Big four accounting firms - Deloitte, KPMG, EY and PwC – and it consists of the use of a universal set of 'stakeholder capitalism metrics' and disclosures that include environmental, social and governance indicators, and that companies can rely on to demonstrate long-term value creation and their contribution to the SDG goals, regardless of their sector or region. Stakeholder capitalism metrics and disclosures are the result of an open consultation process with companies, investors, NGOs, standard-setters and the Impact Management Project, whose collaboration has been instrumental in bringing together the efforts of the five main current independent global frameworks and standard-setters (CDP, CDSB, GRI, IIRC and SASB), leading towards the implementation of a comprehensive, globally consistent and comparable system of corporate reporting to support existing metrics and disclosures, used as a baseline where possible. The aim of this project is therefore to encourage companies to report on the metrics they use in order to align their annual financial and sustainability reports for consultation with investors and stakeholders, without compromising the value of individual sustainability reports that retain relevance as they provide more detailed information about the industry and the company. It also allows companies to influence the drafting of potential regulation by showing that a coordinated global reporting approach is feasible and in the interests of companies, investors, and stakeholders.

The approach followed by companies is based on the 'disclose or explain' theory according to which companies are expected to report all core and expanded metrics on which they have material. In fact, although one of the characteristics of these metrics is their universality and independence from the industry, it may happen that some of them are not feasible or easy to implement due to overriding causes, such as confidentiality constraints, legal prohibitions or lack of materiality, a fundamental concept for selection that refers to information that is important, relevant and/or critical to long-term value creation. In this case, the company must communicate the omitted metrics and provide a justification for this decision.

Specifically, this new tool consists of 21 core and 34 expanded metrics and disclosures organised into four pillars, namely Principles of Governance, Planet, People and Prosperity, which combine the traditional ESG concept with the importance of companies in fuelling economic growth, innovation, and shared wealth. The 21 core metrics, which are primarily quantitative in nature, are

the most established, universal, sector-independent or critically important metrics, and for this reason selected from hundreds of metrics. They are linked to activities within the organisation and information on them is already reported by many companies or easily available. Expanded metrics, on the other hand, tend to be less established in existing practices and standards as they address urgent emerging issues and represent a more advanced way of measuring and communicating value creation as they not only report results but also capture the impact of their operations on the environment and society in monetary terms.

Each pillar, which will be presented below, comprises up to seven themes, each grouping one or more metrics or disclosures to measure environmental performance, selected on the basis of five criteria (WEF, 2020):

1- Consistency with existing frameworks and standards
2- Materiality to long-term value creation
3- Extent of actionability
4- Universality across industries and business models
5- Monitoring feasibility of reporting

Principle of governance

The Principle of Governance refers to the governance dimension of the ESG concept, presenting a strengthened version of existing disclosures that reflects wider feedback from organisations and investors. The shift in a company's purpose towards long-term value creation and consideration of economic, environmental and social impacts makes it difficult to determine a definition of good governance, which is essential to align and drive financial and social performance and build legitimacy with stakeholders in view of achieving the intended purpose and in particular three SDGs: 12-*Responsible consumption and production*, 16-*Peace, justice and strong institutions*, and 17-*Partnership for the goals*. However, the principles of agency, accountability and stewardship continue to be important criteria for assessing good governance. This pillar includes five themes, each of which is associated with a number of core and expanded metrics which reflect the results of governance structures, policies and processes in quantitative terms, and disclosures which invite society to explain how it applies the governance frameworks.

The first theme ‘Governing purpose' addresses the extent to which the corporate purpose established by governance drives strategy, i.e. the means by which the company proposes solutions to economic, environmental and social problems. It includes the core metric *Setting purpose* which

requires the articulation of the output of the process to formulate and publicise the purpose, and the expanded metric *Purpose-led management* according to which the company must communicate how the purpose is embedded in the company's strategies, policies and objectives.

The theme ‘Quality of governing body’ addresses the extent to which the form and function of the governing body are aligned with long-term value creation. The core metric *Governance body composition* captures a wide range of dimensions critical to the composition of the governing body and its committees, the main focus of the metric, while the expanded metrics *Progress against strategic milestones* and *Remuneration* refer respectively to past and future strategic milestones and their contribution to long-term value creation, and to the types of remuneration mechanisms and how they are linked to economic, environmental and social objectives.

‘Stakeholder engagement’, which addresses the nature of stakeholder relationships, is associated with the core metric *Material issues impacting stakeholders*, which requires a list of material issues impacting stakeholders and the company, how they were identified and how stakeholders were engaged.

‘Ethical behaviour’ focuses on the company's behaviour in line with applicable laws and corporate rules, in particular it includes the core metrics *Anti-corruption* by which the company must report the percentage of stakeholders who have received anti-corruption training, the number of incidents of corruption and the initiatives discussed to combat it, and *Protected ethics advice and reporting mechanism* which includes the mechanisms in place to receive information on ethical issues and to report potential problems. The expanded metrics instead include *Alignment of strategy and policies to lobbying* which provides information about lobbying activities, lobbying strategy and the difference between it and its purpose, and *Monetary losses from unethical behaviour* which indicates the total amount of monetary losses from legal proceedings associated with fraud, antitrust, insider trading, market manipulation, negligence, anti-competitive behaviour or other violations of law.

Finally, the last theme 'Risk and opportunity oversight' identifies the degree to which governance identifies and manages risks and opportunities. The core metric *Integrating risk and opportunity into business process* focuses on risks and opportunities, the burden of the board of directors to oversee them, and the company's response to changes over time. The expanded metric *Economic, environmental and social topics in capital allocation framework* considers how the highest

governance body manages sustainable development issues in relation to capital allocation decisions.

Planet

The aim of the Planet pillar, which is equivalent to the environmental dimension of ESG, is to protect the planet from degradation through sustainable consumption and production, sustainable management of natural resources and the adoption of urgent action against climate change so that it can support the needs of present and future generations, a concept that takes up the definition of sustainable development. Indeed, business depends on, but above all it impacts, the environment as activities need natural resources, such as raw materials, and can cause damage that could lead to significant business risks and opportunities. Demonstrating a good understanding of and response to these impacts throughout the entire value chain, or life cycle, of products or services therefore becomes critical to the survival of the business, in order not to risk damaging estimates attributed by third parties. While established issues, such as climate change and water availability, are well formalised within the standards, this is not the case for equally pressing issues that have emerged in recent years, such as plastic waste or loss of nature, which is why expanded metrics also include some emerging metrics that offer new information for investors and stakeholders. Output metrics, both conventional and in the form of monetised estimates, are not sufficient on their own but need to be contextualised to provide useful information about impacts that become important for the achievement of SDGs, such as 6-C*lean water and sanitation*, 7-*Affordable and clean energy*, 12-*Responsible consumption and production*, 13-*Climate action*, 14-*Life below water* and 15-*Life on land*. Seven themes are identified for the planet, society and business, which will be presented below.

For the 'Climate change' theme, the core metrics *Greenhouse gas (GHG) emissions*, which must be reported in metric tonnes, and *TCFD implementation*, i.e. the implementation of the Task Force on Climate-related Financial Disclosures (TCFD) which must also report the timeline required and the targets set by the organisation for reducing global warming, are important. These are associated with expanded metrics relating to *Paris-aligned GHG emissions targets* which requires defining and reporting progress against GHG emissions targets in line with the Paris Agreement calculated through the Science Based Targets methodology (if different, it must be disclosed) and *Impact of GHG emissions* which must be estimated along the entire value chain and reported together with an estimate of the social cost of the carbon used.

The ‘Nature loss’ refers to the loss of benefits due to the destruction of biodiversity and focuses on *Land use and ecological sensitivity*, which requires from a core perspective to report the number and area in hectares of sites owned, leased or managed in protected areas, while from an expanded perspective to report the areas of land used for forestry, agricultural or mining activities and the annual variation, as well as the proportion covered by a sustainability certification standard. Another expanded metric concerns the *Impact of land use and conversion*, i.e. the reporting of the impact in monetary terms.

The theme of ‘Freshwater availability’ covers *Water consumption and withdrawal in water-stressed areas*, a core metric that requires reporting of megalitres of water withdrawn and consumed and the associated proportion in water-stressed regions, and *the Impact of freshwater consumption and withdrawal*, an expanded metric covering impact in monetary terms.

The next four themes only include expanded metrics as they address issues that have emerged in recent years that are not consolidated in existing standards. For the ‘Air pollution’ and ‘Water pollution’ themes the organisation must respectively report any significant emissions to air and estimate their proportion in urban areas, and *Nutrients*, i.e. the metric tonnes of nitrogen, phosphorous and potassium in the fertiliser consumed, as well as the impact these cause on the ecosystem. ‘Solid waste' theme refers to the estimated metric tonnes of *Single-use plastics* consumed, the definition, applications, and method of quantification and the *Impact of solid waste disposal*. Finally, ‘Resource availability’ relates to *Resource circularity*, in particular to the most appropriate resource circularity metrics for the whole company and the methodological approach to calculate the metrics.

People

The UN's *2030 Agenda for Sustainable Development* identifies people, the third pillar that takes up the social dimension of ESG, as the fundamental element for the achievement of the SDGs and the success of the organisation and society, whose aim is "to end poverty and hunger, in all their forms and dimensions, and to ensure that all human beings can fulfil their potential in dignity and equality and in a healthy environment." In particular, the importance of people, whose value can be divided into human and social capital, is especially important for the achievement of the following SDGs: 1-*No poverty*, 3-*Good health and well-being*, 4-*Quality education*, 5-*Gender equality*, 8-*Decent work and economic growth* and 10-*Reduced inequalities*. Measuring, managing, and disclosing information about a healthy and skilled workforce enables the creation of financial

and non-financial value that ensures a competitive advantage and mitigates the effect of risks, especially in the presence of unusual events such as COVID-19 or the Black Lives Matter movement. From the analysis of existing metrics regarding this area, three macro-themes are identified that underpin the above SDGs and distinguish significant business performance and disclosures for the organisation.

The theme of 'Dignity and equality' focuses on providing equal opportunities to all employees and includes the following core metrics to be reported by the organisation:

- *Diversity and inclusion (%)*: percentage of employees by category, age group, gender and other diversity indicators;
- *Pay equality (%)*: ratio of basic salary to remuneration for each employee category, e.g. women and men, minor and major ethnic groups;
- *Wage level (%)*: ratio of the standard entry level wage by gender to the local minimum wage and ratio of the CEO's total annual pay to the median of the total annual pay of all his employees, excluding the CEO;
- *Risk for incidents of child, forced or compulsory labour*: explanation of operations and suppliers that may involve child labour.

With which the following expanded metrics are associated:

- *Pay gap (%, #)*: the average pay gap of base salary and salary of relevant full-time employees by gender and diversity is an indicator of organisational structural inequality, while the ratio of highest paid to median annual total compensation represents the underrepresentation of disadvantaged groups in key roles;
- *Discrimination and harassment incidents (#) and the total amount of monetary losses ($)*;
- *Freedom of association and collective bargaining at risk (%)*: percentage of active workforce and explanation and corrective measures related to violation or exposure to risk of workers' freedom of association or collective bargaining;
- *Human rights review, grievance impact & modern slavery (#, %)*: total number and percentage of operations subject to human rights reviews by country, number and type of complaints reported with related impacts, and number and percentage of operations and suppliers that may involve child, forced or compulsory labour;
- *Living wage (%)*: ratio of current wages to living wage in the states and localities where the company operates.

For the theme 'Health and well-being', the company must report the number, rate and types of work-related injuries and deaths from injuries, and an explanation of how it facilitates workers' access to medical and health services (core metric *Health and safety (%)*). The related expanded metrics concern *Monetized impacts of work-related incidents on organisation (#, $)* found by multiplying the number and type of incidents by the direct costs of the organisation and *Employee well-being* which includes the number of deaths due to occupational diseases and accidents at work, the percentage of employees participating in health programmes and the rate of absenteeism.

Finally, the theme 'Skills for the future' includes *Training provided (#, $)*, in particular the hours of training per capita that employees have undertaken and the average training and development expenditure per employee, and the related expanded metrics *Number of unfilled skilled positions (#, %)* and *Monetized impacts of training - increased earning capacity as a result of training intervention (%, $)*, which includes the investment in training as a percentage of payroll and the effectiveness of training on the business and the workforce.

Prosperity

The Prosperity pillar represents the economic dimension of sustainability which is not present in the ESG concept. It emphasises the importance of business in fuelling economic growth, based for example on decent employment, sustainable livelihoods and rising real incomes, innovation for value creation and shared wealth based on sustainable production and consumption. These aspects should ensure that human beings live prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature, which is the aim of the UN's *2030 Agenda for Sustainable Development*; furthermore, their measurement and reporting allows for the identification of that part of value reflected in off-balance sheet intangible assets and value drivers associated with prosperity that are usually not considered in valuation. Again, this pillar is aimed at achieving some specific SDGs, such as 1-*No poverty*, 8-*Decent work and economic growth*, 9-*Industry, innovation and infrastructure* and 10-*Reduced inequalities*, which are in line with the three identified themes.

The 'Employment and wealth generation' is associated with the following three core metrics: *Absolute number and rate of employment*, i.e. the total number and rate of hiring of new employees and turnover of existing ones; *Economic contribution* concerns the direct economic value generated and distributed and the financial assistance received from the government; *Financial investment contribution* is calculated from CapEx minus depreciation and share buybacks plus dividend

payments, all accompanied by an explanation. The expanded metrics concern qualitative information on *Infrastructure investments and services supported*, their impacts and nature, and examples of *Significant indirect economic impacts*.

The second theme 'Innovation of better products and services' focuses on *Total R&D expenses ($)* and the related expanded metrics *Social value generated (%)* representing the percentage of revenues from products and services designed to provide social benefits or address sustainable challenges and *Vitality index* referring to the percentage of gross revenues from sales of products added in the last three years.

Finally, the 'Community and social vitality' theme includes *Total tax paid* and the corresponding expanded metrics *Total social investment ($)*, an item that summarises the resources that a company uses to pursue the ESG concept, *Additional tax remitted*, i.e. the total additional global tax collected by the company and the taxes paid by the company and *Total tax paid by country for significant locations*.

2.2 ESG rating: a tool for measuring sustainability

From a quantitative point of view, the most widespread approach to carrying out ESG assessments involves independent rating agencies that provide a single score or rating to the company through their assessment methodologies based on the use of data from the evaluation of indicators related to environmental, social and corporate governance impacts with the aim of providing relevant data for stakeholders who want to use non-financial criteria to build their portfolios. An ESG rating therefore does not replace the traditional financial rating but is complementary in that it increases the information available to investors who can gain a more complete overview of the company's situation. While a traditional rating is "*una valutazione (prodotta usualmente da agenzie specializzate) del grado di affidabilità e solidità finanziaria di una società o di uno Stato sovrano"* (Treccani), meaning an assessment, usually produced by specialised agencies, of the degree of reliability and financial soundness of a company or sovereign state, an ESG rating can be defined as "*un giudizio che indica la solidità di un titolo, una società, di un fondo ma anche di un progetto immobiliare o edificio, dal punto di vista però ambientale, sociale e di governanc*e" (Il sole 24 ore), or a judgement indicating the soundness of a security, a company, a fund, but also of a real estate project or building, from an environmental, social and governance point of view.

ESG ratings are not the only output of the used valuation methodologies but they can be replaced by ESG scores and ESG opinions. ESG ratings, scores and opinions very often co-exist and are

used and communicated as similar interchangeable indices, but there is a fundamental difference. ESG ratings measure a company's exposure to ESG risk, in particular higher ratings indicate lower risk and a better ability to manage it, while ESG scores look at the present and the past and consequently do not provide a risk assessment but measure the ESG attitude of a company by offering an assessment of how much the company has been and is committed to manage ESG factors. The same approach is used by ESG opinions which, unlike ratings and scores, are qualitative (La Torre et al., 2020).

ESG ratings are in addition to sustainability reports that are prepared by companies to communicate the environmental, social and governance impact of their activities, as a central element of the ESG information environment, becoming the most important means available to investors to assess and measure the company's ESG performance over time and against peers, in particular the effectiveness with which the company manages ESG risks and opportunities, ensuring that their funds are committed to a company with a satisfactory ESG performance (Amel-Zadeh, 2017)

The large presence of ESG rating rankings in the market, Eccles et al (2019) count about 500 of them, is the result of the difficulty in comparing certain sustainability data due to their qualitative nature, and the considerable differences in methodologies, scopes and coverage of ratings between the different providers present in the market due to the lack of unified standards and transparency (Escrig-Olmedo, 2019). It consequently does not allow an assessment of the quality of the rating, which is a key aspect to gain and maintain the trust of companies and investors in SRI. Some rating agencies might be based on the compliance of the company to be rated with certain sustainability standards, others on the company's ability to recognise and manage risks or even on the degree of materiality of the whole rating process. For this reason, knowledge of the methodology used by rating agencies on the one hand and a deep understanding of one's own ESG preferences on the other are essential for investors to correctly interpret the data. Indeed, investors, asset managers and ESG rating providers have different preferences that make them focus on different environmental, social or governance aspects. As different ESG rating providers may rate the same company very differently, investors should therefore consider and compare the different types of data available according to the information they seek and select the provider whose ratings most closely match their ESG views (Li & Polychronopoulos, 2020).

2.2.1 ESG rating agencies: an overview

According to Borsa Italiana's definition, "*le agenzie di rating di sostenibilità o di rating ESG sono centri di ricerca specializzati nella raccolta ed elaborazione di informazioni sul profilo ambientale, sociale e di governance delle imprese, al fine di fornire agli investitori le informazioni utili a prendere decisioni di investimento consapevoli*", which means sustainability rating agencies or ESG rating agencies are research centres specialised in collecting and processing information on the environmental, social and governance profile of companies, in order to provide investors with useful information to make informed investment decisions. The significant growth in sustainable investments over the last decade has led investors to become increasingly interested in ESG factors and to demand environmental and social information, which only becomes useful when analysed and contextualised, reason why ESG rating agencies have become so popular. Their role is, as can be guessed from the definition, to "scrutinise businesses and assess corporate sustainability performance by using their own research methodologies" (Escrig-Olmedo et al., 2019, p. 1), but they also have a commercial nature as they offer diverse products and services ranging from the creation of sustainability indices, often used as benchmarks, to the provision of sectoral and thematic research reports or sustainability data. These competencies have made them a reference point in the field of sustainability assessment, not only from an economic but also from a social point of view, with particular attention to the concept of sustainability that must be shared by ESG companies and rating agencies, otherwise they risk ruining their legitimacy and trust.

Li & Polychronopoulos (2020) attempt to shed light on an industry characterised by the presence of a large number of actors - around 70 different ESG rating data providers offering a wide range of data - by presenting a three-tier framework that classifies the most common approaches of ESG data and rating providers:

- Fundamental: this category includes ESG data providers whose sole task is to collect data from public sources, such as company documents, corporate websites or non-governmental organisations, and disseminate it to end users who use it to develop their own methodology. They do not offer any added value as they do not have a rating methodology and do not provide ESG scores. An example of a core provider is Bloomberg;
- Comprehensive: this category includes ESG data providers that collect objective public data and subjective data of their own creation as produced by their own analysts through company interviews and independent analysis, and combine it through their own rating methodology to determine a company's ESG score based on different metrics for

environmental, social and governance issues. They also produce reports on country and industry trends. Examples of comprehensive providers are MSCI, Sustainalytics, Vigeo Eiris, ISS and finally TruValue and RepRisk that rely less on traditional ESG analysts and prefer to use algorithms. Most of the ESG rating providers currently on the market belong to this category, with some rating companies globally and others focusing on a specific country or region;

- Specialist: providers in this category focus on a specific ESG issue such as carbon, corporate governance, human rights or gender diversity and are therefore useful for investors interested in addressing a specific topic. Moreover, thanks to the large amount of data they acquire, they can provide specialised data to end users. Examples of specialised providers are TruCost, the Carbon Dsiclosure Project (CDP) and Equileap, however most of them focus on climate-related issues.

The number of players in the rating agency industry to date still very high is the result of a long process of evolution that began in 2008, a year that brought a change in the perception and attitudes of the capital market towards corporate sustainability (Lopatta & Kaspereit, 2014), characterised by M&A processes, which reorganised and consolidated the industry with larger, more professional and linked to the financial sector companies able to offer a clearer service to investors (Escrig-Olmedo et al., 2019). They are no longer considered as single players in a niche market, rather they become a promising business even for traditional rating agencies, as can be seen from the acquisition by Standard & Poor's and Moody's, two of the main rating agencies that are part of the so-called 'Three Sisters', of two ESG rating agencies, RobecoSAM and Vigeo Eiris respectively.

Despite the vast number of ESG data and rating providers and consequently ESG rankings, most investors continue to rely on the best known ones, some of which will be presented below along with their scoring or rating methodologies.

2.2.2 ESG rating methodologies: MSCI ESG Research, Sustainalytics and Refinitiv

As introduced earlier, each ESG data provider and ESG rating agency proposes and uses its own model for scoring or assessing and assigning ESG ratings, influenced by different market-driven differentiation strategies and cultural and ideological factors. However, Chatterji et al. (2016) argue that there are three common aspects considered in each methodology: the first relates to the high-level categories assessed (environmental, social and governance) and the positive criteria included

in each category; the second relates to the assessment of controversial activities through negative screening; finally, the third relates to the process of normalising ratings by sector.

The ESG score and ESG rating providers shown in Table 1 are the main players characterising the sustainable market to date, all of whom are signatories to the Principles of Responsible Investment (PRI). It is decided to explore the rating process adopted by MSCI ESG Research, Sustainalytics and Refinitiv as they are the most important in terms of the number of companies rated.

Table 1: ESG score and rating providers and number of companies evaluated

ESG SCORE AND RATING PROVIDERS	N° OF COMPANIES EVALUATED (APPROXIMATE)
Bloomberg	4.500
ECPI	4.000
ISS	4.000
MSCI ESG Research	8.700
Refinitiv	9.500
RobecoSAM	4.700
Sustainalytics	12.000
Vigeo Eiris	4.800

Source: personal processing

MSCI ESG research

MSCI ESG Research has over 40 years of experience in measuring and modelling the ESG performance of companies and was the first ESG rating provider to rate companies based on industry materiality since 1999 and the first to measure and incorporate companies' ESG risk exposure. The methodology that the agency has developed over time and which is disclosed annually in the *MSCI ESG Ratings Methodology* aims to measure a company's long-term resilience, in particular to identify material ESG risks and opportunities, i.e. those that involve substantial costs or significant profits, dictated by large-scale trends such as climate change or resource scarcity and by the nature of the company's operations, the company's exposure to them and the level of its management capability.

The assessment process consists of a quantitative model that starts with the collection of data and information from various sources such as specialised datasets from academia, governments and NGOs, from Company disclosures (10-K, sustainability report, proxy report, etc.) and from over 3,400 media sources monitored on a daily basis, from which the most significant risks and opportunities, also known as the 35 Key Issues, are identified through a quantitative analysis of each sector as a whole and then divided into 10 themes and assigned to each company, as shown in Figure 8.

3 Pillars	10 Themes	35 ESG Key Issues	
Environment	**Climate Change**	Carbon Emissions Product Carbon Footprint	Financing Environmental Impact Climate Change Vulnerability
	Natural Capital	Water Stress Biodiversity & Land Use	Raw Material Sourcing
	Pollution & Waste	Toxic Emissions & Waste Packaging Material & Waste	Electronic Waste
	Environmental Opportunities	Opportunities in Clean Tech Opportunities in Green Building	Opportunities in Renewable Energy
Social	**Human Capital**	Labor Management Health & Safety	Human Capital Development Supply Chain Labor Standards
	Product Liability	Product Safety & Quality Chemical Safety Financial Product Safety	Privacy & Data Security Responsible Investment Health & Demographic Risk
	Stakeholder Opposition	Controversial Sourcing Community Relations	
	Social Opportunities	Access to Communications Access to Finance	Access to Health Care Opportunities in Nutrition & Health
Governance*	**Corporate Governance**	Ownership & Control Board	Pay Accounting
	Corporate Behavior	Business Ethics Tax Transparency	

Figure 8: MSCI ESG Key Issue Hierarchy (MSCI ESG RATINGS METHODOLOGY 2020)

The next step is to determine weights that establish the contribution, i.e. the materiality, of each key issue to the overall assessment, usually between 5% and 30%, taking into account the industry's contribution relative to others to the impact on the environment or society and the timeframe within which the risk or opportunity will occur. If the industry contributes significantly to the impact and the timeframe is short then the weight will be high, about three times the weight that would occur otherwise. For the Governance pillar, as of November 2020, the minimum value has been set at 33%, determined by assuming the combinations ‘High Contribution/Long Term’ and ‘Medium Contribution/Long Term’ on Corporate Governance and Corporate Behavior respectively across all sub-industries. The key issues and weightings are reviewed and given feedback at the end of each year. The scoring of environmental and social key issues is done by assessing exposure and

risk and opportunity management, as governance is subject to a different process. Exposure is assessed by 80 business and geographic segment metrics on a scale of 0 (no exposure) to 10 (very high exposure) based on a granular breakdown of each company's business, which is why companies in the same industry facing the same risks and opportunities may have different individual exposure. A high score is the consequence of high risk exposure combined with strong management, while poor risk management will result in a lower score. Management is instead assessed by 150 policy/program metrics and 20 performance metrics on a scale of 0 (no effort) to 10 (very strong management). Controversies from the last three years lead to a deduction from the score and are assessed for the severity of their impact on society or the environment and classified as Very Severe (reserved for 'worst of the worst' cases), Severe, Moderate, or Minor. The two risk scores are combined in such a way that a higher level of risk exposure requires a higher level of demonstrated management capability in order to achieve the same score as the overall key issue, which is itself rated on a scale of 0 to 10. Opportunity scoring works similarly to risk scoring but the model for combining exposure and management scoring is different, in fact limited opportunity exposure implies a middle score, high exposure implies both high and low scores. As previously announced, the governance score is determined differently on a 0-10 scale: each company starts with the maximum score of 10 to which deductions are applied based on the assessment of over 100 Key Metrics associated with each key issue.

At this point, the rating is constructed through an industry rating model that uses a weighted average approach whereby a Weighted Average Key Issue Score is calculated for each company based on the scores and weights of the individual key issues, adjusted for Industry Peers and exceptional truncations, and associated with one of seven ratings from the best (AAA) to the worst (CCC) after determining the maximum and minimum industry benchmarks based on percentiles calculated considering the entire universe of companies with ESG criteria. These ratings are not absolute but are explicitly intended to be interpreted in relation to a company's industry peers, which is why they must be normalized.

Sustainalytics

Sustainalytics, a Morningstar company since 2020, is a leading independent ESG and corporate governance research, rating and analysis company that has been supporting investors around the world with the development and implementation of responsible investment strategies for over 25 years. In 2018, it launched ESG Risk Ratings, which measure the extent of a company's unmanaged

ESG risks and consist of a quantitative score and a risk category, the determination of which will be presented below based on the *ESG Risk Ratings - methodology Abstract* prepared by Sustainalytics (January 2021).

The ESG Risk Rating consists of the following three core building blocks: *Corporate Governance* is applicable to all companies as poor governance poses material risks to companies and the associated unmanaged risk typically contributes 20% to the overall exposure score which is only determined by category 4 and 5 events; the *Material ESG Issues*, specifically 20, consist of a series of issues that require a common set of management and oversight initiatives, the assessment of which takes place at the sub-sector level and is reviewed annually, while at the company level they can be removed from the rating if they are irrelevant to the company's business model; finally, the *Idiosyncratic ESG issues* represent issues that can become material in an unpredictable way for the individual company regardless of the sector if the assessment of the associated event exceeds the significance threshold set at category 4 or 5.

The approach used to determine the ESG Risk Ratings has a twofold dimension that considers on the one hand the exposure to ESG risk and on the other hand the Management or how well the company is managing the risks, elements also considered by MSCI. Exposure is composed of the set of ESG factors that entail potential risks and therefore represents the company's vulnerability to ESG risks which are identified through the track record of the company's events, structured external data, company reports and third-party research and assessed at subsector level; Sustainalytics differentiates 138 issues, each with a different risk profile and refined at company level on the basis of the specific business model or other factors. Specifically, the company's exposure score for a particular ESG issue is calculated by multiplying the subsector exposure score and the company's issue beta, which is the degree to which a company's exposure to a material ESG issue differs from the average exposure of the subsector. Beta is calculated in a three-stage process that involves the evaluation of *Beta Indicators* for four areas (Product & Production, Financials, Events, and Geographic) to which the *Qualitative Overlay* and *Correction Factor* are added. For some ESG issues it is not possible to manage the risk completely, which is why the manageable risk factor (MRF) is introduced, which determines the share of manageable risk at subsector level through a range that goes from 30% to 100% and allows to obtain more realistic rating results and to guarantee the comparability of ratings between companies and subsectors. Management, on the other hand, includes risk mitigating actions that demonstrate how well the company is managing ESG risks and that are evaluated through the joint assessment of

management indicators (programmes and policies, health and safety certifications) on a scale of 1-100 based on key risk areas or best practices, and outcome-focused indicators, i.e. quantitative and event KPIs that measure the adequacy of the company's risk management systems and classify the event in category 1 if it has a low impact on the environment and companies with negligible risks, in category 5 vice versa. The different indicators are selected and weighted to provide a more meaningful measurement, the overall management score.

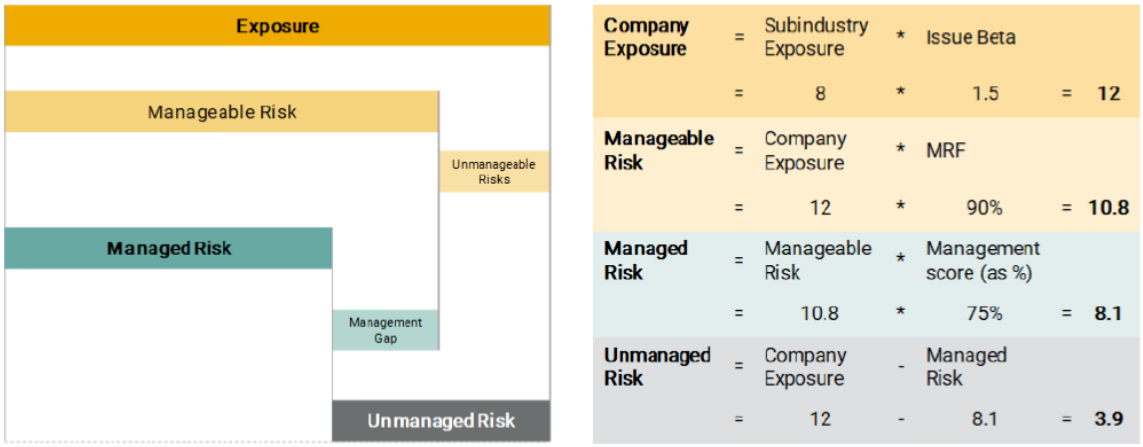


Figure 9: ESG Risk Ratings – the scoring structure (ESG Risk Ratings - Methodology Abstract 2021)

Figure 9 shows the combination of the company exposure and management scores and the degree to which the risk is managed for each of the three core building blocks, resulting in the unmanaged risk calculated as the difference between the company exposure and the managed risk. This represents a quantitative rating (unmanaged risk score or ESG rating) that does not identify the goodness of the behaviour of the company but expresses the amount of the risks not managed by the company; in particular, it differentiates the unmanageable risks that cannot be addressed by any company initiative from the management gap that represents the risks potentially manageable but not sufficiently managed according to Susatinalytics. The score, which ranges from 0 to 50 for 95% of cases, with lower scores referring to a lower unmanaged risk, ties the company to a risk category that can be negligible (0-10), low (10-20), medium (20-30), high (30-40) or severe (40+). Unlike MSCI, the risk categories are absolute due to the introduction of a single currency for ESG risk which makes the risk units equivalent across sectors and comparable across industries, e.g. a bank can be compared to an oil company.

Refinitiv

Refinitiv, an LSEG (London Stock Exchange Group) company since February 2021, is one of the world's largest providers of financial market data and infrastructure and, specifically in the area of sustainability, is committed to provide standardised ESG data and analysis for 80% of global market capitalisation and to create a set of ESG scores and ESG ratings through the use of more than 450 metrics designed to transparently and objectively measure a company's ESG performance and commitment. The ESG scoring methodology, reported *in Environmental, social and governance scores from Refinitiv* (February 2021), is fully automated and starts with information from annual reports, company websites, NGO websites, CSR reports, news sources and stock exchange filings and then follows 5 steps, as shown in Figure 10.

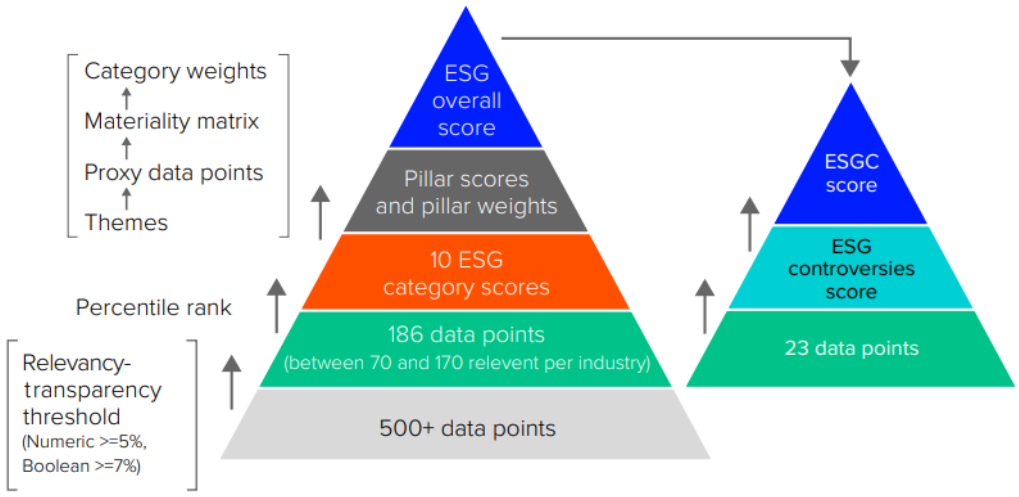


Figure 10: The Refinitiv ESG scoring methodology (Environmental, social and governance scores from Refinitiv, 2021)

The first step, 'ESG category score', is to treat the underlying measures, or data points, which are based on considerations of comparability, impact, data availability and sector relevance. Refinitiv identifies 186 significant ones among the more than 500 available, which can have a dual nature: Booleans are derived from questions that assume a ‘yes’, ‘no’ or ‘null’ answer to which a number is associated (0 or 1 based on positive or negative polarity), while numerical data are reported by the company, also with a certain polarity, and considered only if relevant to all sectors. These are grouped into 10 categories for the three ESG pillars and include Emission, Innovation and Resource use for Environmental, Community, Human rights, Product responsibility and Workforce for Social and finally CSR strategy, Management and Shareholders for Governance. The category scores are then calculated according to the percentile rank scoring methodology (Eq. 1) which does

not make them sensitive to outliers through the following formula and they are grouped into three pillar scores (step 3).

$$score = \frac{no.of\ companies\ with\ a\ worse\ value + \frac{no.of\ copanies\ with\ the\ same\ value\ included\ in\ the\ current\ one}{2}}{no.of\ companies\ with\ a\ value} \quad (1)$$

Step 2 involves the development of the materiality matrix for each category, which reflects the relative importance of each theme relative to a data point, found in corporate ESG reports and ESG databases and associated with one of the categories, for different sectors. There are two methods for calculating the matrix: the *industry median method* used for numerical data points with environmental and social impacts consists of the relative median value for a company in that industry group while the *transparency weights method* is used for boolean data points and weights are associated based on the level of disclosure of each data point in an industry group. The size weight of each category is calculated as Eq. 2 and normalised between 0 and 100 or, if predefined, distributed between 1 and 10.

$$category\ weight\ of\ an\ industry\ group = \frac{magnitude\ weight\ of\ a\ category}{sum\ of\ magnitudes\ of\ all\ categories} \quad (2)$$

Step 3 'Overall ESG score calculation and pillar score' involves calculating the overall ESG score based on the 10 category weights calculated according to the Refinitiv magnitude matrix and calculating the pillar score as the relative sum of the category weights normalised by industry. Step 4 includes the 'Controversies scores calculation', calculated on the basis of 23 ESG controversy topics whose default value is 0, while companies without controversies receive a score of 100. The introduction of severity weights ensures that controversy scores are adjusted according to the size of a company. Finally, the last step is to calculate the ESGC score as a weighted average of the ESG scores and the ESG controversy score to provide a comprehensive assessment of the company's sustainability impact and conduct over time. When the controversy score is greater than the ESG score, the ESG score is equal to the ESGC score.

The use of the percentile rank scoring methodology therefore eliminates hidden levels of calculation and produces a percentile score between 0 and 100 or letter grades on a 12-level scale whose conversion is based on a table provided by Refinitiv. The rating ranges from a D- score, indicating poor ESG performance and an insufficient degree of transparency in public reporting, to an A+ score, indicating the opposite, and are compared with the Refinitiv Business Classifications (TRBC-Industry Group) for all environmental and social categories and measured against the

country of incorporation for governance categories to facilitate comparable analysis within peer groups.

General perspective

The research conducted by Escrig-Olmedo et al. (2019) provides a general perspective of the criteria used by different methodologies. In particular, it shows that from 2008 to 2018 ESG rating agencies have integrated new screening criteria, and used existing ones to varying degrees, into their assessment methodologies to measure corporate performance more accurately and robustly in step with new global challenges.

On the environmental side, the focus that was mainly on the analysis of environmental policies or management systems in 2008 is now also directed to new aspects related to the efforts of large companies to reduce emissions and consumption, in line with the agreements reached at the 21st Conference of the Parties (COP21) in Paris (December 2015).

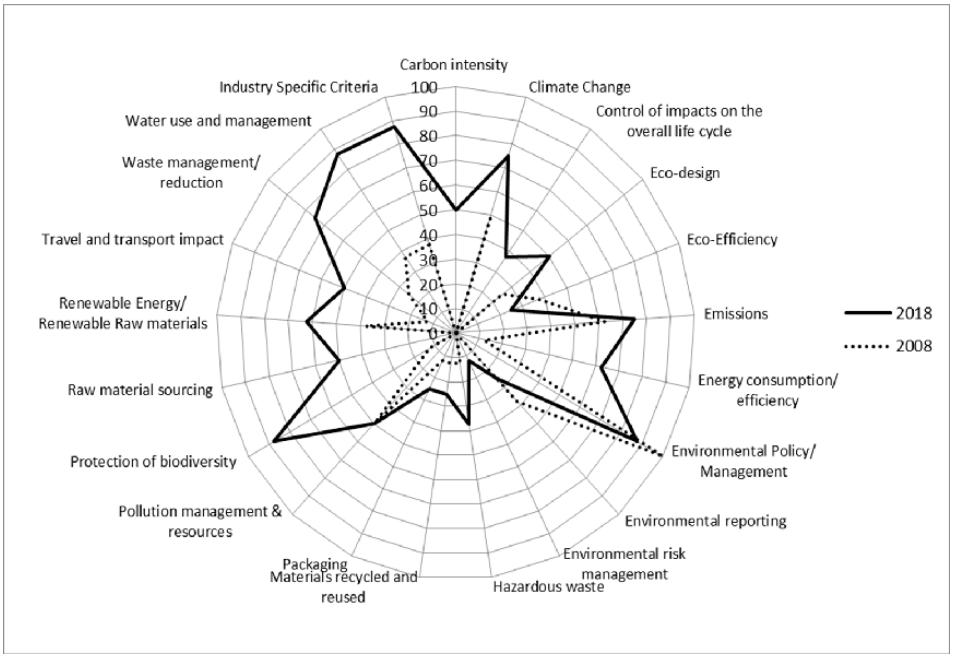


Figure 11: The environmental positive criteria (Escrig-Olmedo et al., 2019)

With regard to the social pillar criteria, *Labour management*, *Human rights*, and *Quality working conditions, Health & Safety*, criteria in line with the SDGs, have taken on particular importance over time, moving away from *Human capital development & training*, the main aspect considered in the 2008 assessment.

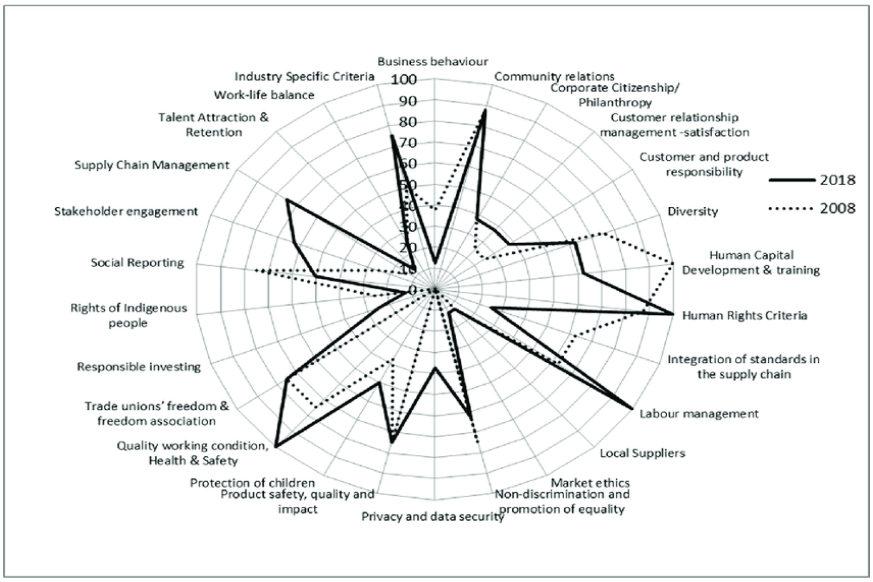


Figure 12: The social positive criteria (Escrig-Olmedo et al., 2019)

Finally, the corporate governance dimension continues to consider the criteria already used in 2008 as important, with a significant increase in *Prevention of corruption and bribery*, an aspect that is becoming increasingly important in assessment frameworks.

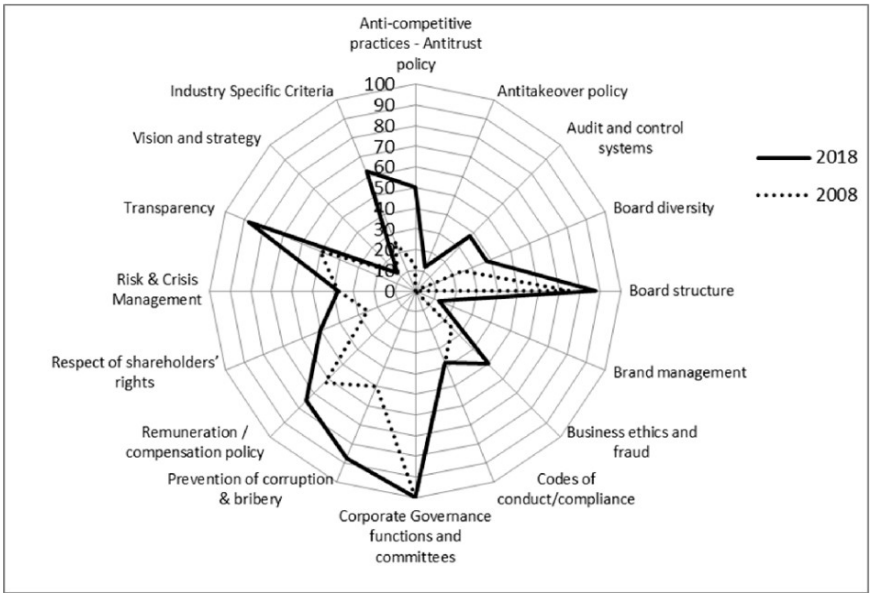


Figure 13: The governance positive criteria (Escrig-Olmedo et al., 2019)

The three figures detail the evolution of the criteria from 2008 to 2018 divided by the three ESG aspects. In addition, it has emerged that, although ESG rating agencies focus on many environmental, social and governance criteria, they do not actually fully integrate sustainability principles into the corporate sustainability assessment process and not all aspects receive the same attention from ESG rating agencies, which could slow down the sustainable development of the companies being assessed.

2.2.3 What makes ESG Ratings problematic

The high number of players in the ESG rating agency industry as a result of the increase in ESG data caused by market growth and the lack of data standardisation due to the lack of a universally shared framework makes it difficult to assess and compare companies' performance on environmental, social and governance criteria due to ESG scores and ratings that often diverge despite referring to the same company. This leads to several consequences presented by Berg et al. (2019). Firstly, it disperses the effect that investors' preferences for certain ESG performance have on stock and corporate bond prices; secondly, it disinhibits companies to improve their ESG performance as ESG rating agencies send conflicting signals on which actions will be evaluated by the market; finally, it represents an empirical challenge as the use of one rating agency over another can considerably alter the results of a study. It is therefore important to understand the main reason why ESG ratings diverge.

Berg at al. (2019) identified three different sources responsible for rating divergence. *Scope divergence* refers to a situation where different combinations of criteria are used to determine the rating, also because of the different interpretations that corporate sustainability has acquired over time, which means it is not avoidable. *Measurement divergence* occurs when rating agencies measure the same attribute using different indicators that may focus on policies, such as the existence of a code of conduct, or performance. The study find that this type of divergence is the main driver of rating divergence, followed by scope divergence, and is partly driven by the rater effect, which is the decision of ESG rating agencies to assign high scores to all categories if a company receives a high score in one category. This means that divergence arises from differences in what is measured and how it is measured. If measurement methodologies are not consistent with each other, as well as providing different ESG ratings, there is a risk that the benefits of adopting sustainable practices may not materialise. Finally, the *Weights divergence* plays a minor role and emerges when rating agencies consider the relative importance of attributes differently. The three divergences are intertwined, making it difficult to interpret the divergence in aggregate ratings.

Other obstacles that threaten confidence in ESG ratings relate to data quality due to the lack of transparency about the criteria and the rating process (PaulWeiss, 2021). The data used by agencies are often self-reported, i.e. companies are free to choose which information to provide for their ratings, which could artificially inflate their ESG score. Even the data reported by third parties may not reflect the results of the company's actual efforts, this creates a difficulty for investors who have to make their decisions based on incomplete information. Furthermore, data is often unaudited

so it is not possible to identify misinformation within sustainability reports that could distort ESG scores. A solution could be a review by a reputable third party as with financial statements which would give the company a different perspective appreciated by investors. In addition to data quality issues, there is also the development of some biases that make ESG ratings inaccurate. The wide range of factors contained in each ESG pillar is reduced to an aggregate score that hardly takes into account the nuances of each and reflects the real strengths and weaknesses of the business. Furthermore, there is a tendency for agencies to focus on management policies and practices rather than on the actual ESG impacts and outcomes of the rated companies which raises questions about the efficiency of ESG factor policies as they are sometimes set up to project a more sustainable corporate image than is actually the case, so-called 'greenwashing'.

A study by the American Council for Capital Formation (ACCF) published in 2018 identifies additional biases that relate to company size, geographic and sectoral position. *Company size bias* relates to the tendency of companies with higher market capitalisation to obtain better ESG ratings than small and medium-sized companies and is confirmed by the study carried out by Boffo and Patalano (2020), members of the OECD and reported in *ESG Investing: Practices, Progress and Challenges*. This might happen because large capitalisation companies have a certain degree of disclosure expertise and more resources to invest in practices that improve sustainability, unlike small and medium-sized companies for whom ESG disclosure might become a burden and resources are limited. *Geographic bias* arises from different disclosure requirements that vary by region and jurisdiction, which is why two companies active in the same industry but in different countries might be assigned very different ESG ratings. An example is provided by companies domiciled in Europe, which often receive higher ESG ratings than companies based in the US. Finally, *Industry sector bias* is due to the use of the same rating model for companies in the same industry despite significant differences in business models and risk exposure that are therefore not accurately captured in the composite ratings by the weights assigned to each pillar. For this reason, it becomes important to standardise disclosures and metrics within an industry even though the standardisation of weighting could affect investors' assessments.

These shortcomings recommend special care in interpreting the results of ESG rating agencies because if ESG data do not reliably and validly reflect organisational reality, sustainable investment practices cannot contribute to sustainable development.

2.3 Criticalities of ESG ratings for non-listed companies

Expectations regarding the adoption of sustainable practices in business are increasing in the private equity industry as well, as can be seen by the increased demand for GPs to report on ESG from potential investors. Private companies are the most suitable environment to incorporate and implement sustainable investment ideas as the long-term horizon allows them to focus on ESG issues, unlike listed companies whose results, aimed at maximizing short-term profits, must be presented to shareholders on a quarterly basis. Moreover, the significant engagement activity that characterises private equity ensures greater control over ESG-related risks and consequently the adoption of continuously improving ESG practices. As reported in the Boston Consulting Group (BCG) report, a paper detailing companies' policies and performance on material non-financial issues, this allows private companies to act more quickly than their public counterparts when it comes to disclosing ESG data and improving the ESG performance of portfolio companies also due to their typically smaller size and leaner structure that subjects them to less paperwork. ESG rating agencies, such as Vigeo Eiris and Sustainalytics, are also adapting to this change of direction by moving towards the private equity industry after receiving requests for ratings from private companies, however the limited information available publicly could present a problem for success.

As has been mentioned many times before, ESG scores are developed based on public data from companies, advertising or reports from non-governmental organisations, information that is difficult to retrieve in the case of private companies which, as the name suggests, do not publicise them despite the growing soft regulation for disclosure and transparency in private equity. Sustainability reporting rules are generally only aimed at public companies, although each jurisdiction adapts them according to its own social construct, e.g. the EU addresses its directives to large companies with more than 500 employees, including listed companies, banks, insurance companies, other companies designated by national authorities as public-interest entities; Canada to all publicly listed, federally incorporated companies; China and the US to all listed companies (EY, 2021).

Private companies thus find themselves without guidance to follow for non-financial reporting, making it difficult to collect ESG information post-investment, which makes them reluctant to share ESG data. A study conducted by ConsumerLab, a research centre specialising in sustainability, found that in Italy only 1.76% of small companies with more than 20 employees publish a Sustainability Report, a percentage that drops to 0.63% for companies with fewer than 10 employees. The lack of an ESG data collection and reporting framework makes it difficult for

GPs to ensure that the company is making progress on material ESG objectives, to assess the link between ESG performance and financial performance and to share ESG performance metrics with LPs (BCG, 2021), who at this point cannot compare performance of different funds to make their optimal choice. The same would happen even if it were possible to collect ESG information as the lack of standardisation of the collection method would create further problems. Indeed, the lack of a specifically designed ESG framework for private companies leads to the use of existing frameworks for listed companies that have different objectives and stakeholders and require a wide variety of metrics and KPIs. The way investors integrate ESG criteria into private equity in this case is however similar to how it is done for listed capital although there are important differences. The first levels of ESG assessment are comparable by looking at social and environmental trends and assessing the willingness of companies to adapt to them through the due diligence work done by private equity investors. It remains difficult to compare ESG performance with financial results without a robust set of data points that normalises the usually qualitative ESG data and allows for comparison.

The need for more standardised ESG reporting for private companies is therefore increasingly urgent in order to meet the expectations of investors who feed private assets such as pension funds, a topic that will be discussed in more detail in section 2.3.1, and who are increasingly expressing the need to know whether investments in these assets promote long-term sustainable strategies. In this regard, a collaboration is underway between a group of some of the world's largest GPs and LPs with the support of BCG who have developed the *ESG Data Convergence Project* with the goal of identifying a set of metrics standards drawn from existing market-leading ESG frameworks to collect and compare ESG data from private companies, committing to make them anonymous and aggregate them to provide useful industry-wide information (BCG, 2021). The project is based on five principles such as 'data first' whereby meaningful quantitative data is collected and usable from the outset, 'collaboration' which ensures that the needs of all stakeholders are met, 'think big, start small' whereby analysis must start with a small but meaningful set of parameters that can already be accurately measured by many companies, ‘dynamism’ ensured by an annual progress review process to maintain alignment with regulatory changes and other market forces, and finally ‘open invitation’ to all GPs and LPs willing to be part of this project to develop a standardised set of metrics for private companies.

By virtue of what has been presented above, it is possible to deduce that private companies present peculiarities that require an ad hoc approach to be properly represented by an ESG assessment. For

this reason, an analysis will be carried out in the next chapter to identify an optimal ESG indicator that meets these needs.

2.3.1 The importance of ESG in pension funds

According to the CFA Instiute, "pension funds are pooled monetary contributions from pension plans set up by employers, unions, or other organisations to provide for their employees' or members' retirement benefits" and represent the largest investment blocks in most countries. Although they can be classified in different ways, they share a common goal, which is to identify the best investments or investment strategies to generate investment returns in order to pay pensions to their beneficiaries. Their long-term horizon exposes them to the long-term effects of many risks, not only financial, which is why they should also incorporate environmental, social and governance principles in the investment choice process.

Lachance and Stroehle (2021) identify five key characteristics of pension funds that have an important impact on ESG integration and can be distributed on various levels in a funnel shape. The first characteristic is the historical origins of the funds and the roles of regulation that condition the mandates, which are very often rigid and narrow making it difficult to incorporate ESG factors, and the legal structure of pension funds. Within these are the corporate governance guidelines that govern the ways in which pension leadership implements ESG issues which may be limited by very strict constraints or characterised by greater freedom or certain responsibilities. Where the legal environment does not provide clear guidance, corporate governance assumes significant importance in defining a sustainable investment strategy. The next level is made up of investment strategies and asset mixes whose aim is to secure short-term returns while maintaining a long-term commitment; and the final level is the ability of pension fund managers to engage in collaborative and advocacy activities to encourage the capital market to take a longer-term view while also considering ESG issues by leveraging their position as the ultimate owners of long-term capital. The degree to which these five areas influence pension funds' ESG policies may differ between public and private pension funds, small or large pension funds, and the cost structure and resource levels of each fund.

Analysing the company from an ESG perspective thus makes it possible to identify risks to which it is exposed that would not have been considered by applying a traditional investment analysis. Sautner and Starks (2021) identify different types and sources of significant ESG risks for companies in which pension funds invest, with a particular focus on climate-related downside risks.

The reputational risk that the company might incur is the result of management missteps on ESG issues that translate into material effects on reputation and consequently on market value as the value of intangible assets represented mainly by third party relationships and its brand is particularly affected by potential reputational penalties due to controversies; the same controversies are nowadays considered by many ESG rating agencies allowing investors to evaluate or avoid companies with higher risk exposure. Human capital management risk has taken on particular importance in the last year as the COVID-19 pandemic revealed certain treatments of companies towards their employees, which highlighted how the management of social issues, of which human capital is a part, affects company performance. Litigation risk concerns litigation related to ESG issues that may increase for companies with inadequate ESG practices while Corruption risk involves both financial and reputational risks. Finally, Regulatory risk recognises that new regulations relating to ESG factors may arise and is an important part of Climate risk, which will be presented below. The concern about climate risks, which may originate from physical risks, regulatory risks as mentioned above or technological risks, stems from the fact that there is not enough disclosure to incorporate and consequently it is difficult to assess and hedge them. It is confirmed by the results of research carried out in recent years; indeed, it has been found that climate risk, and in particular weather uncertainty, can have a great effect on financial markets and very often stock markets underestimate climate risk being a relatively new phenomenon and lacking experience in the field. From a corporate perspective, these risks could be partly managed by providing more disclosure, which Krueger (2018) found to positively affect firm value.

The downside risk faced by pension funds, i.e. the sharp decline in asset values for investors, thus stems from their long-term horizon together with the potential consequences of being underfunded. This is compounded by the fact that investors believe that climate risks are imminent, leaving no time to manage them. Most pension funds therefore focus on ESG factors as a tool for risk mitigation and long-term financial value creation.

CHAPTER 3 - EMPIRICAL ANALYSIS OF THE SUSTAINABILITY OF PRIVATE COMPANIES IN THE CONSTRUCTION SECTOR

3.1 Hypotheses and research question

The choice of private companies not to publish all their data makes it difficult, if not impossible, to assess their degree of sustainability. Therefore, in this chapter an indicator will be developed for a certain sample of companies from a set of variables calculated using only publicly available data that relate to ESG. Subsequently, the effectiveness of the obtained indicator in providing a clear view, as far as possible, of the sustainability of a private company will be tested. To do this, an ESG score will be constructed by analysing the financial statements of the companies that show the 15 best and the 15 worst values of the previously constructed indicator and its correlation with the ESG score obtained by hand will be analysed. If the analysis shows a positive correlation, it will be possible in the future to use the indicator constructed solely from data available in the databases to obtain an indicative measure of the level of sustainability of a private company without resorting to time-consuming manual analysis.

Since there is no specific ESG data available in the databases to which one has access, the first step is to understand what can be calculated with the available data that relate to ESG. The focus is on tax avoidance and labour costs, for which proxies found in the literature will be used.

Corporate taxation has now become a key governance issue so much so that, as stated in the OECD/G20 Principles of Corporate Governance, "boards oversee the finance and tax planning strategies management is allowed to conduct, thus discouraging practices, for example the pursuit of aggressive tax avoidance, that do not contribute to the long-term interests of the company and its shareholders, and can cause legal and reputational risks" (KPMG, 2019, p. 4). Moreover, it is increasingly considered among ESG standards and valuation metrics as shown by the WEF which outlined *total tax paid* as a metric that reflects a company's contribution to public finances. Tax avoidance is therefore no longer just a financial problem for tax authorities but compromises vital resources for companies and other aspects necessary for the smooth functioning of regulatory compliance, organisational integrity, and society, making it a real sustainability issue. Companies are driven to use tax avoidance mechanisms that can occur through underestimating payroll costs, presumably due to undeclared work (UDW), or reducing the relative size of social security contributions (SSC) to maximise profits, contrary to purely sustainable objectives. The integration of ESG principles, incorporating anti-tax avoidance measures or publicising companies that engage

in fair tax practices, together with significant work on taxation can reduce the occurrence of tax avoidance.

Another important issue that is not just a goal but a real driver for sustainable development is the concept of decent work. Decent work presupposes fairness and wage growth, concepts that are also included in the metrics developed by the WEF, such as *pay equality* or *wage level*. This is the only way to create the conditions for sustainable development, which in turn provides a further impetus for improving working conditions and triggers a virtuous circle. For this reason, the second aspect that will be taken into consideration for the construction of the indicator is labour costs, which provide information on how the company treats its employees.

The analysis is carried out on the construction sector as it presents various issues directly related to different ESG factors and is limited to the Italian territory. Indeed, the construction sector is not only a fundamental pillar of the Italian economic system, but it is also one of the major contributors to annual CO2 emissions, energy consumption, raw material extraction and drinking water extraction, showing that it also has an important impact on the environment. In addition, it is a sector with a high risk of accidents as it presents critical issues in terms of occupational health and safety, another particularly significant ESG issue. To confirm this, according to Forum per la Finanza Sostenibile, 68% of SMEs in the construction sector say that sustainability plays an important role in their business and guides their strategic investment choices, while 52% state that they are already working in that direction. Another reason for choosing this sector is the relevance of governance and legality for this sector, in line with the choice to analyse tax avoidance and labour costs.

3.2 Sample and variables presentation

The following paragraphs will present the sample of firms that will be used for the empirical analysis and the proxies used to obtain a reliable estimate of tax avoidance and labour costs that will subsequently be used to construct the indicator.

3.2.1 Sample description

In order to estimate tax avoidance and labour costs, the annual accounting data of all currently active private Italian companies available on the AIDA database are used, in particular they are selected through a research strategy that limits the choice to the construction sector, building construction (NACE Rev. 2:41 code). A further screening is done by reducing the field to companies with revenues above €1,000,000 in order to eliminate micro-enterprises that publish

condensed set of financial statements and do not provide data necessary for the following analysis. The period under consideration is from 2017 to 2020; in this regard, companies established after 2015 are also removed from the selection, so as not to include start-ups that could distort the analysis. However, it should be noted that observations from fiscal year 2017 are lost in the analysis as 1-year lagged data must be included to calculate several variables needed for the estimates. The final sample is therefore composed of 6,669 companies present throughout Italy. Due to the fact that for some companies there are missing values and therefore it is not possible to have the same number of observations, it can be said that the panel is unbalanced. Table 2 shows the distribution of the companies in question according to the region they belong to for the period 2018-2020.

Table 2: Distribution of the sample of firms by Italian region for the period 2018-2020

Regions	Number of firms	%
Valle D'Aosta	24	0.36
Piemonte	402	6.03
Lombardia	1573	23.59
Liguria	109	1.63
Friuli-Venezia Giulia	129	1.93
Trentino Alto Adige	217	3.25
Veneto	689	10.33
Emilia-Romagna	599	8.98
Toscana	335	5.02
Umbria	93	1.39
Marche	158	2.37
Abruzzo	200	3.00
Lazio	726	10.89
Campania	532	7.99
Molise	36	0.54
Basilicata	74	1.12
Puglia	307	4.60
Calabria	92	1.38
Sicilia	241	3.61
Sardegna	133	1.99
Total	**6,669**	**100**

Source: personal processing

3.2.2 Measure of LTAV and labour cost and descriptive statistics

For the estimation of tax avoidance, the choice falls on the proxy developed by Ravenda in 2015 and improved in 2019, which coined for the first time the term *Labour Tax Avoidance* (LTAV), unlike previous studies that until then had relied exclusively on Income Tax Avoidance (ITAV). Labour tax consists of social security contributions and other insurances computed on gross wages of all employees that the employers are legally required to withhold and pay to tax authorities (Ravenda, 2015). However, these payments can be avoided through fraudulent sub-declaration of the hours actually worked by the employee and the related wage costs or the actual size of the workforce (undeclared work) or by reorganising wages with other forms of remuneration such as expense reimbursement or travel allowances, thereby reducing the social security contributions due compared to the declared wages. In the first case the LTAV is considered conforming, in the second case non-conforming.

Previous research has found that these practices to avoid or evade the payment of labour tax are widespread among companies around the world and are often associated with labour exploitation. Indeed, their ultimate purpose is not only fiscal but also includes the possibility to circumvent specific legal labour market obligations (work permits, maximum hours, minimum wages, safety regulations) to protect employees (Feld and Schneider, 2010). In particular, UDW in Italy represents a substantial problem as the rate of irregularity of employees for the specific sector of construction has reached an average of 16% in the last four years, higher than the average of 13% concerning the total economic activities (source: ISTAT). The LTAV, unlike the ITAV, is able to deduce the presence of UDW and this can help to protect employees from illegal exploitation and to avoid tax losses and related equity issues in the social security system.

The proxy used in this analysis includes both conforming and non-conforming LTAV, although from the studies carried out by Ravenda, illegal tax evasion related to underclared work seems to be the main explanation for the results achieved, and is represented by the abnormal level of the ratio of SSCs to lagged assets (AbSSCs), calculated as the residuals of the Eq. 4 estimated using the fitted values of the Eq. 3 representing the estimated wage costs for each of the 6,669 firms in the sample using the Ordinary Least Square (OLS) procedure. The use of estimated rather than actual wage costs explains their underestimated part due to the UDW.

$$\frac{PAYR_{i,t}}{\ln(TA_{i,t-1})} = \beta_0 + \beta_1 \frac{1}{\ln(TA_{i,t-1})} + \beta_2 \frac{SALES_{i,t}}{\ln(TA_{i,t-1})} + \beta_3 \frac{\Delta SALES_{i,t}}{\ln(TA_{i,t-1})} + \beta_4 \frac{\Delta INV_{i,t}}{\ln(TA_{i,t-1})} + \varepsilon_{i,t} \quad (3)$$

$$\frac{SSC_{i,t}}{\ln(TA_{i,t-1})} = \beta_0 + \beta_1 \frac{1}{\ln(TA_{i,t-1})} + \beta_2 \frac{PAYR_{i,t}}{\ln(TA_{i,t-1})} + \varepsilon_{i,t} \quad (4)$$

where the subscripts i and t refer to an individual firm and year, respectively; $SSC_{i,t}$ is social contribution expenses; $\ln(TA_{i,t-1})$ is the natural logarithm of total assets that deflates all the variables in order to better address the non-linearity of the model; $SALES_{i,t}$ is the net sales; $\Delta SALES_{i,t}$ is the change in net sales from year t−1 to t ($SALES_{i,t}$–$SALES_{i,t-1}$); $\Delta INV_{i,t}$ is change in finished product and work-in-process inventories from year t−1 to t; and $PAYR_{i,t}$ is total payroll costs, excluding SSCs. Lower and negative values of AbSSCs suggest higher probability of firm engagement in LTAV, and vice versa. Furthermore, previous studies carried out on ITAV, whose results can be extended to LTAV, show a correlation between the level of CSR disclosure and the level of ITAV: the higher the level of CSR disclosure, the lower the level of aggressive ITAV and consequently socially irresponsible companies are more likely to adopt this practice.

Regarding the treatment of employees, the choice of indicator is directed towards the Unit Labour Cost (ULC) defined by Bellak et al. (2007) as the total nominal labour cost per employee over nominal GDP per employment. However, as the national GDP in this case does not add significant information for the analysis, it is replaced with the median of unit labour cost for the construction sector, as it allows to separate the companies with more virtuous behaviour within the sector from those with less virtuous behaviour. The choice falls on the sector median following an initial analysis using regional GDP per capita. The rationale behind the initial choice of regional GDP per capita relates to the significant difference in the cost of living between northern and southern Italian regions. Indeed, with the same labour costs and number of employees, it would not be fair to treat equally the staff of two different firms operating in a northern and southern region of Italy respectively, as the worker of the firm in the south would receive a higher relative wage compared to its much lower GDP per capita than that of the north. However, the use of GDP per capita cancels out the differences between regions but does not take into account that the employment contract is regulated at the national level, and therefore it is the same for all regions. This alters the current analysis by showing better values for companies in the south and penalising those in the north. Following these considerations, the choice has therefore shifted to the median of unit labour cost

for the construction sector. In particular, the unit labour cost is calculated for each year under consideration and then standardised by the calculated median. The ULC is then calculated as follows:

$$ULC_{i,t} = \frac{total\ labour\ cost_{i,t}/employees_{i,t}}{ulc\ median_{\ t}} \quad (5)$$

where the subscripts i and t refer to an individual firm and year, respectively.

Table 3 summarises the descriptive statistics of the results obtained from the proxies used for labour tax avoidance and unit labour cost for the sample of companies over the three years (2018-2020). AbSSC refers to the estimate of labour tax avoidance obtained through Ravenda's proxy, while ULC refers to unit labour cost calculated as specified above. The number of observations differs from year to year due to missing values while the median of the unit labour cost is equal to 1 consistent with the fact that the ratio was previously standardised by the median. The mean values are in line for all three years which means that it is possible to proceed with the calculation of the mean between the three years to synthesise the variable into a single value, as will be seen in the next section, without worrying about possible outliers.

Table 3: Descriptive statistics of the two variables and comparison over time

Stats	$AbSSC_{2020}$	ULC_{2020}	$AbSSC_{2019}$	ULC_{2019}	$AbSSC_{2018}$	ULC_{2018}
N	6593	5799	6550	5742	6501	5693
Mean	4.69E-09	1.04	3.19E-11	1.03	-9.76E-09	1.03
SD	26.56	0.53	26.69	0.52	27.34	0.51
Min	-697.81	0.002	-510.28	0.002	-919.83	0.0003
Max	357.06	21.16	575.36	23.50	450.87	17.85
p25	-9.86	0.81	-10.69	0.82	-9.16	0.80
p50	-2.73	1.00	-2.84	1.00	-2.85	1.00

AbSSC refers to the abnormal level of the ratio social security contributions to lagged assets that represents the estimate of labour tax avoidance (LTAV) calculated as the residuals of the Eq. 4 estimated using the fitted values of the Eq. 3.
ULC refers to Unit Labour Cost calculated as (total labour cost/employees)/ulc median.

In addition, a correlation analysis is developed for the variables of interest in order to have an overview of their behaviour that could influence the following steps, i.e. whether the most fiscally faithful companies treat their staff better or on the contrary treat them worse. The results obtained for the three years are expressed in Table 4 from which it can be seen that the relationship between the two variables is very weak as the correlation coefficient is close to zero.

Table 4: Correlation analysis over time

	$AbSSC_{2020}$	ULC_{2020}		$AbSSC_{2019}$	ULC_{2019}		$AbSSC_{2018}$	ULC_{2018}
$AbSSC_{2020}$	1		$AbSSC_{2019}$	1		$AbSSC_{2018}$	1	
ULC_{2020}	0.0358	1	ULC_{2019}	0.0397	1	ULC_{2018}	0.0408	1

AbSSC refers to the abnormal level of the ratio social security contributions to lagged assets that represents the estimate of labour tax avoidance (LTAV) calculated as the residuals of the Eq. 4 estimated using the fitted values of the Eq. 3.
ULC refers to Unit Labour Cost calculated as (total labour cost/employees)/ulc median.

The same analysis is carried out by dividing the sample of companies into deciles according to the values obtained for the LTAV in the three years so as to refine the research and to be able to make a comparison between the results found for the fiscally better and the fiscally worse companies. However, even in this case the correlation shows a coefficient always very close to zero for all deciles over the three years. From this it can be deduced that there is no correlation between labour tax avoidance and unit labour cost standardised for the median of the sector.

3.3 Methodology

The methodology used to achieve the objective of this work consists mainly of two steps. The first step consists in the creation of an indicator summarising the company's situation from the point of view of tax fidelity and treatment of employees. The second step is the collection of publicly available ESG information for a sub-sample of companies and the determination of an ESG score calculated following one of the ESG assessment methodologies used for listed companies. In the following paragraphs they will be presented in detail.

3.3.1 Step 1: creation of the summary indicator

Since the objective of this paragraph is to create a single summary indicator, once the estimates for Labour Tax Avoidance and Unit Labour Cost in each year have been found, it is necessary to calculate their average in order to obtain a single value for each measure. From now on, for the sake of simplicity, these variables will be referred to as LTAV and ULC and will also be ranked. The highest values of LTAV and ULC are assigned the lowest positions in the ranking, i.e. first, second, third place etc., which are better for this analysis as higher values of the indicator represent a positive aspect for the company. The position '1' is assigned to the highest value of the LTAV because, as mentioned in section 3.2.2, lower and negative values of AbSSCs, i.e. the residuals obtained from the Eq. 4 as an approximation of labour tax avoidance, suggest a higher involvement of the firm in LTAV practices and consequently firms with higher values can be considered more fiscally faithful. Following the same logic, the position '1' is assigned to the maximum value of the ULC because, for the same number of employees, a higher value of the indicator means a better

salary and therefore a better treatment of the staff by the company. At this point, the average of the ranks associated with LTAV and ULC is calculated for each company to find the final position that takes into account both its fiscal behaviour and that towards employees. The value of final position represents the new summary indicator of the company's sustainability level whose effectiveness will be tested later.

In this regard, it is necessary to rank the indicator in ascending order, so as to easily identify the companies with the best overall behaviour, which are at the top, and those with criticalities, which are at the bottom. The division between the best and worst companies is a key step in order to verify the effectiveness of the indicator. If the best companies publicly report more ESG information and consequently get a better ESG score, while the worst companies are not able to collect enough information, then the indicator obtained through the procedure described in this section will take on an important meaning. In particular, for the detailed analysis of the next paragraph, the first 15 and the last 15 companies of the ranking are selected, reducing the field of choice to companies with 2020 revenues above 20 million to increase the chances of finding more detailed information regarding ESG aspects.

The selected companies are shown in Table 5 with the rank associated with the values assumed by the LTAV and the ULC (LTAV rank and ULC rank), their position in the overall ranking of the 6,669 companies resulting from the combination of the two indicators and whether they belong to the best or worst group, respectively if they are part of the first 15 companies in the ranking or the last 15 of the 156 remaining companies with revenues above 20 million. From the table it is possible to notice which of the two indicators between labour tax avoidance and unit labour cost weighs more in the determination of the final indicator. Analysing the behaviour of both in the best and worst groups, it is clear that the LTAV has a greater influence on the final position. In particular, in the best group the companies show relatively better positions taking into account only the LTAV compared to the position they would assume taking into account only the ULC, therefore the good influence of the LTAV improves the final position making them among the best. The opposite happens in the worst group, where the LTAV shows even much worse positions compared to the position the company would take if only the ULC is taken into account, thus dragging the company among the worst ones.

Table 5: The best and worst companies selected on the basis of the LTAV-ULC indicator

Company	Region	LTAV Rank	ULC Rank	TOT Rank	Group
C.M.B. SOCIETA' COOPERATIVA	Emilia-Romagna	9	126	68	BEST
IMPRESA ERNESTO STANCANELLI S.R.L.	Sicilia	66	141	104	
QUADRIO GAETANO COSTRUZIONI S.P.A.	Lombardia	36	179	108	
SACAIM S.P.A.	Veneto	61	167	114	
DAF COSTRUZIONI STRADALI S.R.L.	Lombardia	40	193	117	
WOLF SYSTEM S.R.L.	Trentino-Alto-Adige	11	225	118	
IMPRESA EDILE DE CARLI ANDREA S.R.L.	Lombardia	127	143	135	
C.E.V. – S.P.A.	Veneto	150	135	143	
CMSA SOCIETA’	Toscana	131	180	156	
D'ADIUTORIO COSTRUZIONI S.P.A.	Abruzzo	70	248	159	
A.C.R.	Emilia-Romagna	4	317	161	
IMPRESA COSTRUZIONI GRASSI E CRESPI S.R.L.	Lombardia	195	195	195	
EDILIZIA WIPPTAL – S.P.A.	Trentino-Alto-Adige	28	378	203	
I.CO.P. S.P.A. SOCIETA’ BENEFIT	Friuli-Venezia-Giulia	3	403	203	
UNIONBAU S.P.A.	Trentino-Alto-Adige	87	331	209	
WOOD BETON S.P.A.	Lombardia	5680	1738	3709	WORST
FERRETTICASA S.P.A.	Lombardia	6404	1151	3778	
C.F.C. SOC. COOP.	Emilia-Romagna	6435	1121	3778	
CONSORZIO STABILE MEDIL S.P.A.	Campania	6387	1477	3932	
IMPRESA PIZZAROTTI & C. S.P.A.	Emilia-Romagna	6458	1544	4001	
NIGRO & C. COSTRUZIONI S.R.L.	Toscana	6407	1756	4082	
COOPERATIVA EDILE ARTIGIANA	Emilia-Romagna	6363	1945	4154	
SINERGO S.R.L.	Veneto	6375	2463	4419	
FACILE RISTRUTTURARE S.P.A.	Lazio	6289	2805	4547	
FRANCESCO FERRARA ACCARDI E FIGLI S.R.L.	Sicilia	6389	3048	4719	
RIZZANI DE ECCHER S.P.A.	Friuli-Venezia-Giulia	6457	3087	4772	
MARICAN CONSTRUCTION 1 S.P.A.	Campania	5526	5343	5435	
CONSORZIO STABILE GRANDI LAVORI S.C.R.L.	Lazio	6398	4481	5440	
CONPAT SCARL	Lazio	6403	4989	5696	
SICIM S.P.A.	Emilia-Romagna	6401	5104	5753	

Source: personal processing

3.3.2 Step 2: ESG score calculation according to Refinitiv methodology

The second step is to determine an ESG score for the 30 previously selected companies. Since, as has been repeatedly stated, there is no ESG rating methodology applicable to private companies, the score is calculated manually on the basis of one of the existing methodologies for listed companies. In this case, the choice falls on Refinitiv, one of the most important ESG rating agencies in the world in terms of rated companies, which has already been presented in section 2.2.2. However, it is assumed that the existing methodology cannot be applied as it stands because the type of data collected from private companies does not guarantee the same degree of detail as data from listed companies. For this reason, it is adapted according to the available data without

departing from the steps of the original and always maintaining a certain consistency in the treatment of the data.

Collecting the ESG data that will be used to calculate the score is the first important step. Refinitiv divides the type of data into Boolean and numeric. In particular, Boolean data are those obtained from questions that require a 'yes', 'no' or 'null' answer, which assume a default value of 0 if no relevant data are found, if the answer to a question with positive polarity (i.e. having a higher value is 'better') is 'no' or if the answer to a question with negative polarity (i.e. having a higher value is 'worse') is 'yes', while they assume a value of 1 otherwise. The research is carried out by analysing the documents of the 30 private companies present in databases to which it is possible to have access, such as financial statements for the year 2020 and in particular notes to the financial statements and management reports, and documents and information present on the websites of the companies. The data collected for this analysis is mostly qualitative, so it should be treated as Boolean, but it is not easily comparable and cannot be summarised in a question that can be answered with 'yes' or 'no'. The few quantitative data reported in the Sustainability Reports published by some companies are also difficult to compare due to the different units of measurement and the lack of data to establish some sort of equivalence. The above-mentioned problems do not make the available data suitable for the existing methodology, which is why another procedure is adopted for assigning values to each data.

Before proceeding with the detailed explanation of the procedure, it is necessary to make a clarification on the *percentile rank scoring methodology*, i.e. the method through which the score is determined at first of each ESG theme to which the collected data is associated and then of each of the ten categories, each belonging to one of the three ESG pillars, according to the scores obtained per theme. As this method is mainly based on three questions, such as

- How many companies are worse than the current one?
- How many companies have the same value?
- How many companies have a value at all?

what is important for the calculation of the score is the position of the company in relation to the others on the same theme, determined by the value of the associated data. If the data is numeric, it is easy to draw up a ranking in descending order; if it is Boolean, all data with a value of 1 will be treated as having the same value.

Considering the above-mentioned difficulties concerning the available data and the data processing of the existing methodology, the assignment of values to each data item is done on the basis of the amount of information that can be obtained for each company. In particular, a sort of ranking is created specifically for each theme, whose positions take a value between 0, if no information is present or the company reports that it does not possess a certain aspect, and 1, if the company possesses the maximum amount of information in relation to the other companies. A procedure is then adopted that integrates the methodology followed by Boolean data with that used by numerical data, so that the mostly qualitative data is converted into numbers and can be compared. The logic according to which the values for each theme are decided and assigned is presented below.

Attribution of values for each theme

The first environmental category that Refinitiv reports concerns *Emission* and the associated score should measure the commitment and effectiveness of a company in reducing environmental emissions in its production and operational processes. The themes for which a score will be calculated to determine the ESG Emissions score include 'Emissions', 'Waste', 'Biodiversity' and 'Environmental management systems'.

The table below shows the requirements that a company must meet in order to achieve one of the values for the 'Emissions' theme. The maximum value is assigned to companies that report producing zero emissions during the year as they represent the optimal situation; a value slightly lower, 0.75, is reserved for companies that produce emissions but have experienced a reduction compared to the previous year and for those that possess the ISO 14064 - *Greenhouse gas standard* as this standard brings credibility and assurance to the GHG reporting and monitoring processes at an international level, a positive aspect for the company that cannot avoid producing emissions; on the contrary, a 0.5 is given if there has been an increase in annual emissions; finally, a 0.25 is reserved for companies that communicate their commitment to prevent or minimise pollution but do not provide detailed data, making it difficult to analyse their actual situation.

EMISSIONS SCORE	**Value**
No information reported	0
The company is committed to prevent or minimise pollution	0.25
There have been increases in annual emissions	0.5
Decreases in annual emissions have occurred and the company has ISO 14064 certification	0.75
The company has produced zero emissions in the year	1

The assignment of values for the theme 'Waste' is made taking into consideration what is stated in the Testo Unico Ambientale (d.lgs. 3 aprile 2006, n. 152) regarding the integrated waste management in Italy, as it outlines the priority of actions to be undertaken within a logic of integrated management of the problem. The first level of attention is focused on the need to prevent the formation of waste and reduce its dangerousness, which is why a value of 1 is assigned to companies that report a reduction in the amount of waste to be disposed of. If it is not possible to reduce the quantity produced, the next step is the need to reuse products and, if this is not possible, to recycle materials, which is assigned a value of 0.9 because of its importance in the circular economy. If this is also not possible, the company has to dispose of the waste paying attention to its type and this could result in an increase in the associated costs, a situation in which it is assigned a value of 0.75. If the company does not fall into the above situations but is registered in the Albo Gestori Ambientali (Environmental Management Register), it is assigned a value of 0.5 as it is assumed that it pays particular attention to this issue as one of the requirements for registration is to carry out waste collection and transport activities. Finally, a 0.25 is assigned to companies that report the commitment but do not provide details, as in the case of emissions.

WASTE SCORE	**Value**
No information reported	0
The company is committed to reduce the amount of waste, recycle or dispose of it	0.25
The company is registered in the Albo Gestori Ambientali	0.5
There has been an increase in the cost of waste	0.75
The company has recycling plants and correctly uses recyclable products	0.9
There has been a decrease in the amount of waste to be disposed of	1

Information on ‘Biodiversity’ is more difficult to find, so companies that show how they take care of biodiversity, e.g. by using environmentally friendly materials with low ecotoxicity, monitoring soil and subsoil and providing an assessment of their contamination, are awarded a value of 1. If the company demonstrates that it pays particular attention to certain aspects of biodiversity protection, such as preventing the formation of ponds or accumulations to avoid the percolation of polluted water, it gets a value of 0.5 while if its commitment remains general it gets a 0.25.

BIODIVERSITY SCORE	Value
No information reported	0
The company is committed to the protection of biodiversity	0.25
The company reports general initiatives for the protection of biodiversity	0.5
The company reports specific information and initiatives related to biodiversity	1

Finally, the last theme belonging to the *Emission* category concerns 'Environmental management systems', i.e. a set of processes that enable an organisation to reduce its environmental impacts. For this theme, values are assigned on the basis of the certifications held by companies, in particular revolving around ISO 14001 - *Environmental management systems*, the international standard that provides a management framework for the integration of environmental management practices. Companies that only have ISO 14001 are assigned a value of 0.5, while if they also have specific environmental policies and/or internal standards, the value rises to 0.75. If, however, they also have other standards such as ISO 20400 - *Sustainable procurement* or nationally recognised certifications, the value is the maximum of 1, as these standards are recognised by external organisations and are more important than the standards established internally by the company. Again, if the company's commitment remains general, the value is 0.25.

ENVIRONMENTAL MANAGEMENT SYSTEMS SCORE	Value
No information reported	0
The company is committed to address or manage environmental issues	0.25
The company has ISO 14001	0.5
The company has ISO 14001, environmental policies and/or internal standards	0.75
The company has ISO 14001 and other recognised certifications	1

The category *Innovation*, also belonging to the environmental pillar, concerns the ability of a company to reduce environmental costs and burdens by creating new market opportunities through new environmental technologies and processes and includes the themes 'Product innovation' and 'Green revenues, research and development (R&D) and capital expenditures (CapEx)'. However, due to a lack of information on product innovation, the score is only calculated for the second theme. In this case the data is treated as Boolean because the question asked is "does the company incur R&D costs?". Since incurring R&D costs is a positive aspect for the company, if the answer is 'yes' it gets a value of 1, if 'no' the value is 0.

The last category of the environmental pillar *Resource use* concerns the performance and capacity of a company to reduce its use of materials, energy or water and to find more eco-efficient solutions by improving supply chain management. The associated themes are 'Water' and 'Energy', for which the score is calculated, and 'Sustainable packaging' and 'Environmental supply chain' for which there are no proxies due to insufficient disclosure and which are therefore not included in the scoring methodology.

For the calculation of the 'Water' score, the value is assigned on the basis of the trend in water consumption by the company compared to the previous year. It is assigned 1 if consumption has decreased, 0.75 if consumption has remained unchanged and 0.5 if consumption has increased. 0.25 is reserved for those companies that communicate that they are committed to reduce their consumption of non-renewable resources.

WATER SCORE	**Value**
No information reported	0
The company is committed to promote the sustainable management of water resources	0.25
There has been an increase in water consumption	0.5
Water consumption has remained unchanged	0.75
There has been a reduction in water consumption	1

For 'Energy', the assignment method differs from that used for water as other variables come into play. The company that obtains the maximum value must have ISO 5001 - *Energy management systems*, the international standard that offers organisations management strategies that aim to bring about an increase in energy efficiency and a reduction in costs, and/or other certificates. Companies that report in detail their annual energy consumption or the installation of solar panels are awarded 0.75, while those that do not specify their consumption but claim to use energy-saving machinery are awarded 0.5. The company that only reports that it supports the conservation of natural resources without specifying anything else is awarded 0.25, as in the other cases.

ENERGY SCORE	**Value**
No information reported	0
The company promotes the conscious and sustainable use of energy	0.25
The company reports on the use of energy-saving machinery	0.5
The company reports annual energy consumption and/or uses solar panels	0.75
The company has IS0 5001 and/or other certificates	1

Turning to the social pillar, there are four categories: *Community, Human rights, Product responsibility* and *Workforce*; the first two coincide with the associated theme and have no further subdivisions within them.

Community refers to the company's commitment to be a good citizen, protecting public health and respecting business ethics, but as with biodiversity, finding specific information is difficult. For this reason, it is decided to assign the maximum value to those companies that report specific initiatives and projects in favour of the community, such as collaborations with schools and universities, non-profit organisations to support poorer countries, etc., and to assign a 0.5 to those companies that are committed to work in respect of the community by supporting cultural and social initiatives without specifying their contribution.

COMMUNITY SCORE	**Value**
No information reported	0
The company intends to operate in respect of communities	0.5
The company presents projects in support of the community	1

With regard to the category of *Human rights*, introduced to measure the effectiveness of a company in terms of respecting the conventions on fundamental human rights, it is decided to omit the calculation of the score associated with it because the information reported by the companies does not bring significant value to the analysis; in fact, all the companies are careful to recognise the rights of the individual and to avoid discrimination without communicating what is done to enable this.

The category of *Product responsibility* reflects a company's ability to produce quality goods and services, integrating health and safety, integrity and confidentiality of customer data, which is why the themes it includes are ‘Responsible marketing’, ‘Product quality’ and ‘Data privacy’. For the ‘Responsible marketing’ theme it is not possible to collect data as the companies in question do not report information on this item, which is why it is omitted from the score calculation.

‘Product quality’ in this case is assessed on the basis of the certifications that the company possesses. The minimum value of 0.25 is assigned to companies that only possess the SOA certification, as this is the compulsory certification for public works contracts and therefore of less relative importance than other internationally recognised certifications. A slightly higher value of 0.5 is awarded to companies that have obtained ISO 9001 – *Quality management systems*, the

internationally recognised reference standard for quality management. Companies with both have a value of 0.75, while those with other qualification certificates or standards such as ISO 21500 - *Guidance on project management* have a maximum value of 1.

PRODUCT QUALITY SCORE	Value
No information reported	0
The company has SOA certification only	0.25
The company has ISO 9001 only	0.5
The company has SOA certification and ISO 9001	0.75
The company has SOA, ISO 9001 and other certificates	1

On the theme of 'Data privacy', a distinction is made between companies that only claim to protect data privacy by adhering to the GDPR, which score 0.5, and those that implement protection initiatives and structured systems for the proper management of privacy, which score 1.

DATA PRIVACY SCORE	Value
No information reported	0
The company protects privacy	0.5
The company implements privacy protection initiatives	1

Finally, the last category of the social pillar *Worforce* refers to a company's effectiveness in terms of job satisfaction, a healthy and safe workplace, maintaining diversity and equal opportunities and development opportunities for its workforce.

For the theme 'Diversity and inclusion', companies are rated 1 if they have women and/or disabled employees, 0.5 if they ensure they offer equal opportunities to all employees but do not report details of staff composition.

DIVERSITY AND INCLUSION SCORE	Value
No information reported	0
The company guarantees equal opportunities	0.5
Presence of women and/or disabled employees	1

In the case of 'Career development and training', the company that reports detailed data on the training provided for employees, measured both in terms of hours spent on courses and training costs, receives the maximum value of 1. The company that provides training courses and promotes professional development through training tools and plans without quantifying its commitment to this, receives a lower value of 0.5.

CAREER DEVELOPMENT E TRAINING SCORE	**Value**
No information reported	0
The company provides training courses	0.5
The company quantifies its commitment to training (hours and/or expenses)	1

The same logic is applied for 'Working condition', so companies that commit to decent working conditions get a value of 0.5 while those that publish detailed information on e.g. hours worked, overtime hours, cases of child labour or forced labour, are awarded 1.

WORKING CONDITION SCORE	**Value**
No information reported	0
The company guarantees decent working conditions	0.5
The company publishes detailed information on working conditions	1

The large amount of information found for the theme 'Health and safety' implies a greater attention in the attribution of the value to the company as it is necessary to consider the various possible combinations that may occur. The minimum value of 0.25 is attributed to companies that claim to be in compliance with health and safety practices and to have no deaths and/or injuries but do not provide any certification to guarantee this. Possession of ISO 45001 - *Occupational health and safety management systems* guarantees a value of 0.5, but if the company has cases of minor injuries the value is lowered to 0.4 while if in addition it carries out prevention programmes, monitoring of safety conditions and/or regular medical examinations, the value is raised to 0.6. Possession of ISO 39001- *Road traffic safety management systems* certifies that the organisation has an adequate management system to control the impacts on road risk arising from its activities, so this increases the value to 0.8, but, again, the presence of an increase in injuries reduces the value to 0.7 while a reduction in injuries increases it to 0.9. The maximum value of 1 is reserved for companies which, in addition to having ISO 45001 and ISO 39001, have specific procedures for managing accidents.

HEALTH AND SAFETY SCORE	Value
No information reported	0
The company is compliant, carries out controls and/or has no deaths and injuries	0.25
The company has ISO 45001 but has minor injuries	0.4
The company has ISO 45001 only	0.5
The company has ISO 45001, carries out medical examinations, monitoring and prevention programmes	0.6
The company has ISO 45001 and ISO 39001 but has an increase in injuries	0.7
The company has ISO 45001 and ISO 39001	0.8
The company has ISO 45001 and ISO 39001 and has a reduction in injuries	0.9
The company has ISO 45001, ISO 39001 and injuries management procedures	1

The Governance pillar includes the following categories: *CSR strategy, Management* and *Shareholders*. Again, the lack of comprehensive information on *Shareholders*, and in particular on the company's effectiveness in terms of equal treatment and the use of anti-takeover mechanisms, does not allow the calculation of the score for this category, but the choice is partly justified by the fact that these are private companies.

The scoring procedure for the *CSR strategy* category, which includes 'CSR strategy' and 'ESG reporting and transparency', differs somewhat from that used for the previous categories. In fact, considering that the focus is on how a company communicates and integrates economic, social and environmental dimensions in its daily decision-making processes, in this case a ranking is not drawn up according to the importance of having certain aspects, but a score is assigned to each ESG document that the company may have and the final value is made up of the sum of the scores associated with the documents possessed.

In particular, for the 'CSR strategy' theme, the available documents are: the SA8000 international standard that encourages organisations to develop, maintain and apply socially acceptable practices in the workplace; the Code of Ethics that contains a series of social and moral rules drawn up by the company and to which all members of the company must adhere; the Corporate Social Responsibility Programme; adhesion to the UN Compact Global, the United Nations strategic initiative whose aim is to promote a sustainable global economy. Each of these documents is given a score of 0.25, so the company that has all of them gets the maximum value of 1.

CSR STRATEGY SCORE	Value
SA 8000	0.25
Code of Ethics	0.25
Corporate Social Responsibility Programme	0.25
UN Compact Global	0.25

'ESG reporting and transparency' can also be assessed on the basis of the company's possession of certain documents, which this time are assigned a different score. Politica integrata qualità, ambiente, sicurezza, which is the starting point for managing the production process in the best possible way, is given a score of 0.1, as is the possession of ISO 37001 - *Anti-bribery management systems* and the registration on the White List for activities most exposed to mafia infiltration. This score is chosen because these documents refer to specific aspects for an ESG pillar. A score of 0.3 is given to the company submitting Dichiarazione Ambientale as it describes the results achieved against all the environmental objectives set. Finally, a score of 0.4 is reserved for the company that publishes the Sustainability Report covering all ESG areas.

ESG REPORTING AND TRANSPARENCY SCORE	Value
Politica integrata qualità, ambiente, sicurezza	0.1
ISO 37001	0.1
White List	0.1
Dichiarazione ambientale	0.3
Bilancio sociale or Report integrato	0.4

Finally, the *Management* category includes the themes 'Structure' and 'Compensation'. Since there is limited information about the structure of governance within companies, the data is considered as Boolean and in particular a value of 1 is assigned if the company reports the organisation chart that describes in detail the company structure, the various offices and their competences, while 0 is assigned to companies that publish only the average number of employees required in the notes to the financial statements. A simplification has to be adopted also for the compensation, as the specific subdivision of the work categories and of the related working hours is not published for all the companies, thus not allowing the calculation of the salary per category. Therefore 0.5 is assigned to the companies that report the compensation for auditors and directors and 1 to those that report the compensation for each category.

COMPENSATION SCORE	Value
No compensation is reported for any category of employee	0
Remuneration for auditors and directors is reported	0.5
Remuneration for each category of employee is reported	1

Overall ESG score calculation

Once all the values have been attributed to the individual companies, the score of each company is calculated first for each individual theme, then for each category applying the percentile rank scoring methodology which is based on Eq 1, already reported in paragraph 2.2.2 during the presentation of the Refinitiv methodology for listed companies.

$$score = \frac{no.of\ companies\ with\ a\ worse\ value + \frac{no.of\ copanies\ with\ the\ same\ value\ included\ in\ the\ current\ one}{2}}{no.of\ companies\ with\ a\ value} \quad (1)$$

At this point, the overall ESG score is calculated as a weighted average of the category scores for the weights for the 'Construction and engineering' sector determined by Refinitiv on the basis of datasets at its disposal. It is argued that it is possible to apply the same weights to the dataset of the 30 companies in question as they have been calculated by Refinitiv on a large universe of companies and are therefore characterised by a certain degree of generalisation that allows extension to smaller datasets. It would be useless and lead to distorted results to calculate the weights on a dataset of a few companies; however, in the event that in the future the same analysis is carried out on a larger sample, the autonomous calculation of the weights could lead to more accurate results.

The use of weights per category leads to more accurate results. Indeed, a parallel analysis is conducted in which the ESG score is calculated as a simple sum of the category scores without applying the weights provided by Refinitiv. The final result is still linear compared to the one derived from the application of the weights even if some inaccuracies are noted, thus showing a less clear but not different picture.

The controversies score for some companies is then calculated using the percentile rank scoring methodology and the combined score is determined. If the controversies score is greater than the ESG score, then the final combined ESG score will be equal to the ESG score. If the controversies score is lower than the ESG score, then the final ESG score will be the average of the two. The last

step is to normalise the scores between 0 and 1 through MinMax scaling to have values that can be more easily processed and analysed.

3.4 Result analysis

The analysis is carried out on the sample of 30 companies previously selected on the basis of the rank assigned, for which the ESG score was manually calculated.

In order to analyse the correlation between the indicator, represented by the rank, and the ESG score, the companies are first sorted in descending order according to the value assumed by the ESG score, as shown in Table 6, and the ESG scores are divided into quintiles according to the following classes, with the first quintile being assigned to the class with higher ESG score values to reflect that companies with higher ESG scores represent a better situation:

- 5^{th} quintile: 0 - 0. 2;
- 4^{th} quintile: 0.2 - 0.4;
- 3^{rd} quintile: 0.4 - 0.6;
- 2^{nd} quintile: 0.6 - 0.8;
- 1^{st} quintile: 0.8 – 1.0.

This step is fundamental to understand how the best and worst companies are distributed within each quintile. The table also shows the rank of each company in the overall ranking of the 6,669 companies and the recalculated rank of only the 30 companies, which is useful to better analyse the relationship with the ESG score. Companies with a rank between 1 and 15 are among the best, those with a rank between 16 and 30 are among the worst.

Table 6: Ranking of companies by ESG score and associated indicator

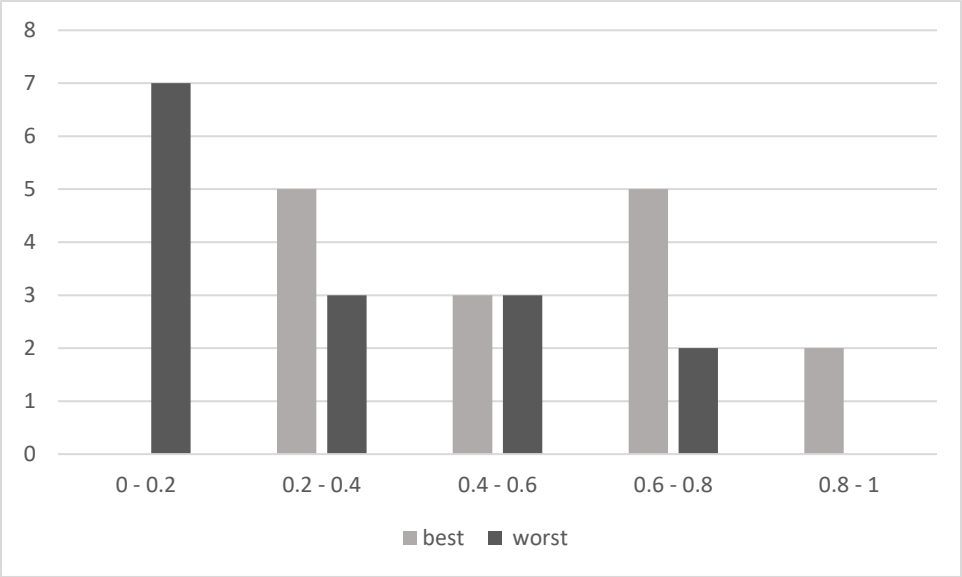
Company	ESG score	TOT rank	Recalculated rank	Quintile
I.CO.P. S.P.A. SOCIETA' BENEFIT	1	203	14	1°
CMSA SOCIETA'	0.916	156	9	
A.C.R.	0.751	161	11	2°
CONSORZIO STABILE MEDIL S.P.A.	0.744	3932	19	
C.E.V. – S.P.A.	0.710	143	8	
QUADRIO GAETANO COSTRUZIONI S.P.A.	0.706	108	3	
DAF COSTRUZIONI STRADALI S.R.L.	0.679	117	5	
IMPRESA PIZZAROTTI & C. S.P.A.	0.653	4001	20	
C.M.B. SOCIETA' COOPERATIVA	0.622	68	1	
D'ADIUTORIO COSTRUZIONI S.P.A.	0.570	159	10	3°
RIZZANI DE ECCHER S.P.A.	0.565	4772	26	
SICIM S.P.A.	0.544	5753	30	
EDILIZIA WIPPTAL – S.P.A.	0.529	203	13	
UNIONBAU S.P.A.	0.511	209	15	
C.F.C. SOC. COOP.	0.454	3778	18	
SACAIM S.P.A.	0.398	114	4	4°
IMPRESA ERNESTO STANCANELLI S.R.L.	0.340	104	2	
CONPAT SCARL	0.324	5696	29	
IMPRESA EDILE DE CARLI ANDREA S.R.L.	0.297	135	7	
WOLF SYSTEM S.R.L.	0.287	118	6	
NIGRO & C. COSTRUZIONI S.R.L.	0.269	4082	21	
FRANCESCO FERRARA ACCARDI E FIGLI S.R.L.	0.268	4719	25	
IMPRESA COSTRUZIONI GRASSI E CRESPI S.R.L.	0.209	195	12	
FERRETTICASA S.P.A.	0.186	3778	17	5°
SINERGO S.R.L.	0.169	4419	23	
COOPERATIVA EDILE ARTIGIANA	0.157	4154	22	
FACILE RISTRUTTURARE S.P.A.	0.101	4547	24	
WOOD BETON S.P.A.	0.099	3709	16	
CONSORZIO STABILE GRANDI LAVORI S.C.R.L.	0.083	5440	28	
MARICAN CONSTRUCTION 1 S.P.A.	0	5453	27	

Source: personal processing

An initial analysis of the Graph 1 showing the distribution of companies by quantile, divided into best and worst groups, clearly shows that the quantiles at the ends, i.e. the first and fifth, correspond exclusively to companies in the best and worst groups respectively. The limited number of companies in the first quintile, i.e. the quintile reserved for companies that disclose precise ESG-related information, is due to the fact that private companies are reluctant to make this information public. However, this clear difference in positioning of the two groups at the extremes leads to the suggestion that there may be a relationship between the ESG score and the indicator calculated from labour tax avoidance and unit labour cost. This thought is also reinforced by the decreasing trend in the number of worst companies in each quintile as the ESG score increases. The diffuse

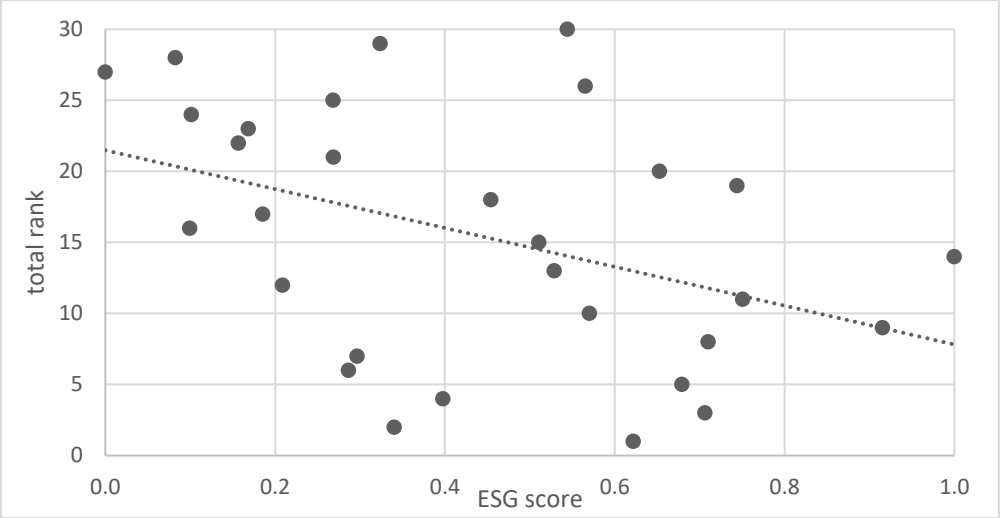
distribution of best companies in the third and fourth quintiles may be due to the fact that the rank is calculated on the basis of only two indicators such as labour tax avoidance and unit labour cost and therefore to problems of methodology, or to the fact that the analysis is carried out on a limited sample of companies. The final result of an analysis conducted on a limited number of firms may be influenced by the behaviour of a couple of firms that may be outliers, so that conducting the analysis on a larger sample in the future may lead to more accurate results.

Graph 1: Distribution of the best and worst companies by quintile



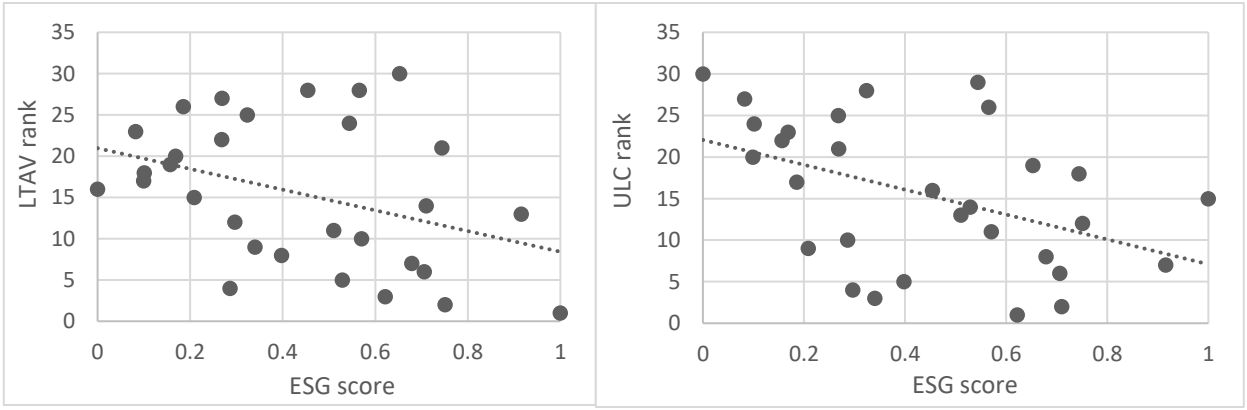
The analysis of the relationship is deepened through the scatter plot (Graph 2) that shows the position assumed by each individual company with respect to the ESG score, which is on the horizontal axis, and to the recalculated rank relative to the 30 companies, shown on the vertical axis. In this case the relationship between ESG score and rank becomes even clearer, as can be seen from the trend line that represents the linear approximation of the data, and reveals a negative correlation between the two variables under examination. In particular, there is a tendency for lower ESG scores to correspond to numerically higher and therefore worse ranking positions, while the opposite is true for higher ESG scores which tend to correspond to numerically lower and therefore better ranking positions. This result suggests that the indicator calculated by considering labour tax avoidance and unit labour cost from publicly available data takes on some significance in capturing at least some aspects of the ESG for non-listed companies. This finding could be of great benefit to sustainability-conscious investors who, before investing in a private company, want to assess how sustainable the company is, which has not been possible so far.

Graph 2: Position of companies by ESG score and total rank



The same analysis is carried out by no longer considering the total rank that takes into account the combined effect of labour tax avoidance and unit labour cost but the respective individual ranks for the 30 companies for which the ESG score was calculated. In this way it is possible to understand the relationship between the ESG score and the separate components of the final indicator. The distribution per quantile does not change in the case of both LTAV and ULC and the same trend is reflected in the scatter plot as can be seen from the Graph 3.

Graph 3: Position of companies by ESG score and LTAV rank/ULC rank



This happens because the companies that are among the best for LTAV are also among the best for ULC, however this result could be influenced by the fact that the ranking is recalculated between 1 and 30 considering only the 30 companies for which there is an ESG score. In fact, the selection of the 15 best and 15 worst companies considering only the rank provided by the measure of labour

tax avoidance or by the unit labour cost on the sample of 6,669 companies partly differs from the selection of the 30 companies considering the combination of both. This is because, as previously verified, the two variables are not correlated and weigh differently for each firm. In particular, it has been noted that considering only the results deriving from the ranking of labour tax avoidance, among the 15 best companies only 3 are also included in the final ranking, while among the 15 worst ones 4 are also found in the final ranking. Considering instead only the results deriving from the ranking of unit labour cost, none of the 15 best companies appears in the final ranking, while 7 companies are found.

Returning to consider the combined indicator, a final check of the relationship is made through a t-test, as it is able to verify if the average between two groups of observations is statistically and significantly different. In this case, if the averages of the two groups, best and worst, are significantly different, the t-test confirms the relationship between ESG score and rank. The results are shown in Table 7.

Table 7: t-test results

Group	Obs	Mean	Std. err.	Std. dev.	[95% conf. interval]	
Worst	15	0.3077303	0.059561	0.23068	0.179984	0.435476
Best	15	0.5682332	0.060274	0.233439	0.438959	0.697507
Combined	30	0.4379818	0.048148	0.263717	0.339508	0.536455
diff		-0.2605029	0.084738		-0.43408	-0.08693

diff = mean(0) - mean(1) t = 3.0742

H0: diff = 0 Degrees of freedom = 28

Ha: diff < 0 Ha: Diff != 0 Ha: diff > 0

Pr(T < t) = 0.0023 Pr(T > t) = 0.0047 Pr(T > t) = 0.9977

It is possible to get a first idea of the final result by focusing on the 95% confidence interval. Indeed, it can be seen that the two ends of the interval reflecting the difference between the values of the worst and best groups are both represented by negative numbers, so it is possible to say that 0 is not included and therefore a difference exists between the two groups. The result is confirmed by the tests associated with the alternative hypotheses diff != 0 (difference other than 0) and diff < 0 (difference smaller than 0). Indeed, the p-value in both cases is less than 0.01, which means that the tests are statistically significant at 1% and reveals that the difference of the group averages is not only different from 0 but specifically negative, consistent with the fact that the ESG scores for

the worst group are lower than those of the best group. The hypothesis that the difference of the mean between the worst and best groups is positive is to be discarded as the p-value of 0.9977 is greater than 0.05 so the test is not significant.

In conclusion, the t-test confirms that the average ESG score is different between the best and the worst companies and therefore it is possible to state that the indicator represented by the rank and based on labour tax avoidance and unit labour cost discriminates well the two groups of companies on the basis of ESG score.

CONCLUSIONS

The goal of this work was to explore the possibility to develop indicators useful to calculate an ESG rating for private companies. This is an unexplored field to date, but the importance that ESG is gaining both within companies and among investors, who are no longer interested only in financial returns but also in the commitment that companies make to the environment, society and governance, is driving us to find a solution that also involves these companies that have not been considered so far but that have great potential in the spread of sustainability. The empirical analysis of this thesis is mainly built on the literature presented by Ravenda for the construction of the indicator associated with labour tax avoidance and on an adaptation of the ESG evaluation methodology provided by Refinitiv for the determination of the ESG score as the available data do not allow the application of the existing methodology.

The study is conducted on companies belonging to the construction sector, which is particularly sensitive to ESG issues, and in particular on the 30 companies selected on the basis of the 15 best and 15 worst values assumed by the indicator constructed considering labour tax avoidance and unit labour cost. In analysing this specific case, a relationship is discovered between the value of the indicator, or rank, assumed by a company and the ESG score associated with it. Higher ESG scores indicating a significant commitment of the company to ESG correspond to lower indicator values, meaning a better position in the LTAV-ULC ranking, and vice versa.

The idea behind this interesting discovery concerns the possibility of calculating quite easily indicators that capture at least some ESG-related aspects for private companies. This allows investors to get an idea about the level of sustainability of a company, compared to others they are interested in, by calculating and combining labour tax avoidance and unit labour cost, the data for which are readily available. They also avoid unnecessary waste of time by searching for ESG data and determining the ESG score through one of the existing methodologies adapted to the case.

It should be noted that this is an exploratory and preliminary study, so, although the results found are interesting and useful for the future, it is necessary to specify the shortcomings it presents due to the lack of available data, which affect both the indicator constructed and the metrics used to determine the ESG score, which being experimental can be further refined.

The first shortcoming of the present work concerns the inability to capture information about a crucial variable for companies and for the whole environmental ecosystem in the game towards

sustainability, namely the Carbon Footprint, the parameter that allows to estimate greenhouse gas emissions into the atmosphere in tons of CO2 and thus to determine the environmental impacts that companies' activities have on climate change. Nowadays, this aspect cannot yet be captured even by ESG ratings as it is not mandatory for organisations to disclose specific data on this, so it is up to individual companies to decide what to publish and which estimation methodology to use, methodologies that are not verified and therefore difficult to compare. If disclosure of carbon footprint data in the notes to the financial statements becomes mandatory, it would be interesting to consider this aspect in this analysis. Although it is not possible to capture the strictly environmental part as a whole, the sustainability theme is much broader, so the analysis carried out remains valid for all other ESG aspects.

As already mentioned in the paragraph on the methodology used, due to the absence of data on some metrics, the calculation of the scores relating to them is omitted; among these is the transparency of shareholders. However, if in the future it were possible to construct a metric capable of incorporating all of the shareholder information in the notes to the financial statements and integrate it into this analysis, it would be possible to obtain even more accurate final results.

While the proxy for estimating labour tax avoidance is provided by the literature, there is no suitable unit labour cost indicator for this case. For standardisation purposes, the national median of unit labour cost for the specific construction sector is chosen because the labour contract is unique at the national level. However, in determining the contract the company could consider and incorporate the fact that the cost of living is different between northern and southern regions, and this could result in a regional fixed effect. In order to refine the indicator, it might therefore be useful to analyse the case in which the median by region or geographical area is used, instead of the national median, so as to capture also the particularly high performing companies in the south which compared to those in the north might be penalised.

A further aspect that could be useful to consider in the future to analyse the treatment of personnel and that could lead to more precise results concerns the separate analysis of an indicator represented by the contribution, insurance and social security dimension, now included in the labour cost. Indeed, the unit labour cost is calculated on the total labour cost but sometimes the attention of the employer towards the employee can be reflected especially in the benefits that are added to wages such as meal vouchers or health insurance. For this reason, it would be interesting to see how this aspect modifies the final result of the study.

A final suggestion concerns the application of the model developed to a larger sample of companies to check whether the same results, or rather more precise results, are obtained and to confirm the possibility of extending it to other sectors.

In conclusion, the results deriving from this preliminary analysis that tries to shed light on a still unexplored field appear very interesting and propositional because, if using in the best way the data available today it is possible to obtain excellent results, a model perfected and extended in the future that considers the aspects presented above could represent an innovative, but above all easy-to-use, tool for the ESG evaluation of non-listed companies.

REFERENCES

ACCF, 2018. *Ratings that don't rate - the subjective world of esg ratings agencies*. Available on https://accfcorpgov.org/wp-content/uploads/2018/07/ACCF_RatingsESGReport.pdf [date of access: 15/11/2021]

AMEL-ZADEH A., SERAFEIM G., 2017. Why and How Investors Use ESG Information: Evidence from a Global Survey. *Financial Analysts Journal* [online], 74 (2018), 87-103. Available on http://dx.doi.org/10.2139/ssrn.2925310

ANASF, 2011. *Manuale per Promotori Finanziari e Addetti alla Vendita di Prodotti Finanziari.*

ASHWIN KUMAR N.C., 2016. ESG factors and risk-adjusted performance: a new quantitative model. *Journal of Sustainable Finance & Investment* [online], 6(4), 292-300. Available on http://dx.doi.org/10.1080/20430795.2016.1234909

BADEN-FULLER C., MORGAN M., 2010. Business models as models. *Long Range Planning* [online], 43 (2–3), 156–171. Available on https://doi.org/10.1016/j.lrp.2010.02.005

BAGLIERI E., FIORILLO V., 2014. *Indicatori di performance per la sostenibilità*. SDA Bocconi School of Management [online]. Available on https://greentire.it/wp-content/uploads/2019/03/sdabocconi-ricerca-greentire.pdf

BANCA D'ITALIA, 2007. Disposizioni di Vigilanza – La funzione di conformità.

BARBIER E.B., 1987. The concept of sustainable economic development. *Environmental Conservation* [online], 14(2), 101–110. Available on https://doi.org/10.1017/S0376892900011449

BARBIER E.D., BURGESS J.C., 2017, The Sustainable Development Goals and the systems approach to sustainability. *Economics* [online], 11(28). Available on http://dx.doi.org/10.5018/economics-ejournal.ja.2017-28

BARNETT M. L., SALOMON, R. M., 2006. Beyond dichotomy: The curvilinear relationship between social responsibility and financial performance. *Strategic Management Journal* [online], 27, 1101–1122. Available on https://doi.org/10.1002/smj.557

BCG, 2021. *How Private Equity Can Converge on ESG Data*. Available on https://www.bcg.com/publications/2021/private-equity-convergence-on-esg-data [data of access: 18/11/2021]

BELLAK C., LEIBRECHT M., RIEDI A., 2007. Labour Cost and FDI Flows into Central and Eastern European Countries: A Survey of the Literature and Empirical Evidence. *Structural Change and Economic Dynamics* [online], 19(1), 17-37. Available on http://dx.doi.org/10.1016/j.strueco.2007.03.001

BERG F., KÖLBEL, J., RIGOBON R., 2019. *Aggregate Confusion: The Divergence of ESG Ratings*. Available on https://dx.doi.org/10.2139/ssrn.3438533

BOCKEN N.M.P. et al., 2014. A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production* [online], 65, 42-56. Available on https://doi.org/10.1016/j.jclepro.2013.11.039

BOFFO R., PATALANO R., 2020. *ESG Investing: Practices, Progress and Challenges*. OECD Paris. Available on https://www.oecd.org/finance/ESG-Investing-Practices-Progress-Challenges.pdf [date of access: 23/10/2021]

BOONS, F., LÜDEKE-FREUND, F., 2013. Business models for sustainable innovation: State-of-the-art and steps towards a research agenda. *Journal of Cleaner Production* [online], 45, 9–19. Available on https://doi.org/10.1016/j.jclepro.2012.07.007

BREUER H., LÜDEKE-FREUND F., 2017. Values-based network and business model innovation. *Int. J. Innov. Manag* [online], 21 (3), 1–35. Available on https://doi.org/10.1142/S1363919617500281

CHATTERJI, A.K., 2016. Do ratings of firms converge? Implications for managers, investors and strategy researchers. *Strateg. Manage. J*. [online], 37, 1597–1614. Available on https://doi.org/10.1002/smj.2407

CREDIT SUISSE, 2020. *From ESG to the SDGs: The shift from process and policies to delivering positive contribution.* Available on https://www.credit-suisse.com/media/assets/microsite/docs/responsibleinvesting/esg-to-sdgs-2020.pdf [date of access: 09/11/2021]

COMIN L.C. et al., 2019. Sustainable business models: a literature review. *Emerald insight* [online], 27(7). Available on www.emeraldinsight.com/1463-5771.htm

CORNELL B., 2020. ESG preferences, risk and return. *European Financial Management* [online], 27(1), 12-19. Available on https://doi.org/10.1111/eufm.12295

DASGUPTA R., 2021. Financial performance shortfall, ESG controversies, and ESG performance: Evidence from firms around the world. *Finance Research Letters* [online]. Available on https://doi.org/10.1016/j.frl.2021.102487

DB CLIMATE CHANGE ADVISORS, 2012. *Sustainable Investing: Establishing long-term value and performance*.

DIESENDORF, M., 1999. *Sustainability and sustainable development*, [online]. Sydney: Allen & Unwin, chap. 2, 19-37. Available on http://markdiesendorf.com/wp-content/uploads/2015/09/CorpSust2000.pdf

ECCLES R.G., LEE L-E, STROEHLE J.C., 2020. The Social Origins of ESG: An Analysis of Innovest and KLD. *Organization & Environment* [online], 33(4), 575-596. Available on https://doi.org/10.1177%2F1086026619888994

ESCRIG-OLMEDO E. et al., 2019. Rating the raters: Evaluating how ESG rating agencies integrate sustainability principles. *Sustainability* [online], 11. Available on http://dx.doi.org/10.3390/su11030915

EUROSIF, 2018. *European SRI Study 2018*

EVANS S. et al., 2017. Business Model Innovation for Sustainability: Towards a Unified Perspective for Creation of Sustainable Business Models. *Bus. Strat. Env* [online], 26, 597–608. Available on https://doi.org/10.1002/bse.1939

EY, 2021. *The future of sustainability reporting standards*.

FELD L.P., SCHNEIDER F., 2010. Survey on the Shadow Economy and Undeclared Earnings in OECD Countries. *German Economic Review* [online], 11, 109-149. Available on https://doi.org/10.1111/j.1468-0475.2010.00509.x

FORUM PER LA FINANZA SOSTENIBILE, 2020. *PMI italiane e sostenibilità*. Available online https://finanzasostenibile.it/wp-content/uploads/2020/11/PMI-italiane-e-sostenibilita-WEB.pdf [date of access: 01/12/2021]

FRIEDMAN M., 1970, *The social responsibility of firms is to increase its profits*, New York Times (12 September), 122– 126.

FUNG H.G., LAW S.A., YAU J., 2010. *Socially Responsible Investment in a Global Environment.* Edward Elgar Pub

GARCIA A.S., ORSATO R.J., 2020. Testing the institutional difference hypothesis: A study about environmental, social, governance, and financial performance. *Bus Strat Env* [online], 29, 3261– 3272. Available on https://doi.org/10.1002/bse.2570

GARRIGA, E., MELE, D., 2004. Corporate social responsibility theories: Mapping the territory. *Journal of Business Ethics* [online], 53, 51-71. Available on http://dx.doi.org/10.1023/B:BUSI.0000039399.90587.34

GEISSDOERFER M., VLADIMIROVA D., EVANS S., 2018. Sustainable business model innovation: A review. *Journal of Cleaner Production* [online], 198, 401-416. Available on https://doi.org/10.1016/j.jclepro.2018.06.240

GRI, 2021. *A Short Introduction to the GRI Standards*. Available on https://www.globalreporting.org/media/wtaf14tw/a-short-introduction-to-the-gri-standards.pdf [date of access: 17/11/2021]

HEINKEL R., KRAUS A., ZECHNER, J., 2001. The Effect of Green Investment on Corporate Behavior. *Journal of Financial and Quantitative Analysis* [online], 36(4), 431-449. Available on https://doi.org/10.2307/2676219

HOLMBERG, J., SANDBROOK R., 2019. *Sustainable Development: What Is to Be Done? Policies for a Small Planet: From the International Institute for Environment and Development*. London: Earthscan Publications, pp. 19–38. Available on http://dx.doi.org/10.4324/9780429200465-1

HONG H, KACPERCZYK M. 2009. The price of sin: the effects of social norms on markets. *Journal of Financial Economics* [online], 93, 15–36. Available on https://doi.org/10.1016/j.jfineco.2008.09.001

HSBC, 2020. *Sustainable financing and investing survey 2020*

HSBC, 2021. *Sustainable financing and investing survey 2021*

HUANG C. et al., 2012. Using material/substance flow analysis to support sustainable development assessment: A literature review and outlook. *Resources, conservation and recycling* [online]. Available on http://dx.doi.org/10.1016/j.resconrec.2012.08.012

HUANG D.Z.X., 2019. Environmental, social and governance (ESG) activity and firm performance: a review and consolidation. *Accounting & Finance* [online], 61(1), 335–360. Available on https://doi.org/10.1111/acfi.12569

JOYCE A., PAQUIN R.L., 2016. The triple layered business model canvas: A tool to design more sustainable business models. *Journal of Cleaner Production* [online], 135, 1474-1486. Available on https://doi.org/10.1016/j.jclepro.2016.06.067

KLEINE, A., HAUFF, M. 2009. Sustainability-driven implementation of corporate social responsibility: Application of the integrative sustainability triangle. *Journal of Business Ethics* [online], 85, 517-533. Available on http://dx.doi.org/10.1007/s10551-009-0212-z

KPMG Impact, 2020. *The time has come: The KPMG Survey of Sustainability Reporting 2020*. Available on https://assets.kpmg/content/dam/kpmg/xx/pdf/2020/11/the-time-has-come.pdf [date of access: 10/11/2021]

KPMG International, 2019. *Corporate tax: a critical part of ESG*. Available on https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/03/corporate-tax-a-critical-part-of-esg.pdf [date of access: 03/01/2022]

KRUEGER P., 2015. Climate Change and Firm Valuation: Evidence from a Quasi-Natural Experiment. *Swiss Finance Institute Research Paper No. 15-40*, Available on http://dx.doi.org/10.2139/ssrn.2565523

LACHANCE S., STROEHLE J., 2021. The Origins of ESG in Pensions: Strategies and Outcomes. *Wharton Pension Research Council Working Paper No. 2021-13*. Available on http://dx.doi.org/10.2139/ssrn.3900120

LAMBERT S., 2015. The importance of classification to business model research. *J. Bus. Models* [online], 3 (1), 49–61. Available on http://dx.doi.org/10.5278/ojs.jbm.v3i1.1045

LA TORRE M. et al., 2020. Does the ESG Index Affect Stock Return? Evidence from the Eurostoxx50. *Sustainability* [online], 12(16). Available on http://dx.doi.org/10.3390/su12166387

LI F.F.; POLYCHRONOPOULOS A., 2020. *What a Difference an ESG Ratings Provider Makes!* Available on https://www.researchaffiliates.com/content/dam/ra/documents/770-what-a-difference-an-esg-ratings-provider-makes.pdf [date of access: 05/11/2021]

LINNENLUECKE M.K., GRIFFITHS A., 2009. Corporate sustainability and organizational culture. *Journal of World Business* [online], 45(2010), 357–366. Available on https://doi.org/10.1016/j.jwb.2009.08.006

LO SF., 2010. Performance evaluation for sustainable business: a profitability and marketability framework. *Corp. Soc. Responsib. Environ. Mgmt.* [online], 17(6), 311-319. Available on https://doi.org/10.1002/csr.214

LOPATTA, K., KASPEREIT, T., 2014. The world capital markets' perception of sustainability and the impact of the financial crisis. *J. Bus. Ethics*[online], 122, 475–500. Available on https://doi.org/10.1007/s10551-013-1760-9

LOZANO R., 2013. A Holistic Perspective on Corporate Sustainability Drivers, *Corp. Soc. Responsib. Environ. Mgmt.* [online], 22(2018), 32– 44. Available on https://doi.org/10.1002/csr.1325

LÜDEKE-FREUND F. et al., 2018. The Sustainable Business Model Pattern Taxonomy – 45 Patterns to Support Sustainability-Oriented Business Model Innovation. *Sustainable Production and Consumption* [online], 15, 145-162. Available on https://doi.org/10.1016/j.spc.2018.06.004

MĂNESCU C., 2011. Stock returns in relation to environmental, social and governance performance: Mispricing or compensation for risk? *Sust. Dev.* [online], 19, 95-118. Available on https://doi.org/10.1002/sd.510

MERCER, 2017. *The language of responsible investment*. Available on https://silo.tips/download/the-language-of-responsible-investment [data of access: 27/10/2021]

MCWILLIAMS A., SIEGEL D., 2001. Corporate social responsibility: A theory of the firm perspective. *Academy of Management Review* [online], 26, 117–127. Available on https://doi.org/259398

MITCHELL D., COLES C., 2003. The ultimate competitive advantage of continuing business model innovation. *Journal of Business Strategy* [online], 24(5), 15-21. Available on http://dx.doi.org/10.1108/02756660310504924

MONTIEL I., 2008. Corporate Social Responsibility and Corporate Sustainability: Separate Pasts, Common Futures. *Organization & Environment* [online], 21(3), 245-269. Available on https://doi.org/10.1177%2F1086026608321329

MSCI ESG Research, 2020. *MSCI ESG Ratings Methodology*

MURALI KRISHNA, I.V., MANICKAM V., 2017. *Environmental Management - Science and Engineering for Industry*, pp 57-75. Butterworth-Heinemann

OSTERWALDER A., PIGNEUR Y., 2010. *Business Model Generation: A handbook for visionaries, game changers, and challengers.* John Wiley & Sons

PAGE J.P., 2005. *Corporate Governance and Value Creation*. The Research Foundation of CFA Institute

PÁSTOR L., STAMBAUGH R.F., TAYLOR L.A., 2020. Sustainable investing in equilibrium. *Journal of Financial Economics* [online], 142, 550-571. Available on https://doi.org/10.1016/j.jfineco.2020.12.011

PAUL, WEISS, 2021. *ESG Ratings and Data: How to Make Sense of Disagreement*. Available on https://www.paulweiss.com/media/3980810/esg_ratings_and_data_how_to_make_sense_of_disagreement.pdf [date of access: 10/12/2021]

PRAHALAD C.K., 2009. *The Fortune at the Bottom of the Pyramid: Eradicating Poverty Through Profits*. Pearson P T R

PORTER M.E., VAN DER LINDE C., 1995. Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives* [online], 9, 97–118. Available on http://www.jstor.org/stable/2138392

RAVENDA D., et al., 2015. Labor Tax Avoidance and Its Determinants: The Case of Mafia Firms in Italy. *Journal of Business Ethics* [online], 132(1), 41-62. Available on http://www.jstor.org/stable/24703651.

RAVENDA D., et al., 2019. The Effects of Immigration on Labour Tax Avoidance: An Empirical Spatial Analysis. *Journal of Business Ethics* [online], 170(2021), 471-496. Available on https://doi.org/10.1007/s10551-019-04393-4

RENNEBOG L., TER HORST J., ZHANG C., 2008. Socially responsible investments: Institutional aspects, performance, and investor behavior. *Journal of Banking & Finance,* [online], 32, 1723-1742. Available on https://doi.org/10.1016/j.jbankfin.2007.12.039

REFINITIV, 2021. *Environmental, social and governance scores from Refinitiv*

RITALA P. et al., 2018. Sustainable business model adoption among S&P 500 firms: A longitudinal content analysis study. *Journal of Cleaner Production* [online], 170, 216–226. Available on https://doi.org/10.1016/j.jclepro.2017.09.159

SARVAIYA1 H., WU M., 2014. An integrated Approach for Corporate Social Responsibility and Corporate Sustainability. *Asian Social Science* [online], 10(17). Available on https://doi.org/10.5539/ass.v10n17p57

SASB, 2017. *Conceptual framework*. Available on https://www.sasb.org/wp-content/uploads/2020/02/SASB_Conceptual-Framework_WATERMARK.pdf [date of access: 17/11/2021]

SAUTNER Z., STARKS L.T., 2021. ESG and Downside Risks: Implications for Pension Funds. *Wharton Pension Research Council Working Paper No. 2021-10* [online]. Available on http://dx.doi.org/10.2139/ssrn.3879170

SCHALTEGGER, S., LÜDEKE-FREUND, F., 2013. Business Cases for Sustainability. In: S. Idowu, N. Capaldi, L. Zu & A. Das Gupta (Eds.), *Encyclopedia of Corporate Social Responsibility* [online], pp. 245-252. Berlin/Heidelberg: Springer. Available on https://ssrn.com/abstract=2265385

SERAFEIM G., 2014. *Turning a Profit While Doing Good: Aligning Sustainability with Corporate Performance*. Available on https://www.brookings.edu/wp-content/uploads/2016/06/serafeim.pdf [date of access: 10/11/2021]

SCHOENMAKER D., 2018. Sustainable investing: How to do it. *Bruegel Policy Contribution* [online], 23. Available on http://hdl.handle.net/10419/208023

SHARMA, S., RUDD, A., 2003. On the path to sustainability: Integrating social dimensions into the research and practice of environmental management. *Business Strategy and the Environment* [online], 12, 205-214. Available on https://doi.org/10.1002/bse.366

SHAKEEL J. et al., 2020. Anatomy of sustainable business model innovation. *Journal of Cleaner Production* [online], 261. Available on https://doi.org/10.1016/j.jclepro.2020.121201

SHIMIZU K., 2018. The Dilemma between "comply or explain" and SRI, ESG methodology; transitional terminology. *Organisational Information Ethics* [online]. Available on https://www.researchgate.net/publication/322594259_The_Dilemma_between_comply_or_explain_and_SRI_ESG_methodology_transitional_terminology

SHORROCKS B., 2001. Competition, Interspecific. *Encyclopedia of Biodiversity* [online], 177-191. Available on https://doi.org/10.1016/B978-0-12-384719-5.00027-7

STOBIERSKI T., 2021. *What is sustainable investing?* Available on https://online.hbs.edu/blog/post/sustainable-investing [data of access: 25/10/2021]

SUSTAINALYTICS, 2021. *ESG Risk Ratings - Methodology Abstract*

TRELSTAD B, 2016. Impact Investing: A Brief History, *Capitalism and Society* [online], 11(2). Available on https://ssrn.com/abstract=2886088

UN DESA, 2015. Transforming our world: the 2030 Agenda for Sustainable Development [online]. Available on https://sdgs.un.org/2030agenda [data of access: 11/09/2021]

VERHEYDEN T., ECCLES R.G., FEINER A., 2016. ESG for All? The Impact of ESG Screening on Return, Risk, and Diversification. *Journal of Applied Corporate Finance Volume* [online], 28(2), 47-55. Available on https://doi.org/10.1111/jacf.12174

WEF, 2020. *Measuring Stakeholder Capitalism Towards Common Metrics and Consistent Reporting of Sustainable Value Creation*. Available on https://www.weforum.org/reports/measuring-stakeholder-capitalism-towards-common-metrics-and-consistent-reporting-of-sustainable-value-creation [date of access: 22/11/2021]

XIE J. et al., 2018. Do environmental, social, and governance activities improve corporate financial performance? *Business Strategy and the Environment* [online], 28(2), 286-300. Available on https://doi.org/10.1002/bse.2224

Websites

ABERDEEN STANDARD INVESTMENTS https://www.abrdn.com/it-it/italy/institutional/insights-thinking-aloud/article-page/the-elements-of-esg#

AREA DEVELOPMENT https://www.areadevelopment.com/taxesIncentives/4-28-2009/sustainability-incentives.shtmlF [date of access: 09/09/2021]

BLACKROCK https://www.blackrock.com/corporate/about-us/blackrock-sustainability-survey [date of access: 03/11/2021]

BORSA ITALIANA https://www.borsaitaliana.it/borsa/glossario.html [date of access: 10/10/2021]

BUSINESS INSIDER https://www.businessinsider.com/the-top-10-benefits-of-convincing-your-company-to-care-about-sustainability-2012-3?r=US&IR=T [date of access: 20/09/2021]

CFA INSTITUTE https://www.cfainstitute.org/en/advocacy/issues/pension-funds#sort=%40pubbrowsedate%20descending [date of access: 04/12/2021]

CREDIT SUISSE https://www.credit-suisse.com/it/it/private-banking/tutelate-la-vostra-eredita/investimenti-sostenibili/impact-investing.html [date of access: 13/09/2021]

IL SOLE 24 ORE https://www.ilsole24ore.com/art/il-rating-esg-investimento-mirato-un-futuro-sostenibile-ADePlE0 [date of access: 05/10/2021]

ISO STANDARDS https://www.iso.org/standards.html [date of access: 16/10/2021]

ISTAT http://dati.istat.it/ [date of access: 17/12/2021]

LASTAMPA https://www.lastampa.it/economia/2021/11/01/news/bilancio-di-sostenibilita-solo-l-1-76-delle-aziende-italiane-lo-presenta-1.40873668 [date of access: 20/10/2021]

LOWELL CENTER FOR SUSTAINABLE PRODUCTION https://www.uml.edu/research/lowell-center/ [date of access: 28/09/2021]

SASB https://www.sasb.org/standards/ [date of access: 16/10/2021]

STATISTA https://www.statista.com/statistics/1268405/return-differential-esg-score-provider-worldwide/ [date of access: 15/09/2021]

STATISTA https://www.statista.com/statistics/892863/esg-adoption-methods-institutional-investors/ [date of access: 15/09/2021]

TRECCANI https://www.treccani.it/enciclopedia/rating_%28Dizionario-di-Economia-e-Finanza%29/ [date of access: 05/10/2021]