Strategies for Sustainability

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Fostering Sustainable Business Models through Financial Markets

Strategies for Sustainability

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We favour trans-disciplinary perspectives and analyses grounded in careful, comparative studies of practice, demonstrations, or policy reforms. This largely excludes further documentation of problems, and prescriptive pieces that are not grounded in practice, or sustainability studies. Philosophically, we prefer an open-minded pragmatism – "show us what works and why" – rather than a bias toward a theory of the liberal state (i.e. "command-and-control") or a theory of markets. We invite contributions that are innovative, creative, and go beyond the 'business as usual' approaches.

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- Develop implementation strategies and examine the effectiveness of specific sustainability strategies;
- Propose what should be tried next to promote greater sustainability in natural resource management, energy production, housing design and development, industrial reorganization, infrastructure planning, land use, business strategy, and organisational changes;
- Prescribe how to do better at incorporating concerns about sustainability into organisations, private action, and public policy;
- Focus on trans-disciplinary analyses grounded in careful, comparative studies of practice or policy reform; and
- Provide an approach "…to meeting the needs of the present without compromising the ability of future generations to meet their own needs," and do this in a way that balances the goal of economic development with due consideration for environmental protection, social progress, and individual rights.

Themes covered in the series are:

Sustainability management
Sustainability strategies
Lifestyle changes
Regional approaches
Organisational changes for sustainability
Educational approaches
Pollution prevention
Clean technologies
Multilateral treaty-making
Sustainability guidelines and standards
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Introduction

The risks that, until now, financial markets have taken into account are the traditional financial risks: credit risk, insolvency risk, interest rate risk, market risk, liquidity risk, and even the so-called operational risk that has to do with possible losses derived from inefficiencies in internal controls, and an inadequate operational and technological infrastructure (internal and external). Supervisors of the financial markets are also increasingly regulating governance aspects (e.g., transparency, remuneration, and board composition) and ethical aspects (such as tax havens, financing of terrorism, money laundering, and bribery).

In recent years, the importance of risk caused by environmental, social, and managerial factors, or in other words non-financial factors or ESG (environmental, social, governance) factors,[1] has been growing, as reported by different reports and analyses. The influence of these factors is visible both in the context of their impact on the financial markets and the economy. Such impacts have multidimensional consequences; they determine the quality of life and the safety of society as well as the costs incurred by market participants. The effects of climate change are particularly severe and at the same time worrying, but the problem of poverty and exclusion due to growing inequalities is a parallel challenge.

A frame of reference was developed, the 17 Sustainable Development Goals (SDGs) within the 2030 Agenda for Sustainable Development of the United Nations Development Program (UNDP), to address these global risks. The SDGs identify global sustainability challenges that can guide companies and financial market to contribute to social and environmental development (Elalfy et al. 2020, Tsalis et al., 2020). However, the global financial crisis that resulted from the credit crunch in 2008 and the current financial and humanitarian crisis caused by COVID-19 have forced financial markets and companies to rethink their systemic risk exposure. New environmental and social global risks present have appeared aggravated by the consequences of the COVID-19 crisis (World Economic Forum, 2021), which has

[1] Non – financial factors (environmental, social and governance issues) incorporated into decisions of business and financial markets and taken into account in the risk management process.

impacted the growing demand to integrate environmental, social, and governance criteria and sustainability issues in financial decisions, and are calling into question the development model followed to date. Risks such as climate change, biodiversity loss, water scarcity, extreme natural disasters, epidemics, social inequalities, and poverty negatively affect the prosperity of our planet.

In the period before the pandemic and now, financial markets have been transforming and adapting their mechanisms to environmental risk conditions, especially climate change. Financial markets and their main market actors are exposed to a different degree to the impact of ESG risks and their negative consequences. The insurance and banking markets are particularly exposed to ESG risks. Financial institutions, considering the impact of ESG risks on their operating activities and financial situation, undertake a number of adaptation measures and adjust their business models towards the so-called sustainable business models. There is a noticeable trend in the banking sector where the "sustainable" approach is becoming one of the leading strategies to avoid credit and reputational risk due to climate change. This risk manifests itself in particular in arrears in payments, changes in payment schedules, loss of third-party liability insurance, and negative opinions from shareholders and customers. At the same time, the banking sector after the crisis of 2008 is one of the sectors subject to the strongest regulatory pressure, and one that is trusted by customers relatively less. These factors cause the liquidity risk in the banking sector to increase due to the regulatory requirements regarding capital adequacy, along with the increase in the competitiveness of non-banking institutions, particularly the so-called fintechs with which banks have difficulty competing (Deloitte, 2020). There are also opportunities for the banking sector to develop inclusive growth and greening the economy initiatives; and these initiatives require not only financing but also specialized services, including advice provided by banks. Banks are involved in civic initiatives related to, inter alia, building sustainable chains in agricultural production, in particular the food economy, as well as involvement in anti-deforestation social movements (Banking on Climate Change, 2020).

The insurance sector and its innovative methods of calculating premiums have also played a transcendental role in the current state of how risks are perceived and managed (Baker & Simon, 2002), and the techniques used by them can be an important source of innovation when establishing the necessary bases to face the problem of measuring and assessing ESG risks, as well as when defining mechanisms for their management (Froestad et al., 2011). Climate change has become a significant factor of instability in the insurance sector, in particular due to potential insurance losses, withdrawal from high-risk markets, and excessively high insurance premiums against the risk of non-financial factors (e.g., climate change) that customers will not be able to pay. The transition to a low carbon economy demands the cooperation of the public and private sectors. The financial markets' role, specifically the asset management industry, is crucial to bridge the financing gap that the shift to a sustainable economy entails (Folque et al., 2021). In terms of investing, risk profiles, returns on equity, and credit-risk portfolios and fixed-income portfolios are changing, affected by changes in investor awareness and ESG factors. Non-financial issues such as work, human rights, and community involvement are increasingly

being included in the risk profile and the calculation of return as they have a significant impact on the risk level of investors.

In this context, financial markets play an important role to avoid negative impacts on the environment and the society, being an important driver for economic stability, global sustainability objectives, and corporate sustainability performance (Scholten, 2006). The role of financial markets seems especially important, as providers of credit and financial resources that must decide where to invest considering different risk factors and how to contribute to sustainable development through their core business (Weber et al., 2012). This is a relevant issue considering the changing European regulatory framework, which will foster the European financial market to mainstream environmental and social factors into risk management (ESMA, 2021). Financial markets must ensure that ESG risks are a lens through which all decisions are made, especially in relation to credit and valuation risks in their portfolios, reflecting the strategic nature of these risks. Asset managers require measurable and comparable information to consider ESG factors in their risk assessment processes (Utz, 2019). To that end, it is important for financial markets to define suitable methodologies to assess such risks (Aziz et al., 2015; Dorfleitner et al., 2015; Weber et al., 2015; Boiral et al., 2020). Rating agencies have made considerable efforts to develop ESG risk assessment methods (Escrig-Olmedo et al., 2019), despite the challenges related to the sustainability risks measurement process (Boiral et al., 2020). The results of these ESG risk assessment processes can lead to exclude certain sectors from cooperation (e.g., dirty business representatives), diversify the cost of the service (most often the cost of obtaining financing), or increase the frequency and scope of transaction monitoring (European Green Deal, 2021).

ESG risks have increasingly become important for companies, to develop a strategic and sustainable management; investors, to ensure more coherent decision-making with the sustainability; and particularly financial market markets with their role as service providers (Velte, 2017). Financial markets are one of the main channels influencing entrepreneurs. By determining the criteria of risk assessment and the conditions of access to financial services, the financial market affects the decisions and attitudes of entrepreneurs, including their business models (Ziolo et al., 2020, Friede et al., 2015). Since 1992, the United Nations Environmental Program Financial Initiative (UNEP FI) has pointed out the need for financial markets to integrate environmental, social, and corporate governance factors (ESG factors) into the decision-making process, especially in criteria for assessing transaction risks (Stampe, 2014). Such criteria for assessing transaction risks are in continuous evolution due economic changes fostering a green economy and social inclusion. These two phenomena highlight the need to extend the risk assessment criteria used by financial markets for ESG risk. In such way, financial markets need to determine criteria for assessing such transactional risks in the COVID-19 and post-COVID global contexts. Therefore, in the new paradigm, ESG factors should take a special place fostering more sustainable companies and investments (Gross &Viard, 2021).

The aim of this book is to show changes in the functioning of financial markets in the conditions of the impact of non-financial factors and the risk they create. To that end, it is necessary to know the main global challenges facing financial markets

and their impact on building sustainable value in business models of enterprises in the context of sustainable adaptation. Extant literature has not focused much on how financial institutions could contribute to generate sustainable value through the definition of sustainable business models (SBM) (see Lozano, 2018), necessitating further studies in this field.

Concretely, on the one hand, this book focuses on assessing the decision criteria adopted by financial markets in the process of transaction risk valuation, in terms of the presence of ESG criteria. On the other hand, this book focuses on assessing the impact of including these criteria in the risk assessment process by financial markets on business decisions, leading as a consequence to building new value in the form of a sustainable business model. The book presents global ESG risks facing the financial markets. It discusses how ESG risks are managed and monitored, and how financial markets can measure and operationalize extra-financial risks in their assessment process. This book analyzes ESG risks implications and influence on company behavior, and the actions that companies should take considering the ESG assessment requirements of financial markets. Finally, it provides a comprehensive, structured, and systematic view of how financial markets and companies should adapt and improve their business models.

This book includes critical contributions from leading academic experts and practitioners in related fields to provide theoretical and practical analyses of the interactions between the ESG risk assessment process of financial markets and business models of companies. The book consists of seven chapters.

Chapter 1 describes the evolving concept of risk, and emerging risk factors and their future implications for global markets. It discusses the growing significance of ESG risk factors in risk management models. This is particularly important in the areas related to climate change and societal risk. These two phenomena referring to the environmental and social pillar of sustainable development strongly weigh on the necessity of extending the risk assessment criteria by financial markets for the ESG risk measures. However, as it is shown in this chapter, ESG risks do not dominate the modern risk landscape for financial markets despite their growing prominence. The most feared risks in the short and medium horizon are environmental risks (climate change as well as extreme weather events and related regulatory responses), economic/financial risks (financial instability and fiscal problems), technological risks (cyber threats and network/ICT related risks), and operational/business risks (supply chain disruptions).

Chapter 2 presents changes in financial markets towards sustainable business practices and assesses the decision criteria adopted by financial institutions in the process of transaction risk valuation in terms of the presence of ESG criteria and to diagnose the impact of including these criteria in the risk assessment process by financial markets on business decisions, leading as a consequence to building new value in the form of a sustainable business model.

Chapter 3 discusses new approaches presented in the literature to create sustainable shareholder value that requires companies and investors to adopt a systemic and long-term vision, and to understand the financial significance of ESG factors within the full spectrum of threats and opportunities. This chapter also defines ESG

risk assessment, sustainable business model, and sustainable value creation, as well as the linkages between corporate sustainability. The main findings shows that the variable corporate sustainability appeared to be strongly correlated with ESG and moderately with the variables sustainable business model and sustainable value creation.

Chapter 4 provides the answers to the questions: what ESG factors have been incorporated by financial markets and companies in the decision-making process? and, how ESG risk is managed and monitored in financial markets and companies? The chapter focuses on the integration of ESG factors and sustainable development concept with companies and financial markets decisions. The chapter explains why companies and financial markets should adopt a systemic and long-term vision, and shows the financial significance of ESG factors within the full spectrum of threats and opportunities and identifies these issues as the research gap needs to be covered.

Chapter 5 provides insights on how the financial markets, through credit rating agencies, are integrating ESG risks into the corporate sustainability assessment processes to find out if ESG risk analysis criteria used by the ratings are aligned with the most important global risks for organizations. The chapter shows that in the last few years, credit rating agencies have increased the efforts to integrate ESG risks into the corporate sustainability assessment process through the incorporation of the sustainability rating agencies' assessment methodologies, which entails changes in the decision-making process of companies. However, ESG risk assessments do not seem to be well aligned with the priority global ESG risks to corporate sustainability management.

Chapter 6 presents and expands the perspective of triple layered business model canvas (TLBMC), considering the perspectives of the ESG. The chapter also aims to answer the question of how innovative management tools support the implementation of the TBL principles into organizational strategies. A holistic, broad-based approach implementing different solutions and the active participation of change-provoking stakeholders can contribute to the long-term success of organizations and entire supply chains. The chapter proposes the elements of environmental, social, economic, and managerial value that are necessary to talk about creating sustainable added value for the chain.

Chapter 7 presents the concept of sustainable adaptation, based on literature review. It discusses the importance of financial markets for the firm to adapt its business model under conditions of threat as well as opportunity. The factors influencing the choice of a bank by an enterprise were identified and it was described to what extent the cooperation with the bank influences the business model of the enterprise. The motives of sustainable business adaptation are explained. The adaptation processes are assessed considering their impact on sustainable value. The aim of the chapter is to assess the impact of financial markets on building sustainable value in business models of enterprises in the context of sustainable adaptation.

The book addresses unique challenges for investors, companies, and financial markets as well as for our society as a whole, advancing the traditional risk management approaches that seem inadequate to address the new global risk.

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Contents

Chapter 1
Addressing the New Global Challenges and Risks in Financial Market

Krzysztof Kluza and Stanisław Kluza

Abstract This chapter describes the evolving concept of risk, emerging risk factors and their future implications for global markets. Firstly, it shows how risk definition and risk assessment framework developed over the last two decades with a growing focus on the risk implications for business strategy implementation. It pictures the growing significance of ESG risk factors in risk management models as well. In the next part, changes in global risk landscape and emerging key risks are discussed based on several risk reports. Despite growing prominence of ESG risks, these risks do not dominate solely the modern risk landscape for financial markets. Other risk categories, in particular technological and economic risks, are also of key importance for future business performance. However, ESG risks accompanied with societal health risks (COVID pandemic) exert a significant direct and indirect impact on these risk categories as the transversal factors. The last sections of this chapter are devoted to a description of key future risk factors in a short and medium horizon. These include environmental risks (climate changes and related regulatory responses), economic and financial risks (financial instability, fiscal strains, asset price bubbles), technological risks (cyber threats, cloud computing and data governance-related risks) and operational risks (supply chain disruptions). This chapter is primarily based on a literature review, financial market data research and comparative analysis of several risk surveys results.

1 Evolution of Risk Concept and Risk Classifications

Risk management belongs to one of the constantly evolving disciplines in business practice and academy. This evolution results from its very nature as the science of risk is de facto the observation of the changing operational models of enterprises and the evolving factors that influence them. This chapter discusses the changing trends of the main risks that markets will have to address, with a special focus on

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emerging risks in the short-term and medium-term horizons. The evolution of major risk subjects will also be briefly presented.

One of the pioneering and renowned institutions in the field of risk management was the Committee of Sponsoring Organizations of the Treadway Commission (COSO).[1] In 2004, COSO published "Enterprise Risk Management – Integrated Framework" (COSO, 2014). The framework was designed to guide managers in uncertain environments in achieving an entity's objectives in such categories as strategic, operations, reporting and compliance. It was subsequently updated and expanded in June 2017 as "Enterprise Risk Management. Integrating with Strategy and Performance" (COSO, 2017) and supplemented further by "Enterprise Risk Management. Compliance Risk Management" in November 2020 (COSO 2020) and "Enterprise Risk Management for Cloud Computing", July 2021 (COSO, 2021).

Another important milestone for enterprise[2] risk management methodologies took place in 2009 when the International Organization for Standardization published ISO 31000 standard (ISO, 2009) – an international standard that provides principles and guidelines for effective risk management (see also Purdy, 2010). The standard was revised in 2018 as the ISO 31000:2018 (ISO, 2018). The ISO 31000 standard is not the basis for certification. It is a set of principles and guidelines and good practices that can be used to establish (design), implement, maintain and improve the effectiveness of the organization's risk management process. ISO 31000 also supports the risk management process defined in the ISO standards encompassing requirements for management systems such as ISO 9001, ISO 14001, ISO 45001, ISO /IEC 27001, ISO 23301, IATF 16949, ISO 22000 and ISO 17025.

The concept of risk is ever-changing. As discussed by Spikin (2013), it focused originally on probabilities and adverse consequences of events, for example:

- Risk is the probability of an adverse outcome (Graham and Weiner, 1995).
- Risk equals the expected disutility (Campbell, 2005).
- Risk is a combination of the probability of the event and scope of its consequences (ISO, 2002).
- Risk stands for events with a negative impact, which can prevent value creation or erode existing value (COSO, 2004).
- Risk equals the expected loss (Willis, 2007).

With developments in this field, the concept of risk evolved into a wide set of phenomena, which affect organization processes aiming to achieve strategy or financial results. Two recent definitions by institutions providing risk management frameworks are as follows:

- Risk is the effect (positive or negative) of uncertainty on an organization's ability to meet its objectives (ISO, 2018).

[1] Other early standards for risk management were, for example: CSA 1997 (Canadian Standards Association), BS6079–3 (2000) (British Standards), IRGC 2004 (International Risk Governance Council) and AS/NZS4360 (2004) (Standards Australia and Standards New Zealand).

[2] The term 'enterprise' may also refer to companies, firms, etc.

– Risk is defined as the possibility that events will occur and affect the achievement of strategy and business objectives (COSO, 2020).[3]

The new concept of risk also caused an evolution of risk categories and risk analysis spectra. Historically, risk events were perceived mainly as physical and financial incidents, subsequently supplemented by operational and legal issues. Similarly, insurance and banking risk models have continued to grow in scope over the past 50 years – from encompassing simple and local risk exposures to the current environment of complex and global exposures, of which vast amounts have a non-financial nature.

Risk classification frameworks, whose examples are presented in Tables 1.1 and 1.2, do not consider common risks such as related to, for example, climate change, health and technological/cyber threats. Even the relatively most developed classification by COSO (2004) does not consider challenges and critical emerging risks. For example, none of the below classifications perceived ESG risks and infectious diseases/pandemics as the transversal risks, exerting their impacts on many or even majority areas and processes in organization, in fact amplifying risks in majority of other categories. Historically, environmental risk management was a part, along with programme risk management, of the engineering risk management. Environmental risk management stood for the handling of environmental, health and safety risks associated with the production, operation and disposal of systems in order to assure their sustainability and immunity to adverse events (Verbano & Venturini, 2011).

Table 1.1 Typology of risks faced by a financial institution

Risk category	Description
Market risk	Equity risk, interest rate risk (trading risk and gap risk), currency risk, commodity risk
Credit risk	Transaction risk, portfolio concentration; issue risk, issuer risk, counterparty risk
Liquidity risk	Funding liquidity risk, trading liquidity risk
Operational risk	Inadequate systems, management failure, faulty controls, fraud, human errors
Legal and regulatory risk	Customer action, tax changes
Human factor risk	Category of operational risk related to losses that may result from (accidental) human errors

Source: own elaboration based on (Crouhy et al., 2001)

[3] For more information on the different risk definitions and risk management systems, see, for example, Hopkin (2018), Chaps. 1 and 6.

Table 1.2 Casualty Actuarial Society (CAS) classification of risks for enterprises in 2003

Hazard risks	Financial risks	Operational risks	Strategic risks
Fire and other property damage Wisdom and other natural perils Theft and other crime, personal injury Business interruption Disease and disability (including work-related ones) Liability claims	Price Liquidity Credit Inflation/ purchasing power Hedging/ basis risk	Business operations (e.g. product development, human resources, supply chain management, etc.) Empowerment, information technology Information/business reporting (e.g. budgeting and planning, accounting information, investment evaluation, etc.)	Reputational damage Competition Customer wants Demographic and socio-cultural trends Technological innovation Capital availability Regulatory and political trends

Source: Verbano and Venturini (2011), adapted from Casualty Actuarial Society document "Overview of ERM", 2003

2 Emergence of ESG Risk Factors in Risk Management Models

The COSO (2004) classification, which recognized the risks constituting current ESG risks (environmental, social and governance), defined them in a traditional and, from the current perspective, a narrow way (see Table 1.3). For example, environmental risks are the risks related to the natural environment that could result in damage to buildings, restricted access to raw materials or loss of human capital due to weather conditions, such as earthquakes, fires, floods or environmental pollution. Social risks are related to changing demographics and social mores, including child labour issues, changes in family structures and work/life priorities, which could alter demand for products and customer behaviour. Health and safety risks are related to employee health and safety in the workplace and encompass such "traditional" issues as unsafe equipment or environment, workplace stress, potential for injury from repetitive strain or falls from heights.

The political, economic, sociological and technological (PEST) analytic framework, a tool for assessing mainly non-operational and non-financial risks, has undergone a similar and even more perceptible evolution. This risk classification system mainly serves to identify external risks although it also covers risks arising from the internal organizational context. Over the last decade, it was extended by the new key emerging risk areas, i.e. legal and environmental. The last one was recently modified to cover also ethical issues. Nowadays, ESG risks constitute the key element of PESTLE analysis. The current form of PESTLE framework is presented in Table 1.4. It is important to notice that this risk framework is generally not applied to financial and infrastructure risks.

ESG risks have substantially gained significance in risk assessment and risk management models being treated as a separate risk category (similarly to the

Table 1.3 COSO (2004) risk categories

Strategic risks	Operational risks	Reporting risks	Compliance risks
Economic risks Industry risks Strategic transaction risks Social risks Technological risks Political risks Organizational risks	Environmental risks Financial risks Business continuity risks Innovation risks Commercial risks Project risks Human resource risks Health and safety risks Property risks Reputational risks	Information risks Reporting risks	Legal and regulatory risks Control risks Professional risks

Source: Epstein and Buhovac (2005)

Table 1.4 PESTLE risk classification system

Category of risk	Description/examples
Political	Tax policy, employment laws, corruption, trade restrictions and reform, tariffs and political stability
Economic	Economic growth/decline, interest rates, inflation rate, labour costs, working hours, unemployment (local and national), credit availability, cost of living, disposable income of consumers
Social / sociological	Cultural norms and expectations, health consciousness, population growth, age distribution, career attitudes, emphasis on safety, workforce trends
Technological	Technology changes that impact products or services, new technologies, barriers to entry in given markets, production and distribution, level of innovation, cybersecurity
Legal	Changes to legislation that may impact employment, access to materials, quotas, resources, imports/exports, taxation, copy right protection, consumer protection laws, etc.
Environmental and ethical	Separated from the above categories and emphasized ethical and environmental factors, originally mainly of economic or social nature, such as availability of resources, environmental regulations and policies, corporate social responsibility as well as climate change hazards

Source: own elaboration based on Hopkin (2018)

evolution of PEST/PESTLE analysis) or as ubiquitous risk factors, affecting other risk categories and, as a result, business performance. A recent study by KPMG (2021) for the banking sector presents present descriptions of ESG risks. Environmental risks are grouped into physical risks (e.g. supply chain collapse, droughts, sea-level rise) and transition risks (changes in regulations to promote sustainability or ban unsustainable activities (e.g. CO_2 tax), structural changes in demand and supply for product commodities). Social risks represent, for example, noncompliance with labour standards or payment standards, lack of assurance of industrial safety standards and health protection for employees and lack of assurance of product safety. Governance risk reflects issues of compliance with tax law, corruption-related issues, inappropriate compensation incentives and lack of proper

assurance of data protection. Taking into consideration operating models of non-financial institutions, ESG risks encompass much larger spectrum of events, as presented in Table 1.5.

ESG risks (both expected and materialized) have numerous direct and indirect consequences on business operations and financials. Initially, through such channels as regulatory guidelines, technology, market dynamics and quality and availability of resources, they affect the providers of important services and the institution itself. This has also effects on customer behaviour, current institution performance and economic prospects of success. The outside-in ESG effects and inside-out secondary effects eventually intertwine and mutually reinforce. In the end, inside-out effects embrace reputational risks, which in turn affect the whole institution, as these risks act as a powerful transmitter between customers and an institution. The final impact of these complex interlinkages is reflected in the deterioration of the institution's profitability and liquidity. Simplified transmission mechanism in financial institutions is presented in Fig. 1.1.

Table 1.5 Examples of ESG risk incidents in non-financial sectors

Environmental	Impacts on ecosystem/landscapes, such as contamination of groundwater, forests, rivers or seas, deforestation or impacts on wildlife Global pollution and climate change, which include atmospheric pollution and criticism related to climate change, carbon and other greenhouse gas emissions Local pollution, which is pollution in local air, water and soil Overuse and wasting of resources, which includes inefficient use or waste of renewable or non-renewable resources, such as water, energy or commodities Waste issues, such as inappropriate disposal or handling of waste Animal mistreatment, which includes torture, mistreatment or abuse of animals, through experiments, husbandry or trophy hunting
Social	Impacts on communities, such as land- or water-grabbing, negative impacts on a community's livelihood or employment opportunities, relocation of communities, safety impacts or access to life-saving drugs Human rights abuses and corporate complicity, such as violence against humans, human trafficking, organ trafficking, privatization of water sources, supporting oppressive regimes or supporting terrorist organizations Local participation issues, which arise when local communities or individuals are not consulted about the firm's activities or when they do not benefit appropriately, and when critics are silenced by unethical tactics Social discrimination, which refers to treating people differently because of certain characteristics, such as gender, race, ethnicity or religion Child labour, which also includes child prostitution, pornography and trafficking Forced labour, such as bonded labour, prison labour, exploitative practices, restrictions on freedom of movement or withholding of wages Occupational health and safety issues, such as lack of safety for employees at work or negligence resulting in work-related accidents Discrimination in employment, which is social discrimination against employees Poor employment conditions, such as "slave-like" working conditions, issues with labour contracts or pay or spying on employees Freedom of association and collective bargaining, which refers to violations of workers' rights to organize and collectively bargain

(continued)

Table 1.5 (continued)

Governance	Corruption, bribery, extortion and money laundering, which includes slush funds, aggressive lobbying, overcharging and nepotism Fraud, which is intentional deception for personal gain or damage to another individual, including counterfeiting, false advertising, misleading investors or stock price manipulations Tax evasion, such as not paying taxes by illegal means and the use of tax havens Tax optimization, which is the non-illegal practice of minimizing tax liability Anti-competitive practices, which are practices that prevent, reduce or manipulate competition in markets, such as bid rigging, dumping, exclusive dealing or price fixing Executive compensation issues, such as excessive salaries or bonuses Misleading communication, such as "greenwashing", false advertising, off-label marketing or "astroturfing"
Miscellaneous	Products and services issues resulting in health or environmental damage, such as toxic or dangerous products, contaminated food and medical treatments with unintended health consequences Controversial products and services, which refer to the sale of products or services that provoke strong disagreement or disapproval (e.g. alcohol, weapons, gambling) Supply chain issues, which refer to problems at suppliers, vendors or subcontractors Violation of international standards, set by international governmental organizations or treaties with a global nature and international customary law Violation of national legislation, which refers to the violation of national and state legislation related to environmental, social and governance issues

Source: Glossner (2021), pp. 37–38

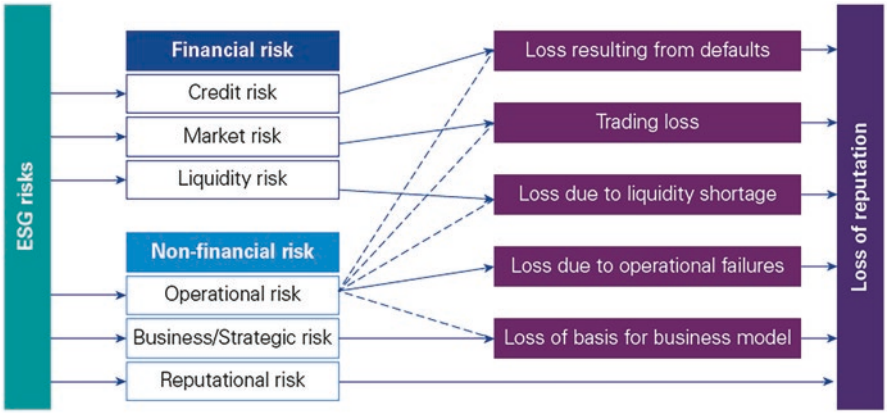

Fig. 1.1 Identification and materialization of ESG risks in banks. (Source: KPMG (2021), p. 18)

Despite growing prominence of ESG risks, these risks do not dominate the modern risk landscape for financial markets. Still, several other risk categories, in particular technological and economic risks, are also of key importance for the future performance of business operations. However, it should be noted that ESG risks, as

the transversal factors, have direct and indirect impact on other risk categories to a significant extent. The changes in key global risks are discussed in more detail in Part 3.

3 The Changes in Global Risk Landscape and Emerging Key Risks

In this part, the results of several global risks surveys are presented. The most prominent of them is the Global Risks Report prepared by World Economic Forum (WEF). It gathers the perceptions of around 800–900 leading decision-makers from business, academia and the public sector and NGOs. The second biggest survey presented is conducted by Ernst and Young (EY, 2020). It is carried out among ca. 500 global board members and CEOs of large companies (at least US$1bn in annual revenue), of which 30% represent technology, media, telecommunications (TMT) sector and banking and capital markets. Another two surveys have a little different profile – this research is based on a smaller sample of 150–200 participants with more specific professional profiles. The CIA/CAS/SOA[4] Annual Survey of Emerging Risks is based on risk managers' opinions, and the Gartner's Emerging Risks Survey focuses on risk and audit executives.

The quoted surveys are carried out cyclically,[5] with the longest history of Global Risks Report, which dates back to 2004, when the Global Risk Network was established, and its first report was published in 2006. The CIA/CAS/SOA Survey of Emerging Risks was commenced in 2008. As the methodologies of these two surveys remained relatively stable, these reports will be used in this chapter to also illustrate risk factors' evolution over the last 10 years (see Tables 1.6, 1.7, and 1.8).

Global Risks Reports depict how a landscape of top global risks is swiftly and remarkably evolving. Ten years ago, they were mainly associated with economic risks resulting from the 2008 global financial crisis. Societal risks related to health (chronic and infectious diseases) also played important role. In 2015, the focus moved to geopolitical issues (esp. related to the Middle East and the rise of Islamic State as well as conflict in Ukraine) and societal issues (water crisis, infectious diseases). Simultaneously, growing importance of climate risks was noticed and declining rank of economic issues. In 2021, the risk picture evolved further. Environmental/climate concerns along with health risks (COVID pandemic) overtook strongly other issues in the ranking. In addition, a growing awareness of technology risks emerged. The more detailed results of the top ten global risks by likelihood and impact according to Global Risks Reports are presented in Tables 1.6 and 1.7.

[4] CIA, Canadian Institute of Actuaries; CAS, Casualty Actuarial Society; SOA, Society of Actuaries

[5] With an exception of the EY survey

Table 1.6 Top global risks by likelihood according to Global Risks Reports by WEF

	2010		2015		2021	
	Category	Risk description	Category	Risk description	Category	Risk description
1	Economic	Asset price collapse	Geopolitical	Interstate conflict	Environmental	Extreme weather events
2	Economic	Slowing Chinese economy (<6%)	Environmental	Extreme weather events	Environmental	Climate action failure
3	Societal	Chronic diseases	Geopolitical	Failure of national governance	Environmental	Human environmental damage
4	Economic	Fiscal/debt crises	Geopolitical	State collapse or crisis	Societal	Infectious diseases/ pandemics
5	Geopolitical	Global governance gaps	Economic	Unemployment or underemployment	Environmental	Biodiversity loss
6	Economic	Burden of regulation	Environmental	Natural catastrophes	Technological	Digital power concentration
7	Geopolitical	Afghanistan instability	Environmental	Climate action failure	Technological	Digital inequality
8	Societal	Liability regime and regulatory framework	Societal	Water crises	Geopolitical	Interstate relations fracture
9	Economic	Retrenchment from globalization (emerging countries)	Technological	Data fraud or theft	Technological	Cybersecurity failure
10	Technological	IT infrastructure breakdown	Technological	Cyberattacks	Societal	Livelihood crises

Source: own elaboration based on WEF (2010), WEF (2015), WEF (2021)

Table 1.7 Top global risks by impact according to Global Risks Reports by WEF

	2010		2015		2021	
	Category	Risk description	Category	Risk description	Category	Risk description
1	Economic	Asset price collapse	Societal	Water crises	Societal	Infectious diseases/ pandemics
2	Economic	Retrenchment from globalization (developed countries)	Societal	Infectious diseases/pandemics	Environmental	Climate action failure
3	Economic	Oil price spikes	Geopolitical	Weapons of mass destruction	Geopolitical	Weapons of mass destruction
4	Societal	Chronic diseases	Geopolitical	Interstate conflict	Environmental	Biodiversity loss
5	Economic	Fiscal/debt crises	Environmental	Climate action failure	Environmental	Natural resource crises
6	Economic	Food price volatility	Economic	Energy price shock	Environmental	Human environmental damage
7	Economic	Slowing Chinese economy (<6%)	Technological	IT infrastructure breakdown	Societal	Livelihood crises
8	Geopolitical	Global governance gaps	Economic	Fiscal/debt crises	Environmental	Extreme weather events
9	Technological	IT infrastructure breakdown	Economic	Unemployment or underemployment	Economic	Fiscal/debt crises
10	Societal	Infectious diseases/pandemics	Environmental	Biodiversity loss	Technological	IT infrastructure breakdown

Source: own elaboration based on WEF (2010), WEF (2015), WEF (2021)

Table 1.8 Top global risks – by frequency of responses

	2010		2015		2020	
	Category	Risk description	Category	Risk description	Category	Risk description
1	Economic	Asset price collapse	Technological	Cyber/networks	Societal	Infectious diseases/pandemics
2	Economic	Currency shock	Economic	Financial volatility	Environmental	Climate change
3	Economic	Chinese destabilization	Economic	Asset price collapse	Economic	Financial volatility
4	Technological	Cyber/networks	Environmental	Climate change	Technological	Cyber/networks
5	Societal	Demographic shift	Geopolitical	Terrorism	Societal	Wars (including civil wars)
6	Environmental	Climate change	Societal	Liability regimes/regulatory framework	Economic	Asset price collapse
7	Economic	Energy price shock	Economic	Chinese destabilization	Technological	Disruptive technology
8	Geopolitical	Wars (including civil wars)	Geopolitical	Wars (including civil wars)	Geopolitical	Globalization shift
9	Geopolitical	Failed and failing states	Economic	Energy price shock	Geopolitical	Failed and failing states
10	Geopolitical	Terrorism	Geopolitical	Regional instability	Societal	Liability regimes/regulatory framework

Source: based on the Annual Survey of Emerging Risks, CIA/CAS/SOA; data for 2010, 2015 and 2020 retrieved on September 30, 2021, from https://www.casact.org/article/14th-annual-survey-emerging-risks and https://tableau.soa.org/t/soa-public/views/EmergingRisks/1_HeatMapTimeSeries?:isGuestRedirectFromVizportal=y&:embed=y

A WEF's current outlook for 2021 to some extent underestimates economic risks esp. such as fiscal/debt crises and asset price collapse and subsequent risk to financial stability which is of critical importance for financial markets. Similarly, as the short-term top emerging risks (up to 2 years), surveyed professionals foresee infectious diseases/pandemics, livelihood crises, extreme weather events, cybersecurity failure and digital inequality. That in general reflects their assessment of the relatively growing significance of technological risks. However, in a medium-term horizon (3–5 years), economic risks move to the top of this ranking. The top five risks envisaged then are (financial) asset bubble burst, IT infrastructure breakdown, price instability, commodity shocks[6] and debt crises (WEF, 2021).

A relatively comparable picture is presented by (CIA/CAS/SOA, 2021) report, though the economic risks such as financial volatility and asset price collapse are more emphasized. Still, the top 2 current risks are infectious diseases/pandemics and climate change (see Table 1.8).

The 2021 Survey of Emerging Risks report indicates also key emerging risks. These are (with short descriptions):

- Climate change – change in climate patterns which generates both extreme events and gradual changes, impacting infrastructure, agricultural yields and ecosystem biodiversity.
- Cyber/networks – a major disruption of the availability, reliability and resilience of critical information infrastructure caused by cyber risks, terrorist attack or technical failure; results are felt in major infrastructure: power distribution, water supply, transportation, telecommunication, emergency services and finance.
- Infectious diseases/pandemics – a pandemic with high mortality/incidence of diseases such as HIV/AIDS, Ebola, coronavirus or influenza.
- Disruptive technology – unintended consequences of technology lead to disruption and/or catastrophic economic losses.
- Financial volatility – price instability and extremes of sectors, including commodities, equities or interest rates.

For more detailed information, see CIA/CAS/SOA (2021).

The survey by EY (2020) brings out some additional topics for consideration. It shows that senior management, with their more microeconomic approach, concentrate more on economic and technological risks. They are also concerned with essential operational problems such as possible disruption of business model or supply chain and human resources turbulences arising after the COIVD-19 pandemic – see Table 1.9.

This more microeconomic perspective is also visible in the results of Gartner's Emerging Risks Survey for 2Q 2021 (see Table 1.10). In this survey, the risk and audit managers are prevailingly worried about cybersecurity control failures, ESG regulatory requirements, human resources and organizational culture challenges

[6] Defined as abrupt shocks to the supply and demand of systemically important commodities at a global scale that strain corporate, public and/or household budgets: chemicals, emissions, energy, foods, metals, minerals, etc. (WEF, 2021).

Table 1.9 Top ten risks that will most impact businesses in the next 12 months according to EY study

Rank	Risk	% of indications[a]
1	Unfavourable economic conditions	49
2	Cyberattack/data breach	48
3	Pace of technology change	46
4	People issues, such as talent shortages or a failure to upskill	42
5	Changes in the regulatory environment	42
6	Reputation and brand risk	40
7	Changing customer demands and expectations	40
8	Business model disruption	36
9	Geopolitical turmoil (e.g. increasing nationalism, trade wars)	36
10	Supply chain disruption	34

Source: EY (2020), p. 5

[a]Percentages relate to those that believe each risk category will have more than a moderate impact on their organization during the next 12 months

Table 1.10 Top five risks by overall risk score and frequency by Gartner in 2Q 2021

Rank	Emerging risks	Overall risk score[a]	Frequency[b] (%)
1	Cybersecurity control failures	1.59	65
2	ESG regulatory requirements	1.42	51
3	Remote talent management	1.23	48
4	Organizational culture degradation	1.19	43
5	Supply chain disruption	1.06	42

Source: https://www.gartner.com/en/newsroom/press-releases/2021-08-11-gartner-says-esg-regulatory-requirements-grow-as-source-of-risk-opportunity; retrieved on October 5, 2021

[a]Overall risk score = square root (impact score x probability score) x % of respondents selecting the risk

[b]Frequency determined by % of respondents selecting the risk as one of their top five risks

and supply change disruptions. It is remarkable that all these top concerns, with the exception of the ESG one, were created or boosted by the COVID-19 pandemic. However, pandemics as a separate risk factor are already not a key issue. Other top risks listed in Gartner's report were "Talent Post Covid", "Diversity, Equity and Inclusion Responsiveness", "Corporate Tax Changes", "Post-COVID China" and "Politicization of Decision Making" (Gartner, 2021a).

This micro-learning perspective of managers on key risks also strongly evolved over recent years in Gartner surveys. For comparison, in the first quarter of 2018, the top five risks by overall risk score were, respectively: "Cloud computing", "General data protection regulation", "Cyber security disclosure", "Global economic slowdown" and "Social engineering" (Gartner, 2019).

Summing up the above brief review of key emerging risk factors, the most feared risks with respect to probability and impact in short and medium horizon are:

– Climate change, extreme weather events and related regulatory responses.
– Financial instability and fiscal problems.
– Cyber threats and network/ICT-related risks.
– Supply chain disruptions.

Societal risk related to population health (infectious diseases/pandemics), which is currently a key risk factor for all market players, does not top the rankings in terms of future threats, as it is already curbed and relatively well-managed. However, its impact was so large that it acted as a transversal risk which triggered and magnified several other risks and generated vulnerabilities in other areas for market players. The current threats of financial instability, fiscal crises, asset bubble bursts, etc. were entirely caused by the COVID pandemic and subsequent fiscal and monetary responses to business environment deterioration and undertaken lockdown measures. Similarly, troubles with supply chain operations were also triggered by the recent COVID pandemic. Even an increased level of cyber/network risks has its roots partially in a soaring demand for ICT services during COVID pandemic. In the next part of this chapter, more details on these key emerging risks are provided. A more extensive description was devoted to climate risk and financial instability risk, which are global macro risks, possibly affecting all kinds of markets and financial activities. The other described risks, although very important also, are of microeconomic nature and affect market players in a more heterogeneous way.

4 Climate Change as a Key Risk

As it was described earlier, from a financial institution perspective (esp. banking sector), ESG risks can be treated as transversal risks, which are not a stand-alone type of risk but exert their influence on other financial and non-financial risks (see KPMG, 2021), as presented in Table 1.5. The biggest long-term impact is expected for environmental risks. As shown in Part 3 above, the principal risk factors for the coming years are associated with the potential profound climate changes (see IPCC, 2021). Besides typical environmental events, climate changes affect also various socio-economic and political phenomena, both on national and international/global level, strongly interrelated with each other. These include:

- Geopolitical security and stability (e.g. climate-driven armed conflicts, security strategies, dispute over rights and access to Artic resources).
- Human well-being and mobility (climate-induced migration, ambiguous impact on the whole of Africa with possible dire consequences, changing tourism flows and income sources).
- Infrastructure capabilities and gaps (obsolesce of production assets in various industries, vulnerable energy infrastructure, risks for energy supply, transportation network disruptions).
- Stability of financial markets (higher cost of capital, economic repercussions due to extreme events with implications for debt markets, strained insurance systems).

- International trade (risks for raw materials supply, manufacturing industry vulnerabilities, global food price volatilities along with long-term growth, diminished reliability of food supply and distribution).

The impact of climate change risks may be classified into three categories:

– Physical.
– Transition.
– Liability.

The physical category encompasses natural events (such as floods, water stress, heat stress and wildfires), on which materialization people have a limited direct impact in the short term and they can only manage and reduce their negative outcomes. The physical category events exert direct impact on financial markets through such channels as, inter alia, real business disruption and increased bankruptcies, reduced value of municipal bonds and insurance losses. For example, the economic losses due to extreme climate events amounted to 1% of GDP in the euro area in 2019 (FSR 2021, Suppl. B). Without remedial actions, these costs are expected to increase over time (see IPCC, 2021).

About 30% of the credit exposures of the euro area banking system to non-financial entities are from firms exposed to high or increasing risk due to one or more physical risk factors caused by climate change. It is also worth noting that there is a significant concentration of this risk on the side of the banking sector. More than 70% of the credit exposures of the banking system to high-risk companies to climate factors are held by only 25 banks. Thus, the potential concentration of physical climate-related risks among a few more vulnerable banks could have a significant impact on the financial stability of the whole sector (FSR 2021, Suppl. B).

Physical threats resulting from climate change can have a lasting impact on GDP, as they can cause long-term production losses and consequently redirect the capital originally allocated to development investments toward the reestablishment of the lost capacity. However, according to IMF (2020) physical risks are not reflected in equity prices.

Currently, considerable effort is placed on assessing possible damages from climate-caused natural hazards, as they potentially constitute a major catastrophic risk for societies; thus, well-tailored policies should be implemented. As ECB states "While methodologies analysing long-dated horizons are subject to several uncertainties, initial indications are that physical risk losses, particularly for high-emitting firms, would become dominant in around 15 years in the event of an insufficiently orderly climate transition – with falls of up to 20% in global GDP by the end of the century should mitigation prove to be insufficient or ineffective" (ECB, 2021, p. 8).

The other two above-mentioned categories of climate risk arise from goals and policies, which were established by governments and international institutions to combat climate change in long term. Transition risks reflect the costs and investments related to a global transition to low-carbon economy. These risks encompass such issues as additional capital expenditures on new assets or restructuring of current operations or relocation (e.g. from coastline to inland), stranded asset problem,

strategic shifts in real business and diminished returns on capital. Bolton and Kacperczyk (2021) present the evidence for carbon premium in the stock market (i.e. pricing of transition risk), which means that companies with higher emissions have to compensate investors by delivering higher returns.

As presented by the McKinsey's report, infrastructure is expected to bear the burden of expected climate change adaptation costs. They are estimated between 60% and 80% of total climate change adaptation spending globally. Depending on methodology, this could amount to $150 billion to $450 billion per year of spending on infrastructure in 2050 (McKinsey, 2020). These transition challenges are accompanied by so-called liability risks, i.e. additional costs borne by market players due to legislation and fines imposed for environmental damage. This includes costs for business due to cap and trade systems on CO_2 emissions.

Climate goals were set in the Paris Climate Protection Agreement. The agreement obliged 195 countries to change the global economy in a climate-friendly manner and marked an important milestone for international climate policy. Climate goals were also embedded in Sustainable Development Goals (SDGs) framework created for United Nations 2030 Agenda for Sustainable Development. SDGs intend to achieve mainly ecological and social goals, although they encompass a vast range of issues, such as poverty, health, education, gender, renewable energy, employment and economic growth, innovation and infrastructure, clean water, etc.

It is important to notice that the implementation of climate goals can be facilitated by positive developments in other SDGs. According to research by Kluza et al. (2021), specifically accomplishment of SDG4 (Ensure inclusive and equitable quality education and promote lifelong learning opportunities) and SDG17 (Strengthen the means of implementation and revitalize the global partnership for sustainable development) explicitly helps to achieve environmental policy goals. Additionally, other SDGs exercise an indirect influence on environmental goals through their reinforcing interactions with SDG4 and SDG17 goals. These are SDG1 (End poverty), SDG3 (Ensure healthy lives and promote well-being), SDG8 (Promote sustained, inclusive and sustainable economic growth, and productive employment) and SDG15 (Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests and halt biodiversity loss).

The severity of transition goals and climate regulations can be modified according to a current state of knowledge on human impact on climate change. It is possible that current goals and requirements are overstretched causing too much surplus loss on market players, or on the contrary, they should be even more rigorous than current agreements. For example, IMF (2020) estimated that carbon prices should amount to a wide range of USD 40 to USD 150 per tonne of CO_2 to achieve the Paris Agreement goals. The carbon prices entered this range (lower bound) only in the beginning of 2021.

In this context, the European Commission announced in February 2021 that it was raising its net greenhouse gas emission target reduction for 2030 from 40% reduction to a minimum of 55% reduction of 1990 emission base level. Correspondingly, the prices of carbon dioxide emission allowances under the European Emissions Trading Scheme (ETS) have increased significantly. For

example, in 2020 these prices remained stable and amounted to approx. EUR 25 per tonne (noting an increase only in December 2020 to EUR 32 per tonne), at the end of September 2021, the price of emission allowances reached EUR 62 per tonne (see Fig. 1.2). This shows how large the increase in operating costs can be for companies directly relying on greenhouse gas emission permits. Also, this indicates how profound energy price shock related to climate adaptation could be in the future, particularly if more ambitious climate goals were approved.

The financial sector is also exposed to the risk of energy transformation along the entire value chain of these industries and due to additional indirect links and multiplier effects. At the end of 2020, exposures to the mining, manufacturing and energy sectors directly affected by the costs of the climate transition (and responsible for more than 70% of the greenhouse gas emissions of non-financial actors) accounted for 25% of the EUR 4 trillion loans in the euro area related through value chain to climate transition risk. The total exposure of banks to this area exceeds 1/3 of their total lending to non-financial institutions. At the same time, non-banking financial institutions had 30% of their portfolios in securities of non-financial institutions categorized as high emitters. At the end of 2019, investment funds and insurance corporations and pension funds invested ca. €1.3 trillion and €0.3 trillion, respectively, in securities issued by high emitters operating mainly in the industrial, energy and materials sectors (FSR 2021, Suppl. B).

The stress tests carried out by the European Central Bank in 2021 showed that EU banking sector credit risk additional losses might amount to 1.60–1.75% of corporate risk-weighted assets under adverse climate scenarios in a 30-year timeframe. Additionally, market risk revaluation losses of insurance sector in the EU

Fig. 1.2 Change in EU carbon permit prices over the last 5 years (till October 7, 2021). (Source: https://tradingeconomics.com/commodity/carbon; accessed on October 7, 2021)

could be material in key climate-sensitive sectors for corporate equity and, to a lesser extent, corporate bond investments in a 15-year timeframe, assuming a disorderly transition scenario. Particularly large losses of 15% for equity holdings may materialize in oil, gas and vehicle industries. In the case of EU investment funds, adverse scenarios showed an additional direct aggregate asset write-down of 1.2% in holdings of equity and corporate bonds in a 15-year timeframe (ECB 2021).

Although the average balance sheet exposure of banks to high-emitting sectors is low at 14% in the euro area, the emission intensity varies between industries, creating exposure concentration risks. Banking sector losses could increase by almost 10% in the event of credit rating downgrades to high-emitting firms because of further sharp growth of prices for the carbon dioxide permits required to implement the Paris Agreement emission levels. And generated spillovers across financial intermediaries may be sizeable as respective corporate debt instruments are also held by investment funds and insurers.

In general, climate risks concern financial markets and banks, as well as non-financial enterprises and the public sector. Financial institutions need to manage their exposure: firstly, from the perspective of credit and business risks related to the need to migrate the corporate sector to a low-carbon economy and secondly, from the perspective of physical risks related to increasing extreme weather and environmental events or more permanent adverse climate changes. ECB analyses show that such risks appear to be particularly concentrated in selected sectors, geographic regions and individual banks, exacerbating the related financial stability concerns.

Financial markets may play an important role in mitigating climate-related risks. As European Central Bank points out in ECB (2021, p. 37), "Aside from pure insurance mechanisms, financial market participants can rely on market-based mechanisms (such as portfolio rebalancing and asset repricing) or on financial instruments (for example derivatives) to manage their climate-related risk exposures. The redistribution of risks to sectors or entities that are better equipped to deal with them or withstand associated losses is a standard feature of financial markets". Green finance and ESG investing are the most important market instruments in reducing climate transition risk. Sustainable financial instruments in Europe have been growing by 20–30% per year since 2015. At the end of 2020, net assets of global ESG funds reached EUR 1480 billion, green bonds (the outstanding amount by euro area domiciled issuers) amounted to EUR 350 billion, global catastrophe bonds amounted to EUR 50 billion, and emission-related derivatives (outstanding amount of notional value of open positions) amounted to EUR 220 billion. Within these instruments there is an emerging demand for sustainability-linked instruments (i.e. transition bonds which offer compensation to investors when the issuer fails to achieve a prespecified sustainability target like a minimum reduction in CO_2 emissions) – see ECB (2021). The other group of market instruments which were designed to curb climate-related risks are carbon markets such as the EU Emissions Trading System (ETS), briefly described above.

5 Fiscal and Financial Instability Risks: Reinforced Due to COVID-19 Pandemic

Historically, the series of global crises stemmed from the behaviour of financial markets and cumulated credit risk, liquidity risk, market risk or foreign exchange risk. This was the case with the crises of 1998 and 2008. Such events are a consequence of internal dynamics of financial markets and industries, where the financing schemes gradually tend to evolve from hedged financing through speculative financing to Ponzi schemes. As a result, they create financial instability with profound adverse implications for a real economy. This phenomenon was explained by H. Minsky in the Financial Stability Hypothesis (Minsky, 1992). The recent global COVID-19 crisis and arising climate crisis had different roots; however, they also generated vast repercussions for financial markets, debt markets and economic systems.

This phenomenon is well-observable for the COVID-19 pandemic. In contrary to the previous crises, this one triggered strong policy responses from fiscal, monetary and macro- and micro-prudential authorities. They were supposed to diminish direct and second-round effects of this adverse pandemic shock on household consumption, employment, corporate investments and credit (and liquidity) availability, as well as govern financial stability in the economy.

Governments used a broad range of instruments such as capital injections, liability guarantees, subsidized loans, employment compensation programmes, tax reliefs, tax and pension payment deferrals, etc. (see, e.g. EC, 2021). Their extent was the largest in the advanced economies. According to IMF (2021), the anti-pandemic activities in a form of additional government programmes or forgone budgetary revenues amounted on average in these countries to 16.4% of annual GDP, and loan, equity and guarantee programmes amounted to 11.3% of their annual GDP. The lowest volume of governmental programmes was in the low-income developing countries, where the combined value of support programmes was below 2% of GDP. The details for individual countries and country groups are presented in Fig. 1.3.

Active fiscal policies resulted in a sharp growth of government deficits and debt. According to IMF (2021) data, average worldwide fiscal deficits expanded from 3.0% to 3.6% of GDP range for the 2016–2019 period to 10.8% of GDP in 2020 and 9.2% in 2021. Similarly, general government debt which fluctuated around 83% of GDP for several years (worldwide average) increased abruptly to an unprecedented 97.3% of GDP in 2020 and is projected to stabilize at 99% of GDP in 2021. The largest fiscal expansion was recorded in advanced economies (see Fig. 1.4). Fiscal deficits are projected to shrink in most countries in 2022 as pandemic-related support expires or winds down. IMF (2021) projection of the average fiscal deficit worldwide for 2022 and 2023 amounts to 5.4% and 4.4% of GDP, respectively. Nevertheless, this scenario is dependent on relatively unchanged interest rate levels and no major distortions to financial stability. However, this assumption is a

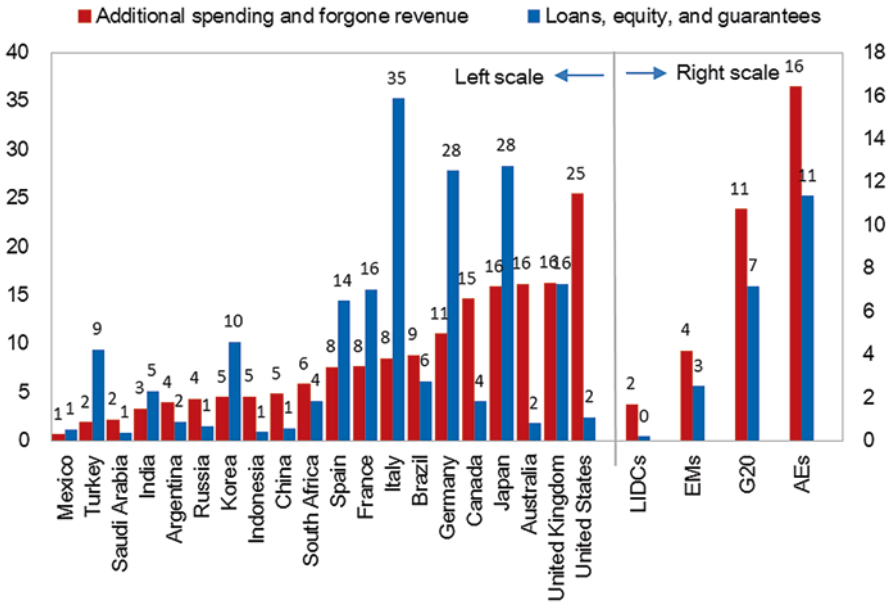

Fig. 1.3 Government fiscal support in response to COVID-19 in 2020–2021, % of 2020 GDP. (Source: IMF (2021))
Note: Data refer to fiscal measures announced between January 2020 and March 17, 2021. Abbreviations: *AEs* advanced economies, *EMs* emerging market economies, *G20* Group of Twenty; *LIDCs* low-income developing countries

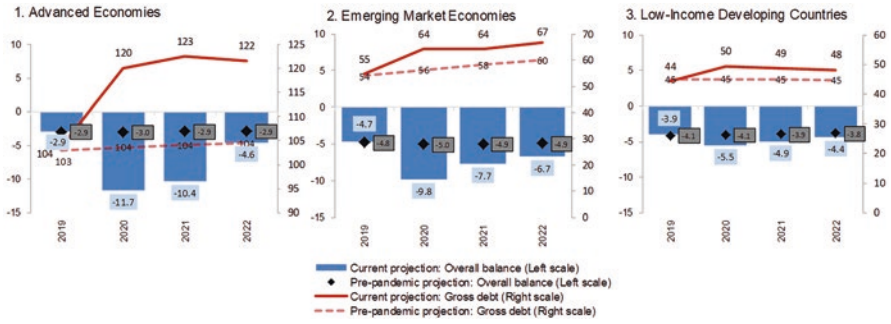

Fig. 1.4 The effect of the COVID-19 pandemic on the forecast of general government gross debt and fiscal balances, all data as % of GDP for the 2019–2022 period. (Source: IMF (2021))
Note: Pre-pandemic projections are based on the January 2020 World Economic Outlook Update by IMF

relatively strong bet, as the threats to financial stability are emerging globally as a key economic risk.

Increased public debt burden is currently relatively easily manageable due to recordlow interest rates. They were decreased by central banks as a part of monetary policy stimulus packages protecting against COVID-caused recession. These actions were accompanied by several quantitative easing programmes and related asset buy-back programmes on an enormous scale compared to policies employed in response to previous financial crises – see Table 1.11.

A combination of very expansionary monetary and fiscal policies resulted in the resurgence of inflation, which reached in many traditionally low-inflation developed countries even 20-year highs, both in the case of consumer (CPI) and producer (PPI) prices. Producer prices were also affected by materialization of another risk, i.e. shortages of several raw materials and components caused by global supply chain disruptions. As of August 2021, inflation reached 3.9% (CPI) and 12.0% (PPI) in Germany, 1.9% (CPI) and 10.0% (PPI) in France, 3.2% (CPI) and 5.9% (PPI) in the UK, 5.3% (CPI) and 8.3% (PPI) in the USA, −0.4% (CPI) and 5.5% (PPI) in Japan and 0.8% (CPI) and 9.5% (PPI) in China. As a result, real interest rates plummeted (see also Table 1.12).

High inflation, near-to-zero nominal interest rates along with hefty government support programmes and low unemployment (leading to growing disposable income of households and cash holdings in economy) created a strong incentive for risk-taking or purely speculative strategies on markets of financial and non-financial assets. In this chapter, this phenomenon is illustrated below for the US economy, which has the largest influence on the performance of financial markets worldwide.

The dynamics of the US house prices and the US stock market in the low and negative interest rate environment are depicted in Fig. 1.5. Their increase strongly outpaced the growth of economy after the outbreak of COVID-19 pandemic, which is typically a sign of asset overvaluation.

Several other indicators signal overvaluation of US stock markets. Analysing a possibility of asset price bubble, it is rational to examine the measures of long-term fundamental soundness of stock markets. Two examples of such indicators are

Table 1.11 Selected quantitative easing programmes; end of period data

	2019	2020	3Q2021
Fed (USD mln)			
QE holdings	3,751,189	6,730,731	7,928,087
Total assets	4,213,832	7,411,396	8,496,410
ECB (EUR mln)			
QE holdings	2,579,447	2,908,908	3,055,363
Total assets	4,664,037	6,979,324	8,273,207
BoE (GBP mln)			
QE holdings	N/D	744,922	855,631
Total assets	475,579	767,807	859,539

Source: own elaboration based on Eurostat, Reuters and Bloomberg data

Table 1.12 Changes in inflation and nominal and real interest rates in selected countries during COVID-19 pandemic

in %	CPI YoY			Central bank rate			5Y Govt Bond YTM			Long-term real interest rate (5Y Govt Bon YTM - CPI YoY)		
end of period	2019	2020	Aug. 2021	2019	2020	3Q2021	2019	2020	3Q2021	2019	2020	3Q2021
Austria	1.7	1.2	3.1	−0.5	−0.5	−0.5	−0.34	−0.68	−0.62	−2.0	−1.9	**−3.7**
Belgium	0.8	0.4	2.7	−0.5	−0.5	−0.5	−0.32	−0.68	−0.61	−1.1	−1.1	**−3.3**
Denmark	0.8	0.5	1.8	0.05	0.05	−0.35	−0.41	−0.57	−0.56	−1.2	−1.1	**−2.4**
France	1.5	0.0	1.9	−0.5	−0.5	−0.5	−0.30	−0.67	−0.61	−1.8	−0.7	**−2.5**
Germany	1.5	−0.3	3.9	−0.5	−0.5	−0.5	−0.47	−0.74	−0.71	−2.0	−0.4	**−4.6**
Italy	0.5	−0.2	2.0	−0.5	−0.5	−0.5	0.68	−0.01	0.26	0.2	0.2	**−1.7**
Netherlands	2.7	1.0	2.4	−0.5	−0.5	−0.5	−0.42	−0.71	−0.65	−3.1	−1.7	**−3.0**
Poland	3.4	2.4	5.5	1.5	0.1	0.1	1.81	0.43	0.59	−1.6	−2.0	**−4.9**
Romania	4.0	2.1	5.3	2.5	1.5	1.25	3.94	2.66	3.25	−0.1	0.6	**−2.0**
Spain	0.8	−0.5	3.3	−0.5	−0.5	−0.5	−0.08	−0.39	−0.30	−0.9	0.1	**−3.6**
United Kingdom	1.3	0.6	3.2	0.75	0.1	0.1	0.65	−0.09	−0.06	−0.6	−0.7	**−3.3**
United States	2.3	1.4	5.3	1.75	0.25	0.25	1.67	0.36	0.28	−0.6	−1.0	**−5.0**

Source: own elaboration based on Eurostat online database and Bloomberg portal (for the US data)

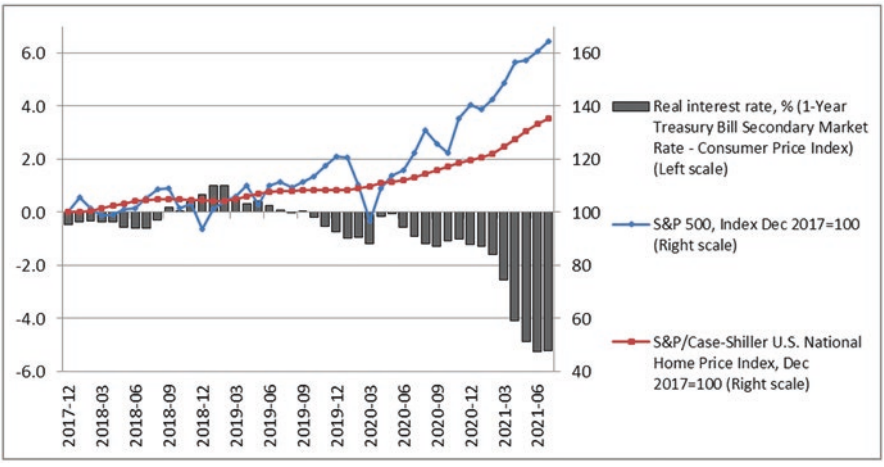

Fig. 1.5 Real interest rates, stock market performance and house prices in the USA in pre-pandemic period and during pandemics; monthly data. (Source: https://fred.stlouisfed.org; based on data retrieved on October 3, 2021)

presented below. They already indicate market overvaluation. The first one is the Shiller PE ratio, which reports market valuation of company earnings per share in the long term. As Fig. 1.6 presents, this ratio is about twice as large as typically accepted by investors and only below record-high level of the Internet bubble in 2000.

Fig. 1.6 Long-term changes in Shiller PE ratio for the S&P 500 index. (Source: https://www.multpl.com/shiller-pe; retrieved on October 3, 2021)

Note: The last observation is for October 1, 2021. Shiller PE ratio is a price earnings ratio based on average inflation-adjusted earnings from the previous 10 years, also known as the cyclically adjusted PE ratio (CAPE ratio).

The second recommended ratio is the Buffett Indicator. This is a ratio of total US stock market capitalization to GDP. As of September 2021, it amounted to 239%. Historical trend suggests that, currently, a ratio of ca. 120% would represent a fair stock market valuation; thus, the current valuation is about 90% (or about 3 standard deviations) above the historical average, suggesting that the market is strongly overvalued, at historical all-time highs (see Fig. 1.7). However, with real interest rates at historic lows, it does not imply an immediate correction of asset valuation.

Additionally, a growing amount of new stock issuance (IPOs) could be another sign of growing asset bubble risk. IPOs have totalled $582 billion over the last year (3Q2020-2Q2021) from non-financial US corporations. That is 60% more than the previous record of the late 1990s' Internet bubble, when the comparable amount was $354 billion. Typically, record-high IPOs precede severe market contractions, as companies try to sell as much as possible of overvalued shares. However, as Hulbert (2021) points out, these statistics on gross equity issuance could be misleading unless they are compared with the levels of buybacks and merger and acquisition activity for the same period. Analysis of net issuance unveils an opposite picture as net issuance amounted to negative $163 billion for this period (see FED, 2021). This would indicate that the possible asset bubble burst risk is not so imminent.

Summing up, it can be seen that if the bubble burst risk finally materializes in this high inflation, high budget deficit and high-leveraged environment, it would create significant financial destabilization, with possibly deeper negative consequences for financial markets and real economy than the COVID-19 pandemic. Such an adverse economic scenario would also trigger materialization of government-backed contingent liabilities in the financial sector (around 40% of global fiscal support is comprised of governments' liquidity support measures through the provision of loans, guarantees, equity injections, etc), which would further devastate the economy and strain the access to capital through financial markets.

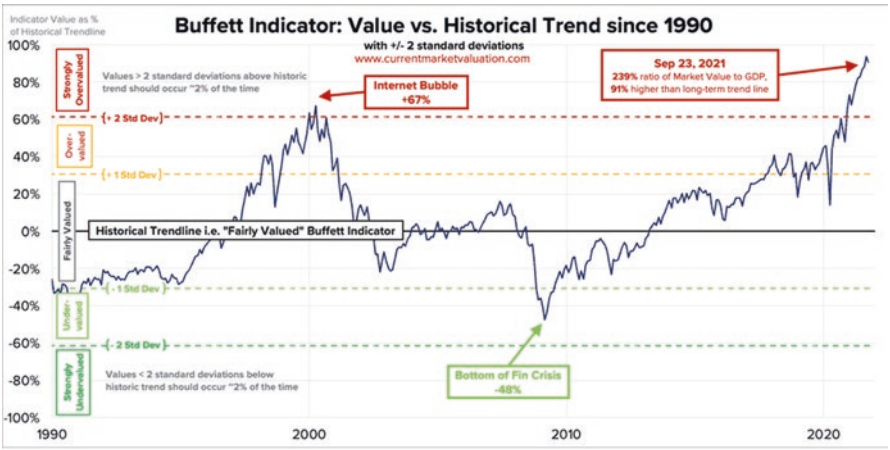

Fig. 1.7 Buffet indicator value deviations from long-term trend. (Source: https://www.currentmarketvaluation.com/models/buffett-indicator.php; retrieved on October 3, 2021)
Note: the long-term trend has an exponential functional form (what may reflect a technological progress) and is based on the data period 1950–2021

6 Technological Challenges

Business operations systematically evolve into further automatization, digitalization and use of artificial intelligence. This process of technological innovations and transformation is recognized as the top strategic opportunity for business organizations. According to EY (2020), technology disruption is the greatest strategic opportunity for business (with 40% of indications by board members). Top trends impacting infrastructure and operations encompass, inter alia, "Anywhere Operations", which enable organizations to decentralize employees and activate operations where it is feasible from business perspective; "improved Operational Continuity", ensuring IT services are continuous as workloads support increasingly geographically dispersed end users; and "Distributed Cloud", which decentralizes cloud resources and shifts the problem of support to cloud service providers – see (Hewitt, 2020). The four capabilities that comprise infrastructure-led innovation are (1) cost intelligence, (2) workforce transformation, (3) platform ops and (4) marketing. "Infrastructure and Operations leaders should now build an innovation platform, apply cost intelligence, lower technical debt, forward-fill skills and enable anywhere operations to be relevant in the post-COVID-19 world" (Manenti, 2021).

Hyper-automation technologies are other emerging solutions to be implemented in corporate business models. They encompass an environment consisting of robotic process automation, artificial intelligence, machine learning, event-driven software architecture and intelligent business process management solutions. Gartner

forecasts that organizations will reduce operational costs by 30% by combining hyper-automation technologies with redesigned operational processes by 2024 (Gartner, 2021d).

A pace of technology change and disruptive technologies are considered to be among top 5 future risks for all organizations (see Part 3 of this chapter). Introducing new technologies is associated with generating specific risks for organizations such as cyber and data privacy vulnerabilities and creates an increasingly complex cybersecurity landscape. The sudden proliferation of the remote work model in 2020 also has accelerated digital roadmaps, causing many organizations to hastily adopt new technologies both on the employee and customer side, presenting new challenges to productivity, consumer service and protection against cyber risks. At the same time, IT support incident requests doubled (in early 2020), and managing access rights for many more remote workers reinforced cyber risk and systems vulnerability (Gartner, 2020). These issues are described in more detail in Part 6a and 6b, below.

6.1 Data Governance and Cloud Computing

As presented in Part 3 of this chapter, the COVID-19 pandemic reinforced several technological risks. Among others, such a situation created new challenges for data governance, as the organizations had to collect more sensitive personal information from employees and customers than ever before. However, according to Gartner (2020), data governance practices are regressing, with fewer dedicated resources to data privacy than in previous years, even though data environments where data is stored are constantly getting more complex. Only 45% of audit executives highly believe that data governance risk is truly manageable. Growth in software-as-a-service (SaaS) and delays in upgrading existing systems had created environments where data is distributed across incongruent platforms, software and servers.

Cloud computing emerges as a key element of data governance risk and vulnerable to cyberattacks. "Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" (NIST, 2011). It originated as an instrument for achieving cost efficiency and improved availability of organizational intangible resources and quickly expanded as a sort of universal improvement of business operational models.

Since the first introduction of cloud computing, public clouds have grown and expanded. Prior to the 2020 COVID-19 pandemic, in April 2019 Gartner valued them as a $214 billion market in 2019 with anticipated growth of 16.5% to $250 billion in 2020 and 15.7% to $289 billion in 2021. Based on the pandemic and the need for remote work, the expansion of public cloud computing was faster and accelerated the implementation timeline for many organizations. In the recent report by Gartner, these spendings soared to $313 billion in 2020 and are projected to

amount to $396 billion and $482 billion in 2021 and 2022, respectively (Gartner, 2021b). Majority of growth comes from Cloud System Infrastructure Services (IaaS)[7] and Cloud Application Services (SaaS)[8].

Due to the importance of cloud computing business solutions, COSO released in 2021 a dedicated Enterprise Risk Management (ERM) framework for governance and control of cloud computing and cloud security. It covers 20 principles assigned to all 5 components of COSO Enterprise Risk Management framework such as Governance and Culture, Strategy and Objective-Setting, Performance, Review and Revision and Information, Communication and Reporting (COSO, 2021). This ERM provides also responses to several critical risks such as reliability and vulnerability of cloud service providers; data theft or leakage, especially in a multi-tenancy environment; connection as the single point of failure; cyber security threats to cloud computing (e.g. malware injections, denial of service, API attacks, access hijacking); and compliance issues. It also deals with cloud migration approach challenges, which may arise from different migration strategies such as rehosting, replatforming, repurchasing, refactoring as well as retaining or retiring. Table 1.13 illustrates the risks and benefits associated with migration to cloud computing.

The future of cloud computing looks full of both opportunities and risks. Integration of cloud with technologies such as artificial intelligence, the Internet of Things and 5G communications is one of the top emerging technological trends. From the investment angle, transformation of cloud infrastructure to increase sustainability of operations from climate perspective and pursue "Carbon-Intelligent" cloud goals is another key challenge. Such a further digitalization and virtualization of processes will enable to increase organizations' productivity and, simultaneously, mitigate climate risks. However, at the same time, this will magnify business vulnerability to cyber incidents and breaches.

[7] NIST definition: Cloud System Infrastructure Services (IaaS) – The capability provided to the consumer is to provision processing, storage, networks and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage and deployed applications and possibly limited control of select networking components (e.g. host firewalls).

[8] NIST definition: Cloud Application Services/Software as a Service (SaaS) – The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g. web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage or even individual application capabilities, with the possible exception of limited user-specific application configuration settings.

Table 1.13 Tactical cloud migration approach risks and benefits by COSO (2021) ERM

Approach	Benefits	Risks
Rehost	Higher speed of migration Reduced risk of migration CSP + partner ecosystem of tools to natively support this migration approach It could be automated/tool assisted	May not use PaaS services Inherit potentially same performance characteristics Limited retirement of technical debt
Replatform	Uses cloud services with no code change required No dependency on underlying physical hardware platform Migration to newer platform Opportunity to modernize technology stack Automated tool assistance available in some cases	Migration could be time-consuming and costlier Requires additional planning and coordination
Repurchase	Eliminates dependency on custom hardware or proprietary technology platforms Could be direct adoption of SaaS solution eliminating the overhead of maintaining application and infrastructure	Careful evaluation of partners/vendors needed Some use cases can grow in time and effort Data migration is required
Refactor	Utilizes cloud native features Increases efficiency and agility at an improved cost Adapts to modern customer needs Eliminates dependency on customer hardware and proprietary technology platforms Improves user experience	It could be complicated and expensive and could impact migration timeline It requires a good understanding of all aspects of the application, compliance, regulatory requirements, security, code, design, etc. Some use cases can grow in time and effort

Source: COSO, 2021, p. 29

6.2 Cybersecurity Control Failures

According to EY (2020), 48% of board members overall (and 69% of board members of financial services companies) believe cyberattacks and data breaches will more than moderately impact their business over the next 12 months, constituting a top 2 emerging risk for their organizations. Similarly, Gartner (2021c) recognizes cyber security control failures as the number one risk for organizations both from probability and impact perspective.

As defined in Bean (2020), cyber risk is the risk of failure or compromise of an organization's information system as a result of a cyber event. Cyberattack consequences may lead to economic disruption, financial loss, geopolitical tensions and/or social instability (WEF, 2021). A cyber event is an event that compromises the availability, integrity or confidentiality of an organization's information system or electronic data, most typically through a cyberattack. A cyberattack is an

(intentional) attack on an electronic device or a network that is executed by introducing or attempting to introduce erroneous or unauthorized electronic information into it for the purpose of damaging or disrupting the normal operation of the device/network, stealing, corrupting, erasing information that is stored and using the resources of the device/network to damage or disrupt the normal operations of another device/network and other parts of the affected organization. Cyber security is a risk to both on-premise and cloud computing – see Bean (2020) for further elaboration on this topic.

Cyber risk increased as supply chain grew, cloud computing flourished and, more recently, new and new devices became interconnected through the Internet during COVID-19 pandemic, as it proliferated a remote/home-work model. But the turning point event in building a consciousness of cyber threats was probably the Petya/NotPetya ransomware attack in 2017. It accounted for around $3.3 billion in insured losses (of which direct losses on cyber business lines (so-called affirmative cyber) accounted only for around $0.3 billion in insured losses), and over 90% of losses were categorized as silent cyber (silent cyber is a peril in which cyberattacks cause losses in traditional lines of business). Despite recognition of the importance of cyber threats, half of the surveyed board members say they are confident that the mitigation measures presented to them can protect the organization from major cyberattacks (EY, 2020).

The financial sector is strongly targeted by cyberattacks. They affect mostly institutions' websites (as the access to a bank or a broker's transaction systems), the ATM or payment card networks and payment processing networks of electronic payment services. Financial services industry has long been known for rapid changes in technology modernization and use of external tech partners to secure system immunity; however, due to its very nature, it is probably the most desired target for cybercriminals. Verizon (2021) reports that the motives behind data breaches in the case of the financial sector are prevailingly financial (96%); other motives are espionage (3%), grudge (2%), fun (1%) and ideology (1%). Breaches are caused by external actors (56%), internal ones (44%), multiple (1%) and partners (1%). Malicious external actors operate mostly through credential attacks, phishing and ransomware attacks. A nature of compromised data is, as follows: personal (83%), bank (33%), credentials (32%) and other (21%).

Pecuniary and operational damages for individual institutions on financial markets are just one side of the problems caused by cyberattacks. The second group of concerns has even bigger significance, as it is related to cyberattack impact on the financial stability of markets through threats to financial infrastructure and business continuity of financial markets and institutions. This means, in particular, the functioning of payment systems and payment schemes, securities settlement and clearing systems, as well as the overall ability to conduct operations in IT systems by a given entity for the benefit of clients. Historically, these were risk factors classified as internal, mainly depending on the efficiency of the implemented systems. On the other hand, in the twenty-first century, the risks arising here usually result from external causes, i.e. cyberattacks.

The magnitude of cyber threats is systematically growing, although so far there has been no cyberattack on financial institutions with system-wide effects. According to the European Central Bank, the most common types of cyber incidents in banks in 2020 concerned disruptions/interruptions in the operation of institutions (22%) and unauthorized access to systems (15%) – see FSR (2021).

Cyber assets are another category, which is directly vulnerable to cyberattacks. Moreover, a turmoil in the cyber assets markets may destabilize the digital economy and related financial subsidiarie,s generating powerful threats to overall financial stability. The European Commission plans to introduce regulations in 2021 to prevent the negative impact of the transmission of disruptions on these markets' cyber/platforms on monetary policy, financial stability and the functioning of payment systems. The so-called MiCa Regulation (EU regulation on crypto-asset markets) shall subject issuers and providers of these services (e.g. cryptocurrencies) to the authorization and prudential and supervisory requirements typical for traditional financial entities and platforms.

Cyber threats also pose a specific challenge for the insurance industry. Exposures that used to be isolated are now correlated. Portfolios have higher levels of risk aggregation when a single cyberattack impacts multiple policies. Commercial property lines are most exposed to silent cyber risks. Silent cyber risks lead to higher losses for both physical property damage and business interruption. They also cause professional liability claims where, for example, an IT provider could be liable for losses stemming from silent cyber exposures if the provider's service is not adequately secured. Silent exposures are very hard to quantify and therefore difficult to price (Trummer, 2020).

From the financial and industrial sectors' perspective, cyber vulnerabilities become more acute with the organizational changes needed to protect employees and serve customers during the COVID-19 pandemic. Drivers of this risk include gaps in security controls, increased employee vulnerability to social engineering, lack of attention to employees' home network security and antivirus software protection. Majority of employees are currently using personal devices to work remotely. However, less than 40% employees reported that employer had delivered tools to secure these devices. As Gartner (2020) concludes, despite increased cybersecurity spending, only 24% of organizations routinely follow cybersecurity best practices. As a consequence of such an approach, cyberattacks are expected to cost organizations $6 trillion annually in 2021. These losses will grow unless cyber risks are managed adequately.

7 Supply Chain Disruptions

Supply chain disruptions and commodity shocks associated with them are recognized as the key emerging risks for the global economy in several studies (see Part 3 of this chapter). As the nature of supply chains evolves, possible risks and their mitigation techniques change as well. Supply chain risk management is a set of

processes which are aimed at dealing with risks and uncertainties stemming from logistic activities as well as supporting processes for production and sales.

For the last two decades, supply chain operations have moved toward the strategic centre of businesses. However, they have been designed to achieve enhanced performance and financial goals, such as:

- The reduction in the number of suppliers.
- Reduction in time delays.
- Shorter product life cycles.
- Fast ramp-up of demand during the initial stages of the product life cycles.
- Reduction in buffers (unsold stock and lead time); see (Verbano and Venturini, 2011).

According to Gartner's research, 59% of retail supply chains were designed primarily for cost efficiency rather than resilience or agility.[9] Fewer efforts were spent in these operations on preparing for ESG opportunities, risks and impacts. With greater use of outsourcing for production and R&D and more integrated and intertwined processes between firms, this creates, however, several potential vulnerabilities for company business models leading to limited availability of key components and production delays during crises. In addition, lack of solutions that help to govern and adapt to new ESG risks can have a significant influence on, inter alia, company image, customer value perception and the cost of goods.

Growing supply chain and joint venture dependency and complexity are important factors from risk management perspective (ISO, 2018). Contemporary supply chains became highly connected and complex also due to international specialization grounded on the comparative advantage theory. As it is presented in Fig. 1.8, this complexity creates additional residual risk for business operations, materializing regardless of other risk factors.

Due to their complexity, large-scale supply chains proved to be strongly vulnerable to global disruptions such as those created by the COVID-19 pandemic. This created a critical challenge to maintain sustainability for their operations. But the pandemic is just one, though very remarkable, example of factors causing potential vulnerability to supply chains. In fact, risk events in this area are everywhere – from key countries' trade tariff change to intense climate change events. For example, the number of trade barriers implemented in 2020 increased by 180% from 2019 levels.

Moreover, volumes of risk incidents are growing. Manenti (2021) presents that 68% of supply chain leaders report that they have been constantly responding to high-impact disruptions since the beginning of 2019. As a response, 90% of surveyed retailers invest in making their chains more resilient, and 96% of them invest in achieving supply chain agility as of mid of 2021 (O'Connor, 2021).

Simultaneously to ongoing risk management, it is important to reduce the surface areas of supply chains defined as the sum of all the products, processes and networks that compose the supply chain today and represent touchpoints that risk

[9] Gartner Supply Chain Symposium/Xpo EMEA, September 13–15, 2021 Day 1 Highlights.

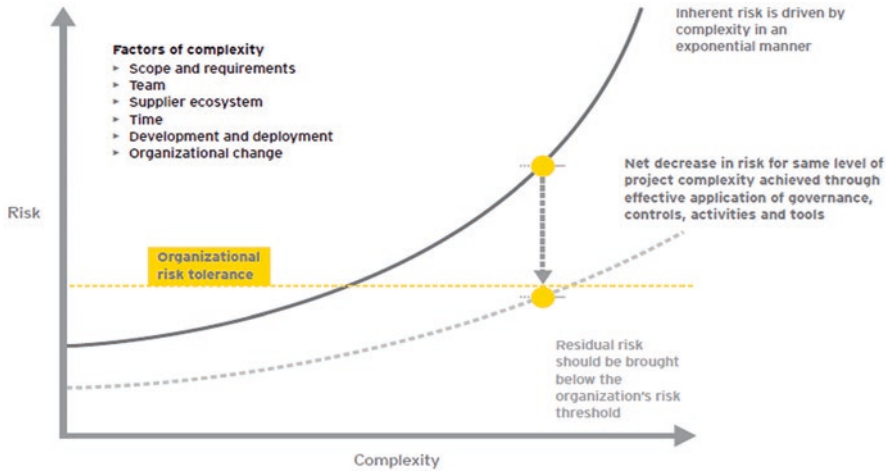

Fig. 1.8 Complexity as a residual risk factor. (Source: EY (2015))

events can have with the supply chain, in order to mitigate structural risk drivers to supply chains. This requires reducing the number of suppliers and locations as well as simplifying processes (including supply timespan). Achieving these goals can be facilitated due technological progress through enhanced use of process automation as well as artificial intelligence and analytics software.

8 Conclusion

Over the last two decades, the concept of risk significantly evolved. Nowadays, risk is defined as the possibility that events will occur and affect the achievement of strategy and business objectives. Simultaneously, ESG risk factors have substantially gained on importance in risk assessment and risk management models being treated as a separate risk category. Environmental risks are grouped into physical risks (e.g. supply chain collapse, sea level rise) and transition risks (e.g. changes in regulations to promote sustainability, structural changes in demand and supply for products commodities). Social risks represent, for example, noncompliance with labour standards and lack of assurance of industrial safety standards. Governance risk reflects such issues as inappropriate compensation incentives and lack of proper assurance of data protection. In addition, ESG risks can be treated as transversal risks, which are not a stand-alone type of risk but exert their influence on other financial and non-financial risks.

As it is shown in this chapter, ESG risks do not dominate the modern risk landscape for financial markets despite their growing prominence. According to 2021 risk surveys such as Global Risks Report by WEF, Annual Survey of Emerging

Risks by CIA/CAS/SOA and Emerging Risks Survey by Gartner, several other risk categories are also of key significance for business performance. The most feared risks in short and medium horizon are:

– Environmental risks (climate change, extreme weather events and related regulatory responses).
– Economic/financial risks (financial instability, fiscal problems).
– Technological risks (cyber threats and network/ICT-related risks).
– Operational/business risks (supply chain disruptions).

Societal risk related to population health (infectious diseases/pandemics), which was a key risk factor in 2020–2021, does not top the rankings in terms of future threats. However, its impact was so large that it triggered and magnified several other risks and generated additional market vulnerabilities. The current threat of financial instability, fiscal crises and asset bubble bursts was predominantly caused by the COVID pandemic and subsequent fiscal and monetary policy responses. Similarly, supply chain troubles and increased level of cyber/networks risks were also triggered by the COVID pandemic.

In a medium-term horizon (3–5 years), economic and financial risks further gain in significance. According to WEF (2021), the top five risks envisaged then are (financial) asset bubble burst, IT infrastructure breakdown, price instability, commodity shocks and debt crises.

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Chapter 2
Interdependencies Between Sustainable Financial Market and Sustainable Business

Beata Zofia Filipiak

Abstract The chapter aims to present changes in financial markets towards sustainable business practices and assesses the decision criteria adopted by financial institutions in the process of transaction risk valuation in terms of the presence of ESG criteria and diagnose the impact of including these criteria in the risk assessment. The determinants of changes in financial markets towards sustainable business practices were discussed. At the end of the chapter, sustainable decision criteria adopted by institutions in the financial market have been discussed.

1 Introduction

Financial markets are regarded as a key factor to make companies and entities work towards becoming more sustainable (Busch et al., 2015; Amidu & Haruna, 2018a, 2018b; Zioło et al., 2021; Filipiak, 2022). In many markets, in many regions of the world, sustainable investment has proven to be an ideal practice with many investors and entities looking to see if they could understand its components and adjust accordingly (Hawn et al., 2018). In the literature on the subject, there is a growing interest in sustainable investment and using sustainable financial instruments with an increasing interest in sustainable finance. Interest in sustainable investment is associated with socially responsible investing (SRI) and involving a need to understand and develop ways to take advantage of the potential benefits associated with this emerging way of doing business in the conditions of sustainable development and social responsibility. The practice and research see the benefits of using sustainability in its activities and financing.

The discussion in the literature of the subject allows us to conclude that the success of enterprises, entities, and financial institutions depends on new business models, which take into account the concept of sustainability (Campbell, 1996; Zott & Amit, 2010; Gerster, 2011; Čihák et al., 2012; Foss & Saebi, 2015). The practice and research see the benefits of using sustainability in its activities. The impact of

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legal and institutional solutions for business sustainability was established (Knyphausen-Aufsess & Meinhardt, 2002; Zott et al., 2011; Doleski, 2015), the relationship between sustainability and create financial value (Teece, 2010; Wirtz et al., 2016), and the impact of the concept of sustainability to create value a strategic asset for competitive advantage and performance of a company (Afuah, 2004; Casadesus-Masanell & Ricart, 2010; Chesbrough, 2007; Geissdoerfer et al., 2018). The benefits of using the corporate social responsibility (CSR) (Zhang et al., 2019) concept for the development of the idea of sustainability in entities, enterprises, and financial institutions were indicated (Lozano, 2014; Roome & Louche, 2015; Joyce & Paquin, 2016; Cardeal et al., 2020). However, there are only a few studies that support the development of sustainable business models (Holtström et al., 2019; Zioło et al., 2021).

Unsustainable activities and assets are increasingly likely to become stranded, as climate and environmental challenges become ever more material. The insufficient integration of ESG risks hampers the reallocation of resources and risks leading to disruptive readjustments in the future, with implications for financial stability. On the one hand, new business models become necessary, and on the other, environmental regulation combined with a sustainable finance framework. This change in approach will allow for the activation of channels of finance to investment that reduces exposure to these climate and environmental risks.

The literature lacks approaches to linking these issues, especially in the face of a pandemic COVID-19. The chapter aims to the presentation of changes and assesses the decision criteria adopted by financial institutions in the process of transaction risk valuation in terms of the presence of ESG criteria and diagnoses the impact of including these criteria in the risk assessment. It is necessary to discuss prerequisites for changes in the financial market towards greening rules and products. It is also necessary to know the determinants of changes in financial markets towards sustainable business practices. This provides the basis for making assessments as well as showing how organizational factors and conditions are changing in order to effectively change business strategies towards sustainable business.

2 Financial Markets and Environmental, Social, and Management Criteria

Environment, social, and governance (ESG) criteria are a relatively new element in investment decisions for both investors and the financial system (especially financial markets and banks). These criteria are closely related to an ethical investment approach consisting of excluding certain types of industries from one's portfolio based on certain moral, pro-sustainability, or ethical grounds. The literature on the subject indicates that the use of ESG criteria as a manifestation of social responsibility is a set of approaches that includes a particular investment selection, retention, and rejection process based on conventional financial decision criteria along with

moral and ESG considerations (Herringer et al., 2009; Syed, 2017). The use of the ESG criteria makes that activity, action, investment, or process qualified as socially responsible (SRI). The main goal of using ESG criteria in socially responsible investment is to positively influence the environment, society, and the company's governance issues (Syed, 2017). Table 2.1 presents the key directions of research on the influence of ESG criteria on the decision-making process.

Table 2.1 shows that the approach to the role of ESG criteria has evolved and is still the subject of research. In addition to studies showing a positive impact of ESG criteria on responsible investing and value impacts, there are other less optimistic surveys. From the point of view of sustainability, it is important to establish two criteria, as previously discussed in the studies by Bourghelle et al. (2009). In many cases, the focus on maximizing profits will be the primary decision criterion. On the other hand, the idea of sustainability, SDG's, and SRI causes a change of mentality (the evolution of the approach is presented in Table 2.1) in the decision-making process about investment in the markets. Deciding on the basis of the ESG criteria means that investors will accept not only resulted in additional costs but also expense ratios. As much as ESG criteria reflect promising sustainable and achieving SDGs goals, the rising costs raise concern over the approach's legitimacy (Escrig-Olmedo et al., 2017).

Sustainability and sustainable investing emerged as key issues in the financial markets. Many authors ask how sustainable development affects the investment process itself (Steinbarth & Bennett, 2018; Zioło et al., 2020; Madison & Schiehll, 2021). At the same time, however, the question arose as to how financial market participants can minimize risk and at the same time take into account environmental factors (Cripps, 2019; Zioło et al., 2020), including ESG factors. Even though there is still no final answer to this question, it is known that the impact of ESG risk factors must be considered alongside traditionally understood risks. The greater importance of sustainability factors and ESG risk on the financial market is also because investors are interested in the return, risks, and liquidity (which traditionally was their area of decision) but increasingly also the factor of ESG and the impact of a lack of consideration for sustainability as factors of creation of new value (Duuren et al., 2016; Ashwin Kumar et al., 2016; Trenz et al., 2018).

Investors in financial markets seek to obtain ESG information (wanting to minimize their risk) from a variety of sources. The literature on the subject indicates that to minimize the risk of sustainability, it is necessary to focus more on material ESG issues that can directly affect the firm's bottom line (Ernst & Young, 2017; Amel-Zadeh & Serafeim, 2018; Schiehll & Kolahga, 2021; Madison & Schiehll, 2021). The research by Khan et al. (2016) shows that this approach is appropriate and allows for better financial outperformance, but only when these investments were related to sustainability issues.

The transition to a sustainable economy requires significant investments. Hence, the activity of managers is focused on finding financial sources to fund environmentally friendly projects. The search for sustainable sources of financing implies adjustment measures. As a result, financial markets give new financial instruments that provide direct financing for the sustainable economy. This means that each

Table 2.1 Development of research on the impact of ESG criteria on the decision-making process

Author	Characteristics of the type of research on the influence of ESG factors
Barker (1998)	The theory of market information from qualitative information is based on the analysis of fund managers, financial analysts, and finance managers.
Liondis (2005)	It showed that there is the growing importance of SRI beliefs and ESG factors in the decision-making process about investment in the markets; poor environmental and governance performance has been shown to have adverse impacts on financial performance.
Koedijk and Slager (2007)	On the basis of the analysis of investigates the investment strategies of institutional investors, significant differences in beliefs and values of pension funds, as well as differences in the asset managers approach regarding working of capital markets have been demonstrated; moreover investments show a higher performance of investments based on the ESG criteria.
Vyvyan et al. (2007)	Study about investment attitude towards ESG and SRI and the level of socially responsible investment gave an indication that environment-related concerns are more important for SRI investment criteria and significant differences in investor attitudes exist; there is no clear relationship between environmentalists and non-environmentalists within the context of utility scores; the importance of the promotion of SRI funds attributes and performance was indicated; it has been shown that the integration of social values in the SRI decision-making process will increase firm value in the long run.
De Graaf and Slager (2009)	The consideration of SRI practices in the investment decision-making process was analyzed, and the result of the research was to demonstrate that the decision criterion must be clear, and a choice must be made between the goal of value based or ethical.
Bourghelle et al. (2009)	It shows the managers see a link between ESG factors and the investment process, but on their priority list, ESG practices are low classified.
Dowse (2009)	Research has shown that awareness about ESG in the organization rests mostly at lower levels or is just limited to corporate affairs and brand departments.
Shiller (2013)	It discusses the important role of financial markets in supporting many activities in society and discusses the view that ESG investing relies on the belief that both investors and society benefit by including ESG information.
Berry and Junkus (2013)	Professional and retail investors prefer to consider ESG in more holistic terms rather than using exclusions.
Epstein et al. (2015)	It shows that large, complex, for-profit organizations are integrating the challenge of simultaneously managing social, environmental and financial performance into decision-making.
van Duuren et al. (2016)	Research shows that for professional asset managers, governance is more important than environmental and social factors; for retail investors, environmental and sustainability issues dominate as the major category.
Dumas and Louche (2016)	It indicated in the research that a responsible investment (RI) collective beliefs currently do not provide a favored environment for RI as a mainstream investment and should be taken into account when debating the sustainability value.
Syed (2017)	The research shows that managers have common beliefs that environment and social responsibility (ESR) is demanded by the governments, ESR is related to managing investment risks, and corporate governance (CG) will bolster long-term shareholder value.

(continued)

Table 2.1 (continued)

Author	Characteristics of the type of research on the influence of ESG factors
Sherwood and Pollard (2018)	It shows that integrating ESG emerging market equities into institutional portfolios could provide institutional investors with the opportunity for higher returns and lower downside risk than non-ESG equity investments.
Parida and Wang (2018)	It shows that investors perceive top corporate socially responsible funds as relatively safe and invest more in them during a financial crisis.
Kleeman (2018)	The research shows a higher ESG score attracts fund flow.
Uma Rao (2019)	Study suggests analyzing the persisting performance of ESG funds.
Sládková et al. (2021)	It shows that the key barrier in the transitions to sustainable investment is not taking into account the ESG factors.

Source: Own elaboration

financial instrument that is useful and will serve to finance or refinance, in part or full, will allow achieving SDG's goals and the application of green economy principles. Table 2.2 shows the directions of green projects for a sustainable economy that contribute to the achievement of the SDGs.

Table 2.2 shows the types of investments in terms of achieving the SDG's objectives. It is important to distinguish between these "E," "S," and "G" aspects. Current debates focus primarily on the issues of climate change and excessive carbon dioxide emissions. However, non-climate environmental and corporate governance issues cannot be ignored. It can therefore be concluded that we are dealing with an increasingly intense focus on global sustainability issues that has been accompanied by growth in innovative financial product sustainability-themed capital market. It is important for the market to develop and create value, but also to influence environmental changes. In addition, industry, entities, and financial institutions have given growing importance to the disclosure of environmental, social, and governance (ESG) risks, and now these risks are incorporated into their investment analysis and decision-making.

3 Determinants of Changes in Financial Markets Towards Sustainable Business Practices

The capital market ecosystem is expected to contribute to long-term sustainable development, especially changes in the efficient financing of pro-ecological infrastructure, changes in the approach of investors, and undertaking more transparent ecological activities. This means that investors should be well equipped to take into consideration other aspects than purely financial, such as materially relevant environmental, social, and governance (ESG) factors and social responsibility.

Sustainable development is supported by different instruments allowing to direct the economy towards a circular economy. Instruments mitigating the effects of ESG

Table 2.2 The directions of green projects for a sustainable economy towards the SDGs

Type of green projects	ESG investing	The extent of the impact on the SDG's objectives
Renewable energy	(E) – environmental	Goal 7: Affordable and Clean Energy
Energy efficiency	(E) – environmental	Goal 7: Affordable and Clean Energy
Pollution prevention and control	(S) – social + (E) – environmental	Goal 6: Clean Water and Sanitation + Goal 7: Affordable and clean energy + Goal 9: Industry, Innovation and Infrastructure + Goal 14: Life Below Water
Environmentally sustainable management of living natural resources and land use	(G) – governance + (E) – environmental	Goal 6: Clean Water and Sanitation + Goal 12: Responsible Consumption and Production + Goal 14: Life Below Water + Goal 15: Life on Land
Terrestrial and aquatic biodiversity conservation	(E) – environmental	Goal 6: Clean Water and Sanitation
Clean transportation	(E) – environmental	Goal 9: Industry, Innovation and Infrastructure
Sustainable water and wastewater management	(G) – governance + (E) – environmental	GOAL 6: Clean Water and Sanitation + GOAL 12: Responsible Consumption and Production + GOAL 14: Life Below Water
Climate change adaptation	(G) – governance + (E) – environmental	Goal 7: Affordable and Clean Energy + GOAL 12: Responsible Consumption and Production
Eco-efficient and circular economy adapted products, production technologies	(G) – governance + (E) – environmental	Goal 9: Industry, Innovation and Infrastructure + Goal 12: Responsible Consumption and Production + Goal 15: Life on Land
Processes and green buildings	(G) – governance + (E) – environmental + (S) – social	Goal 7: Affordable and Clean Energy+ Goal 9: Industry, Innovation and Infrastructure + Goal 12: Responsible Consumption and Production + Goal 15: Life on Land

Source: Own elaboration

factors are also used, which results in greater responsibility for the environment and people. This means that taken into account in the decision-making process not only impacts on the natural environment, but also the impact of the decision on issues of respect for employee rights, or the impact on the local community.

Sustainable development is supported by various initiatives and with the use of various tools. Running a sustainable economic activity requires taking into account the impact on the natural environment of both economic processes taking place in enterprises or institutions but also respect for employee rights or the impact of economic activity on the local community. Therefore, an important element is the

environmental and social cost of economic activity – not included in traditional business analysis. Moving towards the implementation of the idea of sustainability becomes the basic determinant of changes, which forces not only socially responsible investments or actions, but it forces changes in thinking and acceptance for the occurrence of environmental costs and social-economic activity.

The determinants of change can be seen, on the one hand, in the ethical approach and understanding of the need for climate change, considering ESG risks. The second group of premises is based on the regulatory and supervisory area resulting from the urgent need for countries and regions to face climate challenges. The third groups are related to cooperation all over the world and supporting low- and middle-income countries in the process of climate transformation. In short, to make changes and achieve SDGs, it is necessary to adopt all sources of financing – public and private, national, and multilateral. Figure 2.1 presents three main groups of the determinants of change in financial markets towards sustainable business practices.

The first group of determinants results from an ethical approach. Investors, entities, and markets see the need for targeting. It is worthwhile to direct actions towards sustainable development. This multidimensional initiative, involving numerous entities, takes on an extremely practical dimension, as legal solutions, new instruments and products, and new technological solutions are created. The perception of sustainability is changing not only by enterprises interested in the capital, but the financial market recognizes an important group of clients and investors who want to invest and conduct business with "green capital" in mind. This means changing the priority list and reversing the preferences. The priority is sustainability and limiting the effects of ESG risks, and only then are quantitative economic measures taken into account. Kleeman (2018) showed that a higher ESG score attracts fund flow. A

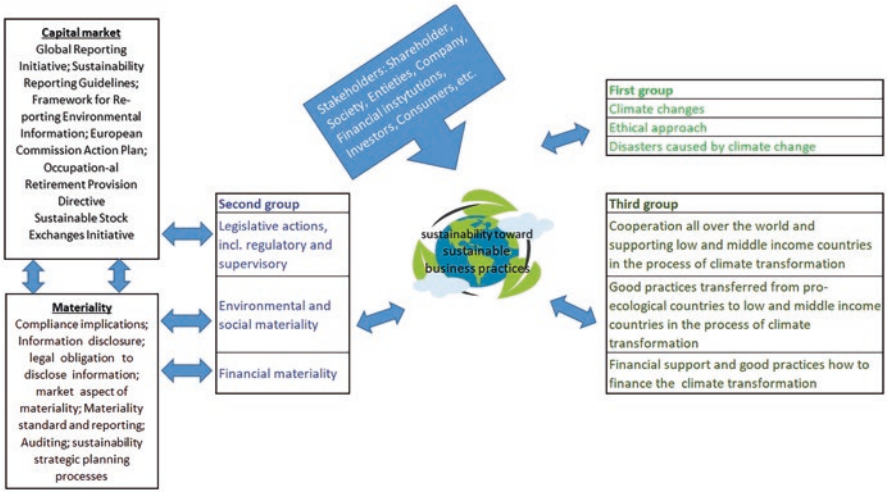

Fig. 2.1 Three basic groups of the determinants of change in financial markets towards sustainable business practices. (Source: own elaboration)

trade-off between sustainability and performance financial arises, as demonstrated by Gantchev et al. (2021).

Financial markets notice changes in the attitudes of their clients, enterprises, institutions, banks, and investors. Stakeholders but also clients of financial markets recognize that climate change is currently affecting and will affect us in various ways (through greater air pollution, ocean acidification, or flooded houses and fields). Pollution makes it difficult to run a business and has costs, related to economic losses, that are relatively easy to quantify in monetary terms. However, other costs are much more difficult to quantify. On the one hand, cost motives are a factor of change, but on the other hand, business ethics and acting following the idea of sustainability become the basis for the correction of business models. In conclusion, understanding actions for sustainability not only supports actions but builds awareness of the need to make changes towards social responsibility and sustainability.

Market participants, having ethical motives related to sustainability, also want to conduct transactions in financial markets with this idea. Financial markets face the prospect of sustainable finance. There is a rapid shift in the rules and principles of operation in the markets, which is a mainstream business strategy. In financial markets, a swathe of public and private sector initiatives are underway to better elucidate the "sustainable characteristics" of firms' business activity, capital raising, and impact on sustainability goals. Environmental factors such as climate change and biodiversity lead to the emergence of these initiatives and the emergence of new financial instruments. However, COVID-19-related developments have pushed for greater inclusion of social and corporate governance factors (AFMA, 2021).

The second group of premises is based on the regulatory and supervisory, which is the result of actions by governments, regions, and international actions. The great regulatory importance results from the Paris Agreement, the UN's 2030 Agenda for Sustainable Development and European Green Deal. Given globalization, the regulatory actions of the European Union are important for financial markets, investors, entities, and banks. Understanding the emerging regulations and actions for the climate while respecting national regulations, the most important regulators and supervisory provisions that affect entities operating in the EU market will be discussed below. This choice was dictated by the idea of achieving SDG 17 – Partnerships to achieve the goal. SDG 17 postulates, inter alia, international support to developing countries, to improve domestic capacity for implementation of sustainability rules. For this reason, EU regulations were indicated as good practices for other countries in implementing the idea of sustainability in financial markets.

An important document for financial markets and investors that requires not only attention but also changes in business models is the "Strategy for Financing Transition to a Sustainable Economy" (the EU's sustainable finance strategy) (Strategy, 2021). It aims to align all funding sources – public and private, national, and multilateral so that the SDGs can be achieved, and climate change is financed. The framework for sustainable finance can make it easier for governments to raise sustainable capital to finance the transition to a sustainable economy and achieving SDGs. As the scale of investment required is well beyond the capacity of the public

budgets, the main task is to channel private financial flows into relevant sustainable economic activities.

The first Sustainable Growth Finance Action Plan with an impact on financial markets and business models of actors was implemented in 2018 and included three key elements of the Sustainable Finance Framework (COM, 2018). These elements are (Regulation, 2020):

1. A classification system, or "taxonomy," of sustainable activities – aims to provide a robust, science-based classification system, allowing non-financial and financial companies to use the same terminology and to counteract abuse caused by differences in terminology.
2. A disclosure framework for non-financial and financial companies – aims to provide investors with information to make informed sustainable investment decisions. Disclosure requirements include the impact of a company's activities on the environment and society, as well as the business and financial risks faced by a company due to its sustainability exposures.
3. Investment tools, including benchmarks, standards, and labels, aim to make it easier for financial market participants to align their investment strategies with the EU's.

The implementation of the plan on financing sustainable growth brought many benefits, but led to the diagnosis of further activities that are needed to meet the sustainability goals has evolved. The result was the development and adoption in 2021 of the EU's sustainable finance strategy. The strategy identifies four main areas, such as (Strategy, 2021):

1. Financing the transition of the real economy towards sustainability
2. Towards a more inclusive sustainable finance framework
3. Improving the financial sector's resilience and contribution to sustainability: the double materiality perspective
4. Global ambitions

Financing the transition towards the SDG (the first area of strategy) is based on permitting different routes and different business strategies. The SDG's goals implementation of requires unprecedented efforts to mitigate and adapt to climate change, rebuild natural capital and strengthen resilience and wider social capital, all as part of sustainable recovery from the COVID-19 crisis. Table 2.3 presents the proposed list of activities within this area.

The second area of "Towards a more inclusive sustainable finance framework" consists of activities involving financial market participants in activities aimed at understanding and increasing the possibilities of sustainable financing. The following types of activities will be carried out in this area (Strategy, 2021):

1. Empowering retail investors and SMEs to access sustainable finance opportunities
2. Leveraging the opportunities digital technologies offer for sustainable finance
3. Insurance: offering greater protection from climate and environmental risks
4. Supporting credible social investments

Table 2.3 The proposed list in of activities in the first area of EU's sustainable finance strategy

Type of activity the Commission UE and governments of EU countries	Characteristics/type of activities covered by the strategy	Challenges and directions of changes for the financial market
Legislative activity, financial support	Supporting investment flows towards economic activities	New supportive framework
Legislative activity	Refining and developing the current framework to better recognize investments for intermediary steps on the pathway towards sustainability	Companies, issuers, and investors can use the EU taxonomy, but they need to prepare for an extension of this taxonomy
Legislative activity, financial support	Proposing legislation to recognize and support the financing of certain economic activities	Better position on financial markets of the energy sector and other climate-neutral industries (positioning of industries)
Legislative activity	An extension of the taxonomy framework beyond environmentally sustainable activities to possibly recognize activities with an intermediate level of environmental performance	Adjustment activities of entities operating in the financial market
Legislative activity	Further work on extending the taxonomy, in particular, the adoption of a complementary EU Taxonomy Climate Delegated Act activities not yet covered in the first EU Taxonomy Climate Delegated Act, such as agriculture and certain energy sectors, in line with the requirements of the Taxonomy Regulation	Facilitating additional capital flows; channel finance to companies, issuers, and investors as they transition towards more sustainable activities and business models
Legislative activity, organizational activities	Commission UE will consider options for an extension of the taxonomy framework beyond environmentally sustainable activities to possibly recognize activities with an intermediate level of environmental performance	Striving to boost transparency and mobilize finance for economic activities that are on a credible pathway towards sustainability while taking into account social aspects
Organizational activities	The general framework for labels for financial instruments	Clarity, transparency, and coherence to sustainable finance markets

Source: Own elaboration

The role of the financial market is to promote and involve entities to co-create the sustainable finance framework. It is about the emergence of new investors but also about the market's use of access channels based on digitization. It is also necessary to build a market for protection from climate and environmental risks but taking into account the ESG risk.

Under the third area "Improving the financial sector's resilience and contribution to sustainability: the double materiality perspective," the financial sector and financial markets themselves will need to be more resilient to the risks posed by climate change and environmental degradation and also improve its contribution to sustainability. To ensure stability, it is imperative that financial markets take into account and integrate financially material sustainability risks (outside-in) and took into account sustainability impacts (inside-out) in financial decision-making processes. The main activities that are determined by the strategy in front of financial markets are enhancing economic and financial resilience to sustainability risks, reflecting sustainability risks in financial reporting standards and accounting, and improving transparency of ratings and rating outlooks (Strategy, 2021).

This area also includes the management of sustainability risks by financial institutions. Financial institutions should disclose their sustainability transition and decarbonization plans. The challenge for financial market actors is to show, in the medium and long term, how they plan to reduce their environmental footprint. A significant action will also be clarifying the fiduciary duties and stewardship rules of investors to reflect the financial sector's contribution to realizing SDGs. The challenge for the financial market itself is to prevent greenwashing. For financial markets, transparency is important, and above all, preventing the loss of reputation (eliminating reputational risk) (Strategy, 2021).

The fourth area "Fostering global ambition" includes a declaration to create an ambitious and robust international sustainable finance architecture and cooperation on sustainable finance bilaterally and multilaterally. To sum up, it should be stated that the second area of influence plays an important role in introducing changes to financial markets. Challenges are posed by investors (integration and inclusion of SMEs and individual clients), as well as requirements requiring adaptation to sustainability. Reporting and ratings taking into account ESG risk are becoming important. The challenge is to counteract negative phenomena such as "greenwashing," which is of particular importance for the achievement of SDGs. Last but not least, there are further regulatory actions related to the taxonomy (Strategy, 2021).

In addition to the indicated "Strategy for Financing Transition to a Sustainable Economy," important regulations for financial market participants are regulations regarding disclose information, and in particular, the legal obligation to disclose information resulting from Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector, abbreviated as Sustainable Finance Disclosure Regulation (SFDR) (Regulation, 2019).

The lack of information on the risks generated by the investments resulting from the advancing climate change or the point of view of the impact of these investments on the environment or human rights is a huge obstacle hindering the inclusion of ESG issues in the process of making business and investment decisions. The SFDR applies to investment products as well as advisory and portfolio management services and regulates the disclosure obligations of financial market entities. The addressees of this information are clients of these entities – in particular those who

are buyers of their products and investment services. The information disclosed is intended to provide clients with knowledge of how (Regulation, 2019):

- A financial market participant or financial advisor considers ESG issues as a risk to the investment value
- The financial market participant or financial advisor takes into account the effects of investment decisions that may have an impact on, for example, the environment, employee issues, or human rights

Additionally, a financial market participant can create products dedicated to ESG issues, targeted at clients who want to invest responsibly. From the point of view of disclosure procedures, an important element is the term "sustainability risk" which means "an environmental, social or management situation or conditions that, if it occurs, could have an actual or potential material adverse effect on the value of the investment." As already indicated, the scope of disclosures, and thus the scope of information available to an investor in the financial market, is of particular importance in the decision-making process.

The revision of Directive 2014/95 / EU on disclosure of non-financial information and Regulation, 2019/2088 / EU on disclosure of information in the financial services sector are aimed at creating a framework for disclosing information that is comparable, publicly available, reliable (qualitative), and sufficiently detailed (Soone, 2020). From the point of view of the functioning of entities on the market, disclosures become an important decision criterion, also taking into account the place of disclosure of information.

An important aspect of the changes in the reporting process itself is the inclusion of factors of ESG when determining the materiality in an audit. Rereporting can be seen as an attempt to bring improved environmental, social, and governance (ESG) practices to the practice of financial markets. However, this movement to mainstream is hampered by the disconnect between financial and ESG information. Materiality is defined as the amount (financial) or nature of an omission or misstatement (environmental and social) in the financial statement that will influence the judgment of a person relying on the statements to decide on financial market participation (Jebe, 2019). Pursuing the convergence of financial and sustainability factors and disclosure is a step forwards to bringing financial markets towards sustainable business practices.

The third group is related to cooperation all over the world and supporting low- and middle-income countries in the process of climate transformation. Efforts have been made to provide input to climate change in low- and middle-income countries. It is shown that appropriate strategies are fostering cross-sectoral but also cooperation between countries and even between containers. Actions taken should include both civil society, business, governments, foundations, academia, and financial institutions which are needed to ensure well-being within planetary boundaries and leaving no one behind (Stibbe et al., 2020; Arbeiter & Bučar, 2021).

Global and local financial markets are becoming a permanent and key partner for institutions and entities engaged in activities for sustainable development, providing them with financing and supporting the process of risk management related to

investments. They share knowledge, provide solutions, and point to the standards of achieving sustainability. Cooperation and action for sustainability also help financial markets to protect themselves from environmental, social, and governance (ESG) risks and foster market transparency and efficiency. Thereby they are in line with corporate social responsibility, changing business models and helping to change them towards sustainability.

Mattsson (2016) states that it is necessary to bridge the gap between sustainable market policies and financial market practices. Activities in this area will contribute to our understanding of the implications of financial practices for sustainability. On the one hand, it is important to promote and show how financial markets can support and finance climate change; on the other hand, it is necessary to ensure consistency (towards taxonomy) and stability (Amidu & Haruna, 2018a, 2018b). Good practices show the directions of what policies and how rich countries have adapted to implement the idea of sustainability, but they also aim to harmonize the practices of countries highly involved in sustainability with the activities of low- and middle-income countries. Financial products at attractive prices, as well as financial support (non-returnable financial instruments) for low and middle-income countries are extremely important.

4 Sustainable Decision Criteria Adopted by Financial Institutions in the Financial Market

Sustainable decision criteria adopted by financial institutions in the financial market follow several directions and can be included in groups and actions. It should be emphasized that initiatives in this area were taken in the past; however, they were not as strong as since 2018. These earlier initiatives are reflected in the actions currently taken but also result from the increasingly conscious actions of financial institutions for the climate and the inclusion of sustainability in their business models and the impact on the business models of their clients. Directionally, the activities include in particular:

- Climate risk supervisory expectations and recommendations link to the Sustainable Growth Finance Action Plan
- Guidelines on granting loans and their monitoring that implement ESG risk in the credit process, issued by the European Banking Authority
- Reorienting capital flows towards a more sustainable economy, good practices, patterns and procedures
- Climate risk management benchmarks
- Measures/indicators for sustainable decision criteria
- Development of the "Sustainable Finance Disclosure Regulation"

The effect of the first Sustainable Growth Finance Action Plan (Regulation, 2020) was the adoption by the European Central Bank of climate risk regulatory

guidelines, containing supervisory expectations regarding, inter alia, risk management and disclosure. This is a very big step in terms of the commitment of financial institutions and financial markets to take into account climate risk. The ECB formulated 13 points – a recommendation (Flak & Miszczak, 2020; ECB, 2020):

1. Financial institutions, including financial markets, should understand the impact of climate, environmental, and ESG risks on the business environment in which they operate in the short, medium, and long term in order to be able to make informed strategic and business decisions.
2. In the process of formulating and implementing a business strategy, financial institutions operating in financial markets should take into account climate risk, environmental risks and ESG factors that have a significant impact on their business environment in the short, medium, and long term.
3. The management board should take into account climate risk, environmental hazards, and ESG factors in preparing the business strategy, business objectives, and risk management framework and should exercise effective oversight of climate and ESG risks. It should take into account good practices and applicable legal rules.
4. Financial institutions operating in the financial market should take into account climate risk, ESG factors, and environmental threats when determining their risk appetite. Reporting on corporate social responsibility is becoming more and more sensitive, which is of particular importance to potential stakeholders and clients.
5. Financial institutions operating in the financial market should assign responsibility for managing climate risk, ESG risk, and environmental risks in their organizational structures, in line with the three lines of defense model (IIA, 2013).
6. Financial institutions operating in the financial market, as well as their clients, should internally report aggregated data reflecting their exposure to climate risk and environmental threats, in order to enable decision-making based on appropriate information.
7. Financial institutions operating in the financial market, as well as their clients, should consider climate risk, ESG risks, and environmental risks as factors influencing already existing risk categories in their risk management systems. Institutions and entities are expected to identify and quantify these risks as part of the capital adequacy process.
8. As part of credit risk management, financial institutions, including banks, should take into account climate risk, ESG risk, and environmental risks at all stages of the credit process and monitor this risk in their portfolios.
9. Financial institutions operating in the financial market should analyze how climate events may have a negative impact on business continuity and to what extent the specific nature of the institution's activities may increase the reputational risk and/or liability of the institution. Institutions are encouraged to continuously monitor the impact of ESG factors on their exposure to market risk

and future investments and to develop stress-testing scenarios that take into account climate and environmental risks.
10. Financial institutions should assess the adequacy of current stress tests to take into account climate and ESG risks in the test scenarios.
11. Financial market institutions should assess whether climate risk, ESG risks, and environmental risks could cause cash outflows or the exhaustion of liquidity buffers.
12. For disclosure purposes, financial institutions should publish material at least in line with the document "Communication from the Commission, Guidelines on non-financial reporting: Supplement on reporting climate-related information" (C 209/01, 2019).

The regulations and recommendations aim to check the resilience of the business models of financial institutions operating on financial markets, to estimate the amount of risk incurred (in particular, climate and ESG risks), and to determine how climate risk affects the capital position of the institution. Table 2.4 shows examples of the relationship between climate and ESG risk and "traditional" types of risk analyzed by financial institutions.

Table 2.4 Examples of the relationship between climate and ESG risk and "traditional" types of risk

Type of risk – "traditional approach"	Climatic risk and the influence of ESG factors	
	Physical risk	Risk of transition
Credit risk	Decrease in the value of collateral in areas subject to climate risk, in particular, the risk related to the occurrence of natural disasters or floods	New technologies, green innovation, and greening regulations cause changes in customer preferences and transform sectors, which increases the likelihood of default
	An increase in the Probability of Default (PD) and Loss Given Definition (LGD) parameters for exposures operating in sectors and locations exposed to the impact of physical risk	Requirements in the scope of environmental standards (especially in the energy sector) require high capital expenditure and result in a decrease in profitability
Market risk	Extreme weather events destroy crops, resulting in higher commodity prices for consumer goods	The emergence of stranded assets, the decline in the value of unprofitable enterprises and the volatility of stock prices
	Extreme weather events cause problems with meeting the deadlines for infrastructure investments, which causes losses and numerous penalties that may lead to default and bankruptcy	Fluctuations in stock quotes
Other types of risk	An increase in the frequency of extreme weather events	Pressure on financial institutions to withdraw from brown projects, the emergence of concentration risk

Source: Own elaboration on Flak (2020)

The European Banking Authority has finalized the loan granting and monitoring guidelines that implement ESG risk in the credit process (EBA, 2020). These guidelines make it possible to assess the borrower's exposure to ESG factors, in particular those related to climate risk and environmental threats. Mainstreaming climate risk into key areas of financial institutions' business, such as business strategy, organizational structure, risk management, and disclosure, puts an equation in practice between climate risk and "traditional" risks.

Despite measures taken by some financial institutions to manage climate risk, it seems that the market is not ready yet to meet the ambitious goals set by regulators. Research on the degree of implementation of climate and ESG risks by financial institutions carried out by the Institute of International Finance and Ernst and Young (Flak, 2020) showed that so far only every third bank has quantified the impact of climate risk on credit exposures, and every fourth bank included them in scenario analyses for stress tests. The main limitations of financial institutions indicate, inter alia, the lack of market standards in terms of the methodologies and tools used to measure climate risk, limited access to data, and insufficient resources within the organization.

Although regulatory actions show a clear path for financial institutions to adapt to sustainability and support climate action, adaptation actions in financial institutions are not so fast. It is necessary to indicate the so-called good practices, but most of all showing patterns and procedures. One of the key actions taken by financial institutions is reorienting capital flows towards a more sustainable economy. Reorienting capital flows towards a more sustainable economy is based on the activities indicated in Table 2.5 and patterns regarding climate risk management. Reorienting capital flows towards a more sustainable economy is an action based on the introduced climate regulations, eliminating the impact of ESG risks and taking into account the assumptions of SDGs.

Another group of activities influencing sustainable decision criteria is aimed at developing the climate risk management benchmarks, in particular procedures, stages, and implementation of measures as well as taxonomy. The benchmarks for climate risk management in financial institutions are based on the assumption of risk exposure characteristics and recognition of the degree of advancement of previously undertaken actions. Climate risk management activities take place in several stages. The number of stages depends on the approach and division of work, the level of detail of the approach, or management style. The general scope of the individual stages can be summarized as follows (Report, 2020; EBA, 2021; Schuller, 2021):

- Stage 1: Activities are aimed at identifying risk sources and conducting benchmarking of preparation of a financial institution against other institutions. The effect of this benchmarking is to enable the efficient allocation of resources to the most urgent areas.
- Stage 2: This requires the development of quantitative models for the identified major risk sources. The purpose of these models is to estimate the impact of risk sources on a financial institution considering both physical and transition risks.

Table 2.5 Reorienting capital flows towards a more sustainable economy

Type of activities	Range of activities	Reorienting
Taxonomy Regulation for climate change mitigation	Establishing a clear and detailed EU taxonomy, a classification system for sustainable activities Taxonomy concerns in particular: climate change objectives, sustainable use and protection of water and marine resources, circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems Actions to cover the taxonomy of all activities and industries	Legal regulations will be undertaken by the end of 2021 Activities aimed at disseminating taxonomy Good practices regarding the implementation of the taxonomy
Green Bond Standard	Creating a Green Bond Standard and labels for green financial products The extension of the Ecolabel framework to financial products	Legislative and conceptual work should be completed in Q3 2021 Implementation and adaptation activities
Investment in sustainable projects	There is a combination of sustainable finance frameworks and tools towards climate investment The aim of the activities is support four policy areas through funding, technical support and assistance, and bringing together investors and project promoters: sustainable infrastructure; research, innovation and digitization; small and medium-sized businesses; and social	Sustainable Europe Investment Plan InvestEU
Incorporating sustainability in financial advice	Activities to include investment advisers and insurance distributors sustainability factors in the activity The integration of the sustainability risks into organizational requirements, risk management procedures, and product governance has taken place	Legislative acting The delegated act
Developing sustainability benchmarks	Elaboration of a regulation amending the benchmark regulation; revision of existing indicators creates a new category of benchmarks comprising low-carbon and positive carbon impact benchmarks, which will provide investors with better information on the carbon footprint of their investments	The regulation The delegated acts Activity was realized to mid-2020

Source: Own elaboration

- Phase 3: The work of this phase seeks to establish how the financial institution can quantify climate risk. It also becomes necessary to understand how climate events affect economic processes where they occur and the situation of a financial institution.
- Stage 4: This involves the development of appropriate procedures and processes to locate climate risk in the risk management structure and business strategy of the financial institution. Actions required to be taken include, inter alia, taking ESG into the existing risk management system and developing a monitoring and reporting plan.

- Stage 5: This aims to place the risk on a strategic level, including business decisions, pricing policy, scoring models, and building a long-term ESG strategy based on transparent communication with shareholders and the market.

There are different approaches to the process of climate risk management by financial institutions. The approach will depend on the markets in which financial institutions operate and the experience of these institutions. Known recommendations in terms of procedures, good practice, or guidelines are Ernst and Young, or The Engagement Policy section developed by Tages SGR, which is a signatory of the UN Principles for Responsible Investment (PRI).

Another important element on the way to sustainable decision-making by financial institutions and their clients is the adoption and implementation of measures/indicators for sustainable decision criteria. An important factor for decisions made by financial institutions towards sustainability is the Green Asset Ratio (GAR). The GAR shows the proportion of assets that are environmentally friendly and that significantly contribute to climate change mitigation or adaptation goals or that enable other activities to achieve these goals. It is an important decision criterion in determining the strategy so that the financial institution can change its activities over time to a greener one (EBA, 2021; Schuller, 2021).

Measures/indicators (like GAR) are of particular importance for decision-making towards a sustainable investment (Regulation, 2019). The new rules on the disclosure of information related to sustainability in the financial services sector aim to achieve greater transparency on how to analyze the sustainability risks that arise from the activities of financial market participants and financial advisers (Regulation, 2019). Table 2.6 presents a summary of quantitative and qualitative information on disclosures.

The regulation indicates that new disclosures should cover at least five elements (Regulation, 2019; Deloitte, 2020; Mirgos, 2021):

1. Information on the adopted strategy regarding the risk for sustainable development in making investment decisions (SR, sustainability risks), including a description of the method for listing risks and prioritizing the main adverse effects on sustainable development and indicators; a description of the main adverse effects on sustainable development and any action taken against them; and information on compliance with responsible business conduct codes and internationally recognized standards of due diligence and reporting.
2. Disclosures regarding the negative impact of investment decisions made on the factors of sustainable development (ASI – adverse sustainability impacts).
3. Information on the remuneration policy, in terms of including information on how to ensure consistency of these policies with the introduction of risks for sustainable development into the business.
4. A financial market participant (financial institution) may also create products dedicated to ESG factors, which will be addressed to clients who want to invest in a responsible and sustainable manner.

Table 2.6 Summary of quantitative and qualitative information on disclosures

The scope of disclosures	Quantitative and qualitative information
Quantitative disclosures of transition risk	
Climate risk–transition risk: quality of exposure by sector	Exposures broken down by sector, including served and non-performing, stage 2 exposures, exposures to entities exempt from the EU Paris-aligned benchmarks, etc. Exposures by economy sector and maturity band
Climate risk–transition risk: maturity ranges – exposures by sector	Up to 5 years 5–10 years 10–20 years Over 20 years of age No maturity specified Weighted average maturity
Climate risk–transition risk: loans secured on real estate – energy efficiency of collaterals	Exposures according to collateral in the form of real estate with different levels of energy efficiency according to EPC standards (energy efficiency certificate)
Climate risk–transition risk: measures	The fair value of exposures to each of the sectors listed in the formula Relative CO2 emissions of exposures by sector, expressed as a sector-specific measure as defined in the template Deviation from the Sustainable Development Scenario of the International Energy Agency (IEA)
Climate risk–transition risk: trading portfolio	Exposures by economic sector, including exposures to entities exempt from the EU Paris-aligned benchmarks
Quantitative disclosures of physical risk	
Exposures exposed to climate risk–physical risk	Selection of the disclosure variant: simplified or advanced Disclosures should cover the following as a minimum: exposures by sector, including exposures to the chronic effects of climate change, exposures vulnerable to severe climate change, including serviced exposures, stage 2 exposures, and non-performing exposures
Assets for the purpose of calculating the Green Asset Ratio (GAR)	Gross exposure value broken down by the following environmental objectives: climate change mitigation and climate change adaptation. For each objective, indicate the value of environmentally sustainable exposures broken down into specialized financing, support activities, and transition activities
Green Asset Ratio (GAR) KPIs	Information on the percentage of activities of the institution (i.e., gross carrying amount of loans, debt securities, and equity instruments in their banking book) that finance environmentally sustainable activities
Other measures to mitigate the risk of climate change	Qualitative information on the nature of mitigation measures, including the type of climate risk, type of counterparty, and financial instrument

Source: Own elaboration on: Flak and Rocka (2021), Disclosures (2021)

5. Information obligations have been introduced, which a financial market participant has to fulfill when they offer "dark green" products (financial products aimed at sustainable investments) or "light green" products (products promoting, inter alia, the environmental or social aspect, or both of these aspects).

Sustainable development activities, by taking active initiative, establishing treading, and establishing decision-making law, equalizing activity as well as good practices, are becoming an important element of changes in the business models of financial institutions operating on financial markets. Through targeted actions, financial institutions not only become participants of changes but also they create them. Financial institutions motivate their stakeholders and clients to behave and run their business more sustainably. There is a need for cooperation between financial institutions, stakeholders, and clients, as well as for supporting them with good practices. An important element of cooperation is initiatives aimed at reducing and monitoring the impact of ESG risk and the impact of ESG factors on other risk types to which institutions are exposed.

5 Conclusions

The question of whether the financial markets are a key factor to make companies work towards becoming more sustainable is still difficult to answer. Based on the presented facts and the example of the European Union countries, it can be indicated that financial markets become a factor that motivates to change behavior, business strategies, or investment directions. An important factor is the willingness to make changes, consistency in actions, and striving to improve the already existing solutions. The EU's sustainable finance strategy is such a challenge. It is of great importance as it combines the tasks of governments and financial markets. The idea is to cooperate, so it can be concluded that there is a real possibility, with the support of the governments of the EU member states, for financial markets to foster and facilitate more sustainable business practices. If financial markets influence the behavior of their clients, most of them will try to consider changes in their business models imposed by financial markets. It should be stated that the EU's sustainable finance strategy and the existing solutions (even those in the implementation phase) enforce (step by step) a real shift towards more sustainable business practices.

Taking into account climate change, it is not only necessary but even necessary for financial markets and financial institutions to actively engage in stimulating changes in their clients' business models. It is very difficult to discuss the degree of interference in these activities. Without multidirectional impact for change, without interacting with all stakeholders (especially customers), the actions towards sustainability may not be highly effective. The existing solutions in the field of decision-making criteria have an impact on the risk assessment process by financial institutions on business decisions. These solutions lead, as a consequence to building new value in the form of a sustainable business model, both in financial institutions and in redefining the business models of financial market clients.

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Chapter 3
Corporate Sustainability and Value Creation: A Perspective of Companies and the Financial Market

Iwona Bąk and Katarzyna Cheba

Abstract This chapter discusses new approaches presented in the literature to creating sustainable shareholder value that requires companies and investors to adopt a systemic and long-term vision and to understand the financial significance of economic, social and governance (ESG) factors of threats and opportunities. The chapter is based on a literature review and comparative analysis. In the analyses, contingency tables showing the distribution of observations focused on several features at the same time were also applied. These tables provided the basis for calculating the strength of relations between the analysed research areas (represented by a particular feature). The research results confirm the existence of the relations between corporate sustainability and ESG factors (including an evaluation of ESG risk), sustainable business model and sustainable value creation.

1 Introduction

The term 'corporate sustainability' (CS) has been defined in many ways in the subject literature (Lozano, 2018; Dentchev et al., 2018; Zioło et al., 2020). According to IISD (1992), it means adapting business strategies in a way which satisfies the current needs of the company and its stakeholders while maintaining and protecting social and environmental resources necessary in future, and a similar definition was offered by Dyllick and Hockerts (2002). Most authors point out that implementing the concept of sustainable development by companies is also connected with the realisation of economic and social objectives, as well as with caring for the natural

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environment (Buxel et al., 2015; Misztal, 2019). These objectives were defined in the subject literature using the so-called ESG factors:

1. Environmental – such as climate change impacts, water, waste, air quality and air pollution
2. Social – such as human rights, child labour, diversity, freedom of association and consumer protection
3. Governance – such as employee relations, executive compensation and board and management structures

Lozano (2012) defines CS as 'the activities of companies that actively contribute to a balance in economic, social and environmental dimensions in all aspects and dimensions (past, present and future) while taking into account the company's system and its stakeholders)'. According to Krechovská and Prochazkova (2014), CS 'is understood as the ability of a company, through its governance practices and market presence, to positively influence ecosystems (improving natural resources, reducing pollution levels, etc.), society (supporting local populations, creating employment etc.) and economic development (distributing wealth through dividends, paying fair salaries, respecting supplier payment obligations etc.)'. In general, CS means conducting a business activity aimed at obtaining the principal economic objectives of a company, but in conjunction with caring about the social and environmental aspects of its functioning (Camilleri, 2017). Applying the principles of sustainable development enables the company to gain a competitive advantage and increase its market share (Dvořáková & Zborková, 2013; Grabara et al., 2015). The plethora of analogies to the general definition of sustainable development is given in the Brundtland Report (WCED, 1987), describing it as 'meeting the needs of a firm's direct and indirect stakeholders (such as shareholders, employees, clients, pressure groups, communities, etc.), without compromising its ability to meet the needs of future stakeholders as well' (Dyllick & Hockerts, 2002). These definitions suggest that the realisation of the financial goals of a company should also take into consideration the social and environmental aspects. Such an approach to running a business is based on sustainable production, aimed at optimising the processes involved, for example, by reducing the use of energy and resources and by care to create the appropriate working conditions which comply with the current legal regulations. The level of corporate sustainability is affected by numerous and varied factors, which, even though are connected, can also be grouped as follows (Niedźwiedzińska & Kowalska, 2019):

- External – comprising macroeconomic conditions, directions of development of the policy of environmental protection, funds supporting activities oriented at the protection of natural resources from funds, social awareness, the level of companies' competitiveness, the level of research development, expenditure on innovative activity
- Internal – connected with economic conditions, investment plans, the implemented strategy of the development and business model, the acceptance of including environmental and social aspects in the current business activities of a company, as well as the risk connected with reporting on the ESG factors (economic, social and governance risk).

Lozano (2018) also noted that 'the business model is affected by the company's resources (tangible and intangible), the supply chain and the company's stakeholders (internal, interconnecting and external), including the environment (inside and outside the company)'.

This chapter mainly focused on the internal factors influencing the sustainable development of companies. These factors are more difficult to study as they are strongly dependent on the specific conditions of individual enterprises. They are more difficult to systematise and generalise to the entire population of enterprises. The main aim was to examine the relations linking corporate sustainability with other terms used in the subject literature to describe this relatively new area of research. The in-depth exploration of this issue will allow for its better understanding and possibly indicate new strands of research.

2 Development of Companies Towards Creating Sustainable Value

A turbulent and often unstable market environment brings the need for the companies functioning in it to search for the most effective and efficient business solutions which would guarantee achieving competitive advantage (Zec et al., 2015; Nwabueze & Mileski, 2018). Companies, in order to become distinguishable on the market, have to build their unique business models as well as implement them via dynamically realised strategies (Coda & Mollona, 2006). They are also aware that a similar approach to business is also often favoured by their competitors (Jabłoński, 2012). The realisation of a model of corporate sustainability is carried out by combining the principles of corporate social responsibility (CSR) and those of sustainable value creation (SVC) (Baumgartner, 2014). According to Sheehy and Camilleri (2021), corporate sustainability is a concept that is significantly different from CSR. Like CSR, corporate sustainability accepts the view that companies have a wider responsibility beyond profit, wherein corporate sustainability is a much more recent concept that is ingrained in environmental and global policy. Following Sjåfjell and Richardson (2015), businesses must change their methods of production as part of a larger change society must have with respect to its relationship with the environment. Natomiast CSR is 'form of international soft law directing business behaviour to align with global norms touching on social and environmental practices as well as corporate governance' (Sheehy & Camilleri, 2021).

Sustainable development is of particular importance in the era of the changes occurring in global economies and in connection with climate change and its negative impact on the functioning of societies (Misztal, 2019). It is of paramount importance that actions supporting sustainable development on both micro- and macroeconomic levels are being undertaken (Pieloch-Babiarz et al., 2021). This has been acknowledged by an increasing number of business leaders who have acknowledged that business and society are inseparably bound together and that business objectives can be intertwined with social aims (Gasiński & Pijanowski, 2009). The evaluation of the degree to which a company's business activity has a sustainable

character is complicated, due to the complexity of relations and the difficulty of their direct measurement (Parris & Kates, 2003).

ESG factors are now recognised as key in the measurement of non-financial impact of a company on its stakeholders (Przychodzen et al., 2016; Shakil, 2021). Research has also shown that including ESG factors in a corporate strategy can have a positive influence on its financial results, increase its competitive advantage, lower operational risk and also help in raising funds (Friede et al., 2015; Fatemi et al., 2018; Vinodkumar & Alarifi, 2020). In unstable capital markets around the world, the capacity of corporate business models to adapt to changes in their economic environment requires the inclusion of reporting ESG by external stakeholders (Fahrurrazi, 2018). It is observe a growing demand for reports and analyses of ESG on the part of external stakeholders, such as the stock market, investors, financial analysts and corporations because they constitute a leverage in the compromise regarding return on risk and sustainable development (Risklab, 2010). ESG criteria have been gaining in importance in financial markets (Zhang et al., 2020). In EU countries, the obligation to prepare non-financial reports has been in force since 2017 (Arvidsson & Dumay, 2021). This obligation also applies to SHRD II for asset managers. Companies that want to attract long-term investors should focus on sustainable development and reporting non-financial data (Krištofík et al., 2016). For their stakeholders, this constitutes a reliable source of information about their financial condition, development plans and impact on employee issues (Tunio et al., 2021).

Applying ESG criteria can be beneficial not only for large corporations but also small private firms. According to the IFB Research Foundation (IFB, 2012), the relation between company assets and creating long-term value constitutes company strategy. According to the opinion formulated by the authors of this publication, there are four keys to creating sustainable value, which must be considered by every company and adapted to its own situation. These were drawn from the experience of companies which operate on the borderline or close to the borderline of business results in creating sustainable value, including both family and non-family firms:

1. Resource efficiency, including the utilisation of natural capital and other resources
2. Employee relations and the development of human capital
3. Engagement with public forums and governments on sustainability issues
4. The interplay between long-term objectives and short-term performance (Kurznack et al., 2021)

A significant problem connected with the functioning of companies is to determine the point when a particular company activity can be considered as being sustainable. Most authors define corporate sustainability as a combination of economic, social and environmental aspects that ensures the sustainable operation of the enterprise (Hart & Milstein, 2003; Posłuszny, 2017). Designing an efficient and effective system of functioning oriented at increasing company value is one of the priorities of a company managed with the use of modern methods. However, the creation of company value is not an easy task, and many businesses experience serious difficulties in perceiving the appropriate sources of its construction. The IFB Research

Foundation (IFB, 2012), bearing in mind the dimensions of sustainable development, defined the creation of sustainable value (SVC) as: 'the behaviours and actions of an organisation across multiple financial and non-financial dimensions in order to manage the risks and opportunities associated with economic, environmental and social developments'. The novelty in this area is the way in which they analyse different types of capital used by the company to create value and the methods used to keep and build up its resources. According to Richardson (2008), the proposition of value corresponds to the question: What can the company offer to its customers and why would they want to pay for it? The value proposition provides the grounds for the basic strategy of attracting customers and obtaining competitive advantage. In turn, Osterwalder and Pigneur (2012) suggested that this category 'describes a set of products and services which generate value for the individual segments of customers', and it constitutes the reason why the customers value the products and services offered by a given company higher than those offered by the competition. Value is an indispensable component and a guideline for the concept of a business model (Bocken et al., 2014). New business models within the perspective of sustainability take in synchronisation of a number of values (economic, social and environmental) and are anchored together with all aspects of the multiple values (Šimberová & Kita, 2020). The research regarding relations between various factors and company value is at the core of discussions taking place at the level of companies themselves and between scientists. In the subject literature (Schramade, 2016; Liu et al., 2019; Kurznack et al., 2021), the debate is mostly focused on indicating which factors have the strongest (significant) influence on the value of a company. Experts from Grant Thornton, the world's leading auditing-advisory consultancy, listed the following factors impacting on company value (Bednarski, 2014):

- A business model: Strong, tested and possible to implement business models contribute to the reduction of risk in the conducted activity and – in consequence – to the increase of company value.
- Unique assets/intellectual property: Organisations with a well-established brand, patents and/or their own technologies and unique processes can use them to increase their business value.
- Proposition of value: The unique value proposition offered to clients differentiates the company from its competitors.
- Market factors: Company value is also influenced by the industry/sector in which the company operates, its ability to compete effectively with others and increase its market share.
- Company history: Company value depends on its history of growth, sales and profitability. It also changes depending on the financial flows within the company and its profit margin in relation to other companies in the same industry/sector.
- Management staff and systems: Effective management systems as well as expert and dedicated management are key elements impacting on company value.

3 Empirical Material and Methods

Systematic literature research is an extension of the literature review presented in the previous part of the work. For this purpose, a three-stage research procedure was used in the study, including analysis of the content of publications, carried out with application of Voswiever software, quantitive analysis using statistical methods, and an in-depth analysis of the publications' content.

3.1 Stages in the Employed Research Procedure

The procedure used in the chapter to answer the research questions covers several stages. The flowchart of the procedure developed for the literature review is presented in Fig. 3.1.

Stage 1 of the conducted research involved the bibliographic examination of the publications listed in one of the most known databases: Web of Science (WOS) in the last 10 years (2011–2021). Its aim was to create the initial database comprising publications whose title, abstract and keywords include references to the term 'corporate sustainability'. At this stage, the authors also searched for those keywords which in the literature are most frequently linked with that term, and their combination served to create the final database. In Stage 2, the created database was used to carry out quantitative analyses aimed at the assessment of the strength of relations occurring between the identified keywords. Stage 3 was dedicated to the in-depth analysis of the content of these publications in order to further explore and identify the ways and scope of conducting research on corporate sustainability.

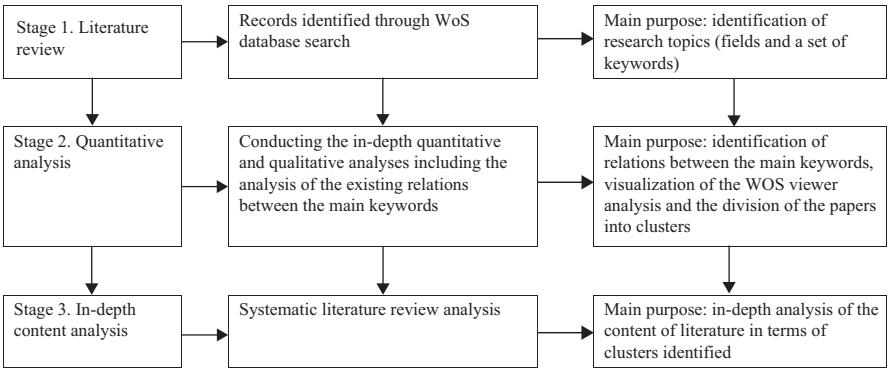

Fig. 3.1 Systematic literature review flowchart. (Source: own elaboration)

3.2 Literature Review: Identification of Keywords

The result of the review of papers which in their title, abstract and keywords refer to the term 'corporate social responsibility' is the database comprising over 34.5 thousand publications. While publications referring to the term 'corporate sustainability' are less frequent, the Web of Science database contains nearly 3000 works of this type. Their analysis suggests that the following keywords are most frequently used to describe corporate sustainability: ESG [factors] (including evaluation of ESG), sustainable value creation and sustainable business model. Table 3.1 presents the results of Stage 1, starting from the frequency of citing the selected keywords but taken separately, followed by the search in the created database regarding their combinations.

In total, the authors identified in the WOS database 135 publications which included in their title, abstract and keywords the references to the term 'corporate sustainability' and other keywords selected for the research. The evolution of the number of the publications and citations of these papers is shown in Fig. 3.2.

Figure 3.2 confirms the growing interest in the research on sustainable corporate growth, showing also references to other selected terms, mostly in the last few years. The first publication which made a direct reference to corporate sustainability (marked: corporate sustainab*) appeared in the WOS database back in 1997, while a publication dated 2008 mentioned in its title, keywords and abstract also the other terms. It is worth mentioning here that over 60% of such papers were published in the last 3 years, which may mean the gradual specialisation of the original term and directing research into complementary areas connected with corporate sustainability. It was also noted that the increase of related publications was accompanied by a stable growth in the number of citations, the largest occurring in the last few years, to reach the highest level in 2021 (713).

Despite the growing number of publications and the related citations, the created database is not overly impressive which possibly confirms the limited exploration of the issues from the selected, specialist area of research. It should also be pointed out

Table 3.1 Number of papers identified in the WoS database according to the selected keywords

The combinations of topics	Number of papers
Corporate sustainab*	2894
ESG	2565
Sustainable business model*	1023
Sustainable value creation*	148
Corporate sustainab* AND ESG OR corporate sustainab* AND sustainable value creation* OR corporate sustainab* AND sustainable business model*	135

Source: Own elaboration based on WoS database
*May take various lexigraphic forms

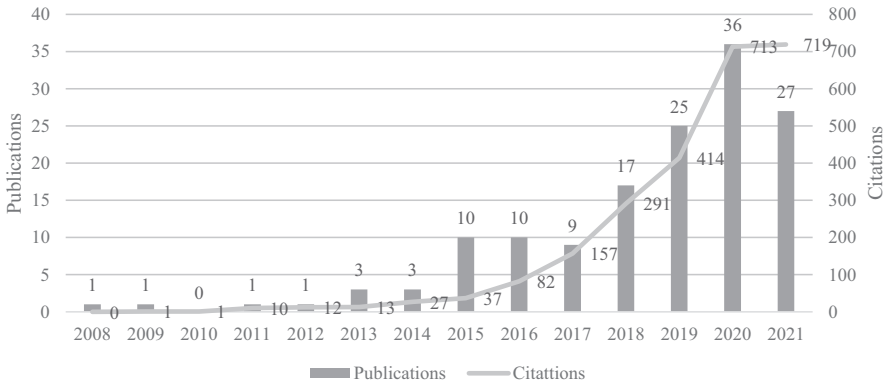

Fig. 3.2 Total publications and citations by year. (Source: Own elaboration)

that the WoS database contains over 6000 articles referring to the individual keywords selected for this study. It was possible to identify 2894 papers that contain in their title, abstract and keywords the term corporate sustainability; 2565, ESG; and 1023, sustainable business model, while only 135 referred to these issues in the proposed setting. The articles included in WoS mostly cover such areas as business economics (85), environmental science ecology (71), science technology (58) and engineering (18). They were published in many specialist journals, among those are *Sustainability*, *Business Strategy and the Environment* and *Journal of Cleaner Production*. The authors of the identified publications are mostly from Italy (18 papers), Great Britain (17), the USA (16) and Spain (13). Table 3.2 provides information about the ten most cited papers.

The in-depth analysis of the publications listed in the Web of Science which make up the final database (135 papers including the combination of the selected keywords) provided the basis for constructing six binary variables with two categories: 'yes' (when the issue was explored in the publication) and 'no' (not explored), respectively, ranked 1 and 0:

X_1 – corporate sustainability (1, if analysed; 0, in other cases)
X_2 – sustainable business model, SBM (1, if analysed; 0, in other cases)
X_3 – ESG (including evaluation of ESG risk; 1, if analysed; 0, in other cases)
X_4 – sustainable value creation, SVC (1, if analysed; 0, in other cases)
X_5 – finance (1, if analysed; 0, in other cases)
X_6 – innovation (1, if analysed; 0, in other cases)
The variables constructed in this way also provided the basis for further analyses which aimed to examine the strength of the connections between them.

Table 3.2 The ten most cited papers

Paper title	Author/year	Journal	Total citations
Conceptualizing a sustainability business model	Stubbs, W; Cocklin, C, 2008	Organization &Environment, 21(2), 103–127	508
Design thinking to enhance the sustainable business modelling process – a workshop based on a value mapping process	Geissdoerfer, M; Bocken, NMP; Hultink, EJ, 2016	Journal of Cleaner Production, 135, 1218–1232	138
Investigating the relationship of sustainable supply chain management with corporate financial performance	Wang, ZH; Sarkis, J, 2013	International Journal of Productivity and Performance Management, 62(8), 871–888	101
A review of corporate sustainability reporting tools (SRTs)	Siew, RYJ, 2015	Journal of Environmental Management, 164180195	97
Corporate sustainable development: Is 'integrated reporting' a legitimation strategy?	Lai, A; Melloni, G; Stacchezzini, R, 2016	Business Strategy and the Environment, 253, 165–177	93
Commitment strategies for sustainability: How business firms can transform trade-offs into win-win outcomes	Beckmann, M; Hielscher, S; Pies, I, 2014	Business Strategy and the Environment, 231, 18–37	78
Do environmental, social, and governance activities improve corporate financial performance?	Xie, J; Nozawa, W; Yagi, M; Fujii, H; Managi, S, 2019	Business Strategy and the Environment, 282, 286–300	71
Sustainable business models, venture typologies, and entrepreneurial ecosystems: a social network perspective	Neumeyer, X; Santos, SC, 2018	Journal of Cleaner Production, 172, 4565–4579	70
Exploring the role of lean thinking in sustainable business practice: a systematic literature review	Caldera, HTS; Desha, C; Dawes, L, 2017	Journal of Cleaner Production, 167, 1546–1565	70
The sustainable business model pattern taxonomy-45 patterns to support sustainability-oriented business model innovation	Ludeke-Freund, F; Carroux, S; Joyce, A; Massa, L; Breuer, H, 2018	Sustainable Production and Consumption, 15, 145–162	68

3.3 Quantitative Analysis: Stage 2

Stage 2 employed contingency tables to identify the relations between papers containing the selected keywords and the dependency measures for qualitative changes. The evaluation of the occurrence and the form of dependence between various phenomena constitutes a key element of statistical analysis, called correlational quantification, aimed at recognising whether there exists co-dependence (correlation)

between the two observed variables. If the correlation is confirmed, then a statistical assessment of the relevance of this correlation is carried out (Młodak, 2020). The measurement theory distinguishes four scales suitable for such analysis: the weakest, nominal, then ordinal, interval and – the strongest of them – ratio scale. Numerous statistical measures exist for each of the scales which allow to make conclusions about the dependence of the variables, whereas in the case of the higher scales, it is also possible to use measures defined for the lower scales. The analysis of dependence between two qualitative variables is based on examining their joint composition, which is most clearly illustrated by a contingency table (cross-way tables), in which the lines correspond to the categories of one variable, while the columns apply to the other; such tables are mostly used in social sciences (Bonett & Price, 2007). The subject of two-dimensional contingency tables was explored by, among others, Yule (1900, 1912), Janson and Vegelius (1982), Gower and Legendre (1986), Krippendorff (1987), Baulieu (1989, 1997), Albatineh et al. (2006), and Matthijs (2008).

In the case of the occurrence of quantitative variables, and in particular ordinal scales, the dependence is measured using the following coefficients: Spearman's R, Kendall's Tau and Gamma. A particular variation of coefficient Gamma (Goodman and Kruskal's) (Zysno, 1997; Stanisz, 2006; Mider & Marcinkowska, 2013; Albatineh et al., 2006; Barbiero & Hitaj, 2020) is Yule's Q coefficient of contingency (association), used as a measure for evaluating association when the data are presented in the form of a 2×2 contingency table. This coefficient also requires similar assumptions and is used when data contain many interlinked observations, i.e. representing the same variant of a characteristic.

The value of Yule's Q coefficient of contingency belongs in the interval $[-1,1]$, while its sign does not indicate a direction of dependence. In order to calculate the coefficient, it is necessary to assemble trial observations into all possible pairs, and next divide them into three possible categories:

- *Compatible pairs* – variables compared within these two observations change in the same direction, i.e. in the first observation they are both are either larger than in the second one, or both are smaller. The number of such pairs per test is marked P.
- *Incompatible pairs* – variables change in the opposite direction, which means that one of them is smaller for this observation in a pair, for which the other one is smaller. The number of such pairs per test is marked Q.
- *Combined pairs* – one of the variables obtains equal values in both observations.

Yule's Q coefficient of contingency is described by the following formula:

$$Q = \frac{P - Q}{P + Q}.$$

The closer the absolute value to 1, the stronger the association between the characteristics. When:

Q equals 0: no association between variables
$Q = 0$ up to ±0.29: very slight association
$Q = -0.30$ up to -0.49 or 0.30 up to 0.49: moderate association between variables
$Q = 0.50$ and 0.69 or -0.50 and -0.69: strong association between variables
$Q > 0.70$ or <-0.70: very strong association

Contingency tables form the basis for the verification of the non-parametric 0 hypothesis, which informs that the selected statistical sample was taken from the general population in which there occurs independence between the examined variables. This means comparing the observed frequencies with those expected when assuming hypothesis 0 (about the absence of association between these two variables). In the test of independence χ^2, the authors formulated hypothesis H_0 and the alternative H_1:

H_0: variables X and Y are independent.
H_1: variables X and Y are dependent.

To verify these hypotheses, the following statistic was used (Bąk et al., 2019):

$$\chi^2 = \sum_{i=1}^{k}\sum_{j=1}^{r}\frac{\left(n_{ij} - \hat{n}_{ij}\right)^2}{\hat{n}_{ij}},$$

where χ^2 is the statistic of chi-square composition with $(k - 1)\cdot(r - 1)$ degrees of freedom, n_{ij} is the empirical partial multiplicities or the number of units with i-th variant of variable X and j-th variant of variable Y and $\hat{n}_{ij}$ is the theoretical partial multiplicities calculated according to the formula

$$\hat{n}_{ij} = \frac{n_{i.}\ n_{.j}}{n},$$

where $n_{i.}$ is the number of units with i-th variant of variable X, $n_{.j}$ is the number of units with j-th variant of variable Y, k is the number of variants of variable X, r is the number of variants of variable Y and n is the multiplicity of the sample.

The verification decision can be made based on the sample probability p, obtained with calculations in the *Statistica* program:

– If $p \leq \alpha$, hypothesis 0 is rejected and the alternative one is assumed.
– If $>\alpha$, there are no grounds for rejecting hypothesis 0.

Out of the analysed 135 publications which regard sustainable companies (see Table 3.3), 125 stress the importance of sustainable business models for companies (Stubbs & Cocklin, 2008; Johanndottir, 2014; Dentchev et al., 2018; van Bommel, 2018; Rotondo et al., 2019; Brozovic, 2020; Paletta et al., 2021; Sanchez-Planelles et al., 2021). The authors also noted that companies around the world are increasingly paying more attention to factors connected to ESG, trying to achieve equilibrium between the company objectives and the expectations of their stakeholders in

Table 3.3 Cross-way table for variables: Corporate sustainability and sustainable business model (SBM)

	SBM	Summary	
Corporate Sustainability	No	Yes	
No	6	4	10
Yes	8	117	125
Summary	14	121	135

Source: Own calculations

Table 3.4 Cross-way table for variables: Corporate sustainability and ESG

	ESG	Summary	
Corporate sustainability	No	Yes	
No	5	5	10
Yes	1	124	125
Summary	6	129	135

Source: Own calculations

ever more complex conditions, which finds its reflection in scientific research (Miralles-Quiros et al., 2018; Iamandi et al., 2019; Taliento et al., 2019; Munoz-Torres et al., 2019; Sharma et al., 2020; Huang, 2021; Rahman & Alsayegh, 2021). As seen in Table 3.4, over 95% of the publications discuss issues connected with ESG factors, at the same time addressing the issues related to corporate sustainability.

Based on the contingency tables, Yule's coefficients were set, and their statistical relevance was examined at the level of relevance at 0.05. It was shown that there is a moderate (0.460), statistically relevant dependence between corporate sustainability and sustainable business model (SBM) functioning in companies. The results show that the variable corporate sustainability is strongly correlated with ESG (0.625).

The literature also emphasises that ESG principles can and should become an integral part of strategies and business models for companies around the world because their implementation not only reflects the general need for sustainable development which is beneficial for all stakeholders but also offers wider possibilities of financing, helps in attracting best staff, finds new and retains the existing markets, as well as ensures the long-term success of the company (Gray & Milne, 2002; Bansal, 2005; Banerjee, 2007; Hahn & Figge, 2011; Florea et al., 2013; Milne & Gray, 2013; Drempetic et al., 2020). The study found a strong (0.634) statistically relevant dependence between the variables SBM and ESG (see Table 3.5).

International research is being conducted to show the relations between running a business in a way respecting sustainable development and the value of companies. As shown in Table 3.6, 87% of the studied articles focused on these issues. Most of the research mainly concerns the more advanced and mature economies, and the results confirm that investors appreciate the active involvement of companies in sustainable development which, in turn, has an impact on improving their value

Table 3.5 Cross-way table for variables: SBM and ESG

	ESG	Summary	
SBM	No	Yes	
No	6	8	14
Yes	0	121	121
Summary	6	129	135

Source: Own calculations

Table 3.6 Cross-way table for variables: Corporate Sustainability and SVC

	SVC	Summary	
Corporate Sustainability	No	Yes	
No	6	4	10
Yes	8	117	125
Summary	14	121	135

Source: Own calculations

(Figge & Hahn, 2004; Berthelot et al., 2012; Buxel et al., 2015; Šimberová et al., 2015; Loh et al., 2017; Evans et al., 2017). Innovation is a factor which facilitates such changes, and an increasing number of publications combines the topic of innovations with that of sustainable companies (Table 3.7). In academic publications, in government documents and in business practice, one can observe the increasingly more frequent appearance of the term 'eco-innovation'. This applies to any innovation which leads to achieving sustainable development through a reduction of the negative impact of production on the environment, the enhancement of nature's resilience to external threats and the responsible use of natural resources (Kożuch, 2017). The variable Corporate Sustainability is moderately correlated with the variable SVC (0.460) and variable Innovation; these are relevant statistical dependencies at the level of relevance 0.05.

When analysing the concept of sustainable business models, it appears natural to determine dependence between the terms SBM and sustainable value creation. The existing literature on the subject of sustainable business models points to the fact that creating value results from resources exchanged in relations between the company and its stakeholders (Norris et al., 2021).

Creating a business model whose core is constituted by the principles of responsibility towards the stakeholders and shareholders in the fulfilment of their needs, together with attaining sustainable corporate value, has now become a significant area in scientific studies, which is reflected by an impressive number of the related publications (Table 3.8). There is a statistically relevant moderate (0.362) dependence between the variables SBM and SVC.

Businesses consider ESG factors as a way to increase the value of the current and potential portfolio companies. They also release a flow of funds allocated to the acquisition of companies which have a notable impact on the defined objectives. The report published by PwC (2021) indicates ESG factors as a driver in creating corporate value. ESG factors are also indicated as the driving force behind the

Table 3.7 Cross-way table for variables: Corporate Sustainability and Innovation

	Innovation	Summary	
Corporate Sustainability	No	Yes	
No	4	6	10
Yes	9	116	125
Summary	13	122	135

Source: Own calculations

Table 3.8 Cross-way table for variables: SBM and SVC

	SVC	Summary	
SBM	No	Yes	
No	6	8	14
Yes	8	113	121
Summary	14	121	135

Source: Own calculations

creation of the company's value. The impact of ESG factors on SVC is the subject of many studies (see Table 3.9), among them: Atan et al. (2018), Ionescu et al. (2019), Kim and Li (2021), and Prall (2021). Yule's *Q* correlation coefficient points to a strong (0.516) statistically relevant dependence between the variables ESG and SVC.

The subject literature emphasises the positive aspects of the influence of ESG factors on building corporate value and the effective management of a company, as well as innovative results (Beloff & Chevallier, 2012; Geissdoerfer et al., 2016; Breuer et al., 2018; Rotondo et al., 2019; Xu et al., 2021; Sanchez-Planelles et al., 2021). Moreover, research on the interactive effects of individual ESG aspects shows that initiatives regarding corporate order play a moderating role in the relation between initiatives concerning the environment and innovative productivity, and in that between social initiatives and innovative productivity (Zhang et al., 2020). Despite the fact that the literature excessively highlights the social consequences of responsible investments and draws too little attention to their financial side (Domańska-Szaruga, 2011), around 88% of the studied publications address the subjects connecting ESG factors (including the evaluation of ESG risk) with innovativeness of companies (see Table 3.10). There is a statistically relevant moderate (0.322) correlation between the variables ESG (including evaluation of ESG risk) and Innovation.

3.4 In-Depth Content Analysis: Stage 3

In the next stage, the authors carried out in-depth analysis of the contents of the publications selected for study. Its aim was to attempt to identify the relations linking the selected keywords with other words used by the authors to describe the

Table 3.9 Cross-way table for variables: ESG (including evaluation of ESG risk) and SVC

	SVC	Summary	
ESG	No	Yes	
No	5	1	6
Yes	9	120	129
Summary	14	121	135

Source: Own calculations

Table 3.10 Cross-way table for variables: ESG (including evaluation of ESG risk) and Innovation

	Innovation	Summary	
ESG	No	Yes	
No	1	5	6
Yes	12	117	129
Summary	13	122	135

Source: Own calculations

conducted research. To examine such relations at this stage of analyses, the authors used VOSviewer software, version 1.6.14, which allowed to identify three clusters containing the following expressions:

1. Cluster 1: Companies, corporate governance, corporate social responsibility, emerging markets, environmental, ESG, ESG performance, firm performance, sustainability reporting, sustainable development
2. Cluster 2: Business models, corporate social responsibility, corporate sustainability, innovation, management, stakeholder theory, sustainable business model (models), value creation
3. Cluster 3: CSR, environment, environmental performance, financial performance, governance, investment, risk, social responsibility, social responsibility investment

The outcome of Stage 3 of the research is shown in Fig. 3.3.

In the first cluster, it is worth noting the links existing between the term ESG and other keywords. Such links were identified only in this cluster, and one can also see here the connections between these terms and expressions referring to companies: firm performance, companies, corporate governance and corporate social responsibility. The indicated words can be found in Raghupathi et al. (2020), drawing attention to the inclusion of the ESG concept in the current activity of companies. The study aimed at measuring the impact of internal sustainability efforts on the performance of individual companies, policies and projects, whereas Xie et al. (2019) investigated the relation between corporate efficiency and corporate sustainability to determine whether firms concerned about environmental, social and governance (ESG) issues can also be efficient and profitable. The research suggests that there is a positive relation between activities undertaken by companies in respect of ESG and the obtained financial results. According to these authors (see Raghupathi et al., 2020; Xie et al., 2019), their findings may provide evidence about the voluntary

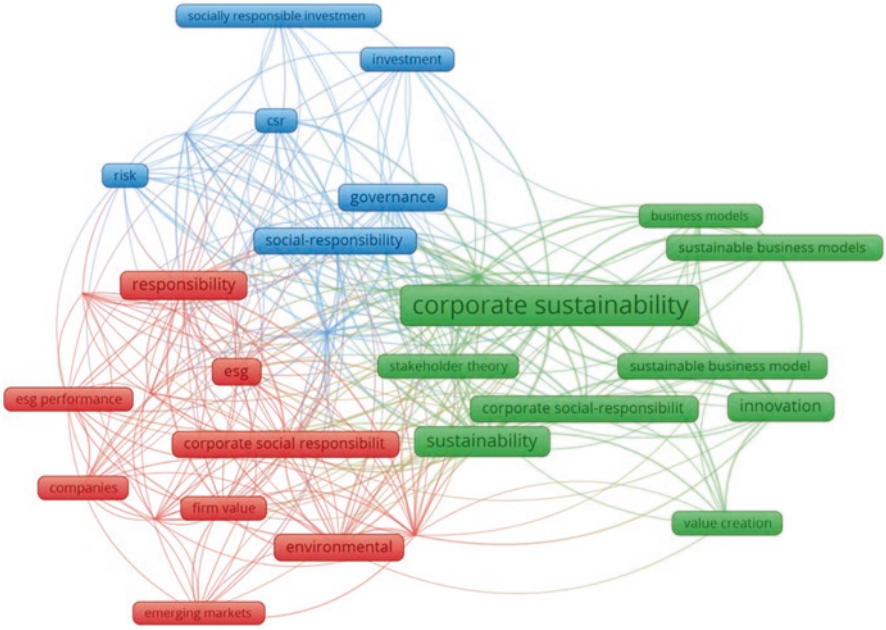

Fig. 3.3 Clusters network

choices of corporate social responsibility strategy to enhance corporate sustainability. Such relations were also confirmed by Taliento et al. (2019), who carried out an original study on the financial materiality of the ESG information of primary companies listed on major European stock markets in Belgium, France, Germany, Italy and Spain (BEL, CAC, DAX, FTSE-MIB, IBEX). Another study in this scope but on a global scale, using a sample of 1481 multinational corporations (MNCs) across 43 countries and territories for the period from 2013 to 2019, was carried out by Yu et al. (2021). It confirmed that more of the environmental disclosure decreases a firm's ex ante cost of equity because it lessens investors' information asymmetry.

Table 3.11 provides information about selected publications, which refer to research including ESG in the scope of analyses concerning the sustainable development of companies. The table provides bibliographic data as well as information about research samples (in the case of empirical studies) and the applied research methods.

The presented information suggests that research on the role of ESG factors in company activity is usually carried out on very large samples, using advanced statistical and econometric methods. Most frequently the research is based on secondary data available in databases of various international institutions.

A characteristic of cluster 2 is the connections regarding sustainable development of companies and business models referring to sustainable development, and importantly, these connections are present in over 70% of all the analysed publications, which are of a diverse nature – some of them are focused on seeking the best

Table 3.11 Bibliographic analysis of publications – cluster 1

Bibliographic information	Sample information	Research method
Raghupathi, V; Ren, J; Raghupathi, W, 2020. Identifying corporate sustainability issues by analyzing shareholder resolutions: A machine-learning text analytics approach, sustainability, 12(11)	CERES sustainability shareholder resolution database, with 1737 records spanning 2009–2019	A combination of text analytic approaches (i.e. word cloud, co-occurrence, row similarities, clustering, classification, etc.)
Xie, J; Nozawa, W; Yagi, M; Fujii, H; Managi, S, 2019. Do environmental, social, and governance activities improve corporate financial performance? Business Strategy and the Environment, 28(2), 286–300	The Bloomberg Environmental, Social and Governance Database, with financial data of 6631 companies in 2015 from 74 countries and 11 sectors	Data envelopment analysis (DEA)
Yu, EPY; Tanda, A; Luu, BV; Chai, DIH. 2021. Environmental transparency and investors' risk perception: Cross-country evidence on multinational corporations' sustainability practices and cost of equity, Business Strategy and the Environment	1481 multinational corporations (MNCs) across 43 countries and territories from 2013 to 2019	A simple one-period model
Rajesh, R; Rajendran, C. 2020. Relating Environmental, Social, and Governance scores and sustainability performances of firms: An empirical analysis, Business Strategy and the Environment, 29(3), 1247–1267	1820 firms globally for 5 years, from 2014 to 2018	A Partial Least Square (PLS) analysis and standard bootstrapping using Smart PLS 3.0 software
Bektur, C; Arzova, SB. 2021. The effect of women managers in the board of directors of companies on the integrated reporting: example of Istanbul Stock Exchange (ISE) Sustainability Index, Journal of Sustainable Finance & Investment	15 companies that have ESG scores between the years 2014 and 2019 from 56 companies included in the ISE Sustainability Index (XUSRD) as of 03.02.2020	The Panel Data Analysis method

(continued)

Table 3.11 (continued)

Bibliographic information	Sample information	Research method
Taliento, M; Favino, C; Netti, A. 2019. Impact of environmental, social, and governance information on economic performance: Evidence of a corporate 'sustainability advantage' from Europe, Sustainability, 11(6)	150 companies of primary stock-listed companies with higher market capitalisation, size and liquidity	A PLS (partial least squares)/SEM (structural equation modelling) methodology together with the unprecedented consideration of ESG measures (Environmental, Social and Governance), either absolute (scores) or relative (extra-performance over industry sector)
Miralles-Quiros, MM; Miralles-Quiros, JL; Goncalves, LMV. 2018. The value relevance of environmental, social, and governance performance: The Brazilian case, Sustainability, 10(3)	73 companies belonging to 24 business sectors	The modified version of Ohlson's model proposed by Barth and Clinch
Cek, K; Eyupoglu, S, 2020. Does environmental, social and governance performance influence economic performance? Journal of Business Economics and Management, 21(4), 1165–1184	372 US companies from mixed industries (e.g. technology, financial, manufacturing, logistics and oil) listed in S&P 500	Structural equation modelling and multiple regression analysis

Source: Own elaboration

definition for a sustainable business model. The study carried out by Lozano (2018) analysed seven reviewed articles, which aimed at defining and explaining sustainable business models and which were widely cited. This review of the literature resulted in a definition, according to which, more sustainable business models (MSBMs) were defined as 'a holistic and systemic reflection of how a company operationalizes its strategy, based on resource efficiency (through operations and production, management and strategy, organizational systems, governance, assessment and reporting, and change), so the outputs have more value and contribute to sustainability more than the inputs (with regard to material and resources that are transformed into products and services, economic value, human resources, and environmental value)'. A similar review of 37 publications of various types, which defined the term 'sustainable business models', was also presented in Dentchev et al. (2018). Some studies also included the results of empirical research on the implementation of a sustainable business model in company activity (see: van Bommel, 2018; Neumeyer & Santos, 2018; Del Baldo, 2018; Norris et al., 2021).

Cluster 3, diversely from the previous two clusters, demonstrates the combinations of terms that can be described as complementary to the research on corporate sustainability. The cluster comprises publications which stress the role of governance in the activities undertaken in regard to corporate social responsibility (CSR) and environment protection. In these studies, governance is not merely one of the elements of the ESG concept but also a factor of decisive importance in the actions

undertaken for the protection of the environment, for example, through investment, risk management and implementing CSR in companies. References to the term 'governance' in this context can be found in Knappe and Schmidt (2021), which examined the role of corporations in global environmental governance. Relations between the concepts of corporate sustainability and innovation, in particular dedicated to environment protection, were also discussed in Zhang et al. (2020). For this cluster, other important considerations regard the inclusion of the concepts of ESG and corporate sustainability among the factors decisive for the effectiveness and profitability of company activities (see: Stubbs & Cocklin, 2008). This is also a cluster in which it is worth noting the connections with the term 'risk' (including evaluation of ESG risk). The study of the relations connecting management with company results and sustainable growth, has now become one of the key themes in the literature on corporate sustainability. Information about the results of research in this field can be found in, among others, Oprean-Stan et al. (2020) and Liu et al. (2022). According to the European Banking Authority, ESG factors can affect financial results of institutions by increasing credit risk, market risk, operational risk, risk of liquidity and financing. Measuring ESG risk has great importance in obtaining a complete picture of an institution's exposure to that risk, especially in the initial stages of its measurement – which currently applies to the majority of institutions.

4 Conclusions

The results in this chapter constitute a contribution to the subject literature due to examining the impact of internal factors on the sustainable development of companies. For these purposes, the authors carried out a bibliographic study of publications listed in the Web of Science database, which contain in their title, abstract and keywords references to the term 'corporate sustainability'. Among the nearly 3000 publications, the authors identified the following keywords used to describe corporate sustainability: ESG, sustainable value creation and sustainable business model. The extensive database confirms the growing interest in research concerning the sustainable development of companies, also including references to other indicated terms, mostly in the last few years. In the WOS database, the study identified 135 publications which contained in their titles, abstracts and keywords references to the term 'corporate sustainability' and the other selected keywords. Based on the literature review, six binary variables were selected, and in order to explore the connections between the variables, contingency (cross-way) tables were used. Over 90% of the publications indicated that companies around the world attach a growing importance to factors linked with protection of environment, social responsibility and government (ESG). In turn, the financial condition of a company is one of the elements taken into consideration in risk assessment carried out by financial institutions. The inclusion of non-financial factors in business models improves the financial condition of businesses; hence, they consider ESG factors to be a way to increase a value of both the current and potential portfolio companies. The variable

Corporate Sustainability appeared to be strongly (0.625) correlated with ESG and moderately with the variables sustainable business model (0.460) and sustainable value creation (0.460).

The literature also underlines the positive aspects of the impact of ESG factors on building the value of a company and its effective management, as well as its innovative results. There is a statistically relevant moderate (0.322) correlation between the examined variables ESG (including evaluation of ESG risk) and Innovation.

The success of modern companies depends on their achievement of high economic efficiency, as well as on the social acceptance of their activity. This requires that companies reveal information about environmental and social effects of their actions. The analyses carried out by the authors of publications regarding sustainable value in a company show that business benefits connected with the introduction of initiatives for sustainable development are becoming increasingly obvious. The engagement of companies in sustainable development allows them to improve their products, which in turn results in greater customer satisfaction and loyalty. This creates a positive company image and leads to the improvement of the jobs market and cooperation with business partners and eventually also the growth of sales and obtaining competitive advantage linked to the above-mentioned aspects.

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Chapter 4
ESG Risk in Financial Decisions of Financial Markets and Companies

Magdalena Ziolo and Anna Spoz

Abstract This chapter discusses the need for financial markets to integrate environmental, social, and corporate governance factors (ESG factors) into decision-making processes. The chapter focuses on the importance of integration of ESG factors and sustainable development with financial decisions. The chapter discusses why enterprises and financial markets should adopt a systemic and long-term vision and to understand the financial significance of ESG factors within the full spectrum of threats and opportunities and identify these issues as the research gap needs to be covered. The chapter is based on a literature review, comparative analysis, and case studies. ESG factors can be material and can increase long-term, sustainable value of companies and financial markets.

1 Introduction

Financial markets and enterprises make decisions under the conditions of risk. Risk strongly influences the decision-making process (Terje, 2015). Over the last 5 years, as indicated by the Global Risks Report, the impact of nonfinancial factors on the risk economy (ESG risk) has been growing. Such risks have an impact on decisions made by the financial and business sectors—as could be seen, for example, during the COVID-19 pandemic (Global risks, 2021). Due to its power of influence, ESG risk is more and more often considered in decisions made by financial markets and businesses. It is particularly important to include ESG risk in financial decisions as it relates to the activities of financial markets and enterprises. From the perspective

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of financial markets, the most exposed to such risks are banking, insurance, and capital ones. In the case of financial institutions, legal changes create costs related to the need to adapt businesses to new requirements and standards, including adapting products and services to the requirements of sustainable development, implementing the green office model, implementing an ESG risk management system and fulfilling the obligation to report and disclose information on nonfinancial factors. Failure to comply with the regulations results in legal/financial sanctions as well as a risk to reputation and loss of customers. Environmental risk directly affects the profitability of business. ESG risk affects the operational risk of financial institutions, since it affects the value of receivables (e.g., loans granted to companies from the dirty business sector may be potentially nonperforming loans due to the transformation costs that these companies must incur to adapt to ESG requirements; the costs of the so-called sustainable adaptation have an impact on the company's situation and its financial standing).

For banks, credit risk is increasing, as greenhouse gas emission reduction policies can generate costs for sectors and companies with high carbon emissions. Price volatility in carbon markets (CO_2, oil, gas, coal) and climate-related goods leads to uncertainty in the financial projections. Climate change and climate policy are affecting insurance companies through increasing risks for their customers (McDaniels et al., 2017). Climatologists predict changes in the intensity and occurrence of extreme weather events (storms, floods), as well as the resulting risk of growing property claims—insurers likely consider climate change to be a threat, not an opportunity (Ahmed et al., 2013). Losses due to extreme weather events in 2004 amounted to a record EUR 32 billion. Climate change also generates higher risk for investors and asset managers, primarily because the availability of comparable and consistent data on companies' emission levels, as well as tools for assessing the relevant risk, remains limited (WWF Allianz, 2005). ESG risk has particular relevance to financial markets and companies. ESG risk factors can influence a company's financial performance through direct operations risk, supply chain risk, and product risk. On the one hand, financial market participants more and more often account for environmental, social, and management (ESG) criteria in their investment decisions and risk assessment. Companies, financial markets, and regulators are asking new questions, looking for new threats and looking for new opportunities in the markets of the future. This chapter aims to answer the following questions: What ESG factors have been incorporated by financial markets and companies in decision-making processes? How is ESG risk being managed and monitored in financial markets and companies?

The remainder of this chapter is organized as follows. Section 2 briefly reviews the related literature in the scope of financial decisions. Section 3 describes ESG risk and its impact on enterprises and financial institutions, Section 4 presents issues related to the implementation and management of ESG risk in these entities, and Section 5 concludes the chapter.

2 Financial Decisions[1]: Theoretical Framework

Decisions are an integral part of the management process accompanying any business activity (Terje, 2015). Financial decisions are made as part of financial management and, depending on the stage of managing the company, they have a different character. Financing decisions are concerned with shaping the proportion between external and internal sources of financing, so they have an impact on the structure of capital (Financing decisions, 2017). Financial decisions are usually treated more broadly and affect not only the capital structure but also the financing structure; in this context, they concern decisions on choosing a tax strategy, inter-alia. A. M. Dinu drew attention to another type of decisions, namely, capital decisions, which he treated as decisions in the field of financial management, consisting of placing specific investments or allocating capital at a specific time and generating specific flows of flows (benefits) in the future (Dinu, 2013). In the literature on the subject, it is noted that the scope of financial decisions includes decisions concerning the following (Kapoor, 2014; quora.com):

- Level of leverage—financial, operational, and total leverage
- Funding pattern for long-term capital requirements
- Funding pattern for short-term capital requirements
- Fundraising by issuing financial instruments
- Obtaining funds from financial investments
- Defining the demand for financial capital from banking and financial institutions and the capital market
- Managing working capital and determining the demand for said capital
- Burdening the financial result with interest and related charges (shaping the level of EBIT and EBITDA)
- Determining the rational level of debt and its changes as well as the influence of debt on the risk of insolvency and bankruptcy
- Shaping the level of interest and depreciation to reduce the company's tax liability
- Analyzing various ways to improve the earnings per share ratio and increase the market value of shares
- Shaping the cost of capital at the level of a single source of financing and the weighted average cost of capital

Both in the short and long term, a derivative of the decision-making choices made is the accompanying level of risk. This applies in particular to decisions regarding the company's cost structure (operating leverage) as well as capital structure (financial leverage). Therefore, when making financial decisions, it is impossible to ignore the achievements of the theories:

[1] The problem was discussed in more detail as a part of the monograph B. Oliwa, A. Spoz, M. Ziolo, Financing SMEs by banking sector. Risks, financial sources, strategies, Wyd. KUL, Lublin 2017.

- Trade-off theory
- Pecking order theory
- Asymmetric information theory
- Agency theory/financial agency theory

The trade-off theory, also known as the static theory of capital structure, was developed in the 1950s based on the research of Franco Modigliani and Merton Miller (Dahlström & Persson, 2010). This theory is based on the assumption that the share of debt in financing is determined by the costs and benefits of debt in relation to the owned and desired capital level. In terms of benefits, attention is paid to the phenomenon of the tax shield and tax benefits; in terms of costs, the impact of debt servicing costs on the level of operating profit is indicated. Thus, in the theory of substitution, equity is replaced (substitution) with debt or debt with equity depending on the moment of reaching the optimal capital structure, at which the goodwill is maximized and the average cost of capital is minimized. In turn, the optimal capital structure is the result of the relationship between benefits (tax shield) and costs (costs of bankruptcy, agency costs) related to debt financing. Based on the assumptions of this theory, a conclusion can be drawn that profitable companies will benefit from debt financing due to the benefits they can achieve in connection with the involvement of debt in the capital structure. The pecking order theory (Myers & Majluf, 1984) is, in contrast with the theory of substitution, a dynamic theory based on the assumption that the structure of capital is shaped by considering factors such as the cost of obtaining external capital (transaction costs) and information asymmetry (managers have more knowledge about the company's situation than external entities).

The pecking order theory explains a situation in which there are changes not only in the capital structure but also in the amount of capital involved. According to this theory, internal sources of financing (retained earnings) are preferred in the capital structure; if this source turns out to be insufficient, bonds are issued and, ultimately, shares are issued (Jahanzeb et al., 2013). Such a hierarchy of obtaining for sources of financing results from the anticipated behavior of investors who may decide to abandon/withdraw from investments financed with new share capital. Therefore, initially, retained earnings are used to finance investments; in the next steps, external financing is used, and then external/own financing. Profitable companies should, therefore, be characterized by low debt ratios, and only when the scale of their investments reaches a larger/more significant dimension, the debt of profitable companies may be higher than those companies that make investments on a smaller scale (Dahlström & Persson, 2010; Jahanzeb et al., 2013). The material scope of enterprises' financial decisions can be analyzed from a narrow and/or broad approach. In a narrow approach, these decisions will focus on issues related to shaping the capital structure and financing structure and are directly related to these decisions, costs, financial benefits, and financial risk (Table 4.1). Financial decisions also concern the choice of the donor of capital and thus, the financial institution—the entity providing capital. This applies in particular to external financing, although one should not forget the role of financial institutions in the transfer of risk

Table 4.1 ESG risk in financial decisions

Financial markets	Scope of financial decisions: profitability, liquidity, credit policy, tax policy, OpEx, CapEx, cash flow, interest margins policy, interest rate policy, credit rating, credit scoring, sustainable rating, collateral policy, asset management policy, solvency policy, stress tests
Companies	Scope of financial decisions: profitability, liquidity, debt policy, tax policy, OpEx, CapEx, cash flow, inventory policy, asset management policy, solvency policy

Source: own elaboration

and their advisory function, i.e., knowledge transfer, which may affect the effectiveness of the company's financial strategy.

All decisions, including financial decisions, are made through a decision-making process, where one may also discuss decision models (models of decision-making processes). A decision-making process in SMEs has its own specificity, as it entails more strategic behaviors than is commonly recognized. This aspect has been indicated in particular by Reboud and Mazzarol (2008). In turn, İbicioğlu et al. (2010) pointed out that the analysis of small and medium-sized enterprises (SMEs) management is dominated by qualitative aspects, with significant roles for creativity and intuition in the evaluation process. H. Simon and P. Drucker also emphasized the role of intuition in decision-making processes, stressing that it is an important element in the process of making effective, strategic decisions and that good decisions require a nonstandard approach. Other studies, including Kraus et al. (2007) and Kono and Barnes (2010), raised the question of the importance of communication skills, teamwork, and financial knowledge in the decision-making process. Decision-making determinants are also indicated by the theory of credit discrimination against SMEs by J.K. Galbraith, who argued that SMEs' difficulties in accessing credit are compounded by the following:

- Market structure (number and type of enterprises)
- The course of the business cycle
- Money supply

An extensive study on factors influencing risk perception in SME decision-making was carried out by Y.A. Al-Rashidi (2011) and distinguished the following groups:

- Cultural factors
- Motivational factors (internal and external motives)
- Economic factors
- Management style
- Risk perception and attitude
- Demographic factors
- Decision-making perspective
- Type of elections (collective, individual)

There are relationships between the financial performance or, more broadly, the financial situation of enterprises and ESG factors. Orlitzky et al. (2003)

demonstrated the existence of a positive correlation between social and environmental factors and the financial situation (Scholten, 2006, pp. 19–33). A study conducted by Velte (2017) on a group of 80 companies also confirmed the existence of such relationships, in particular the impact of ESG factors on ROA (Velte, 2017, pp. 169–178). Friede et al. (2015) analyzed the results of research presented in over 2,000 scientific articles and confirmed the dominant, positive influence of ESG factors on the financial situation (Friede et al., 2015, pp. 210–233). The impact of ESG on financial markets is also well recognized (Kiesel & Lucke, 2019, pp. 263–290). EBA (European Banking Authorities) discusses actions to reduce the impact of ESG-related risks on financial markets (Table 4.2.).

ESG risk impacts banking risk, particularly through the impact of environmental risk on credit risk. This is because environmental risk has an impact on the financial situation of market entities (especially enterprises) that operate in the so-called environmentally sensitive region. These entities are obliged to comply with environmental protection regulations and to adjust their activities in such a way as to meet environmental requirements. The cooperation of banks with entities violating environmental standards simultaneously creates the risk of losing reputation. Loss of the ability to generate revenues is also determined by health risk, included in the social risk category, which strongly affects the economy and creditworthiness of business

Table 4.2 Qualitative disclosures of ESG related risks—financial market perspective

Governance	The responsibilities of the management body in setting, overseeing, and monitoring the risk framework, objectives, strategies, and policies in the context of ESG risks The incorporation of nonfinancial risks in the organizational arrangements including role of risk committees, business lines and internal control functions Governance arrangements in terms of setting targets, escalation procedures and reporting Alignment of the remuneration policy with nonfinancial risks
Business model and strategy	Adjustment of the institution's business strategy to integrate ESG risks and factors Objectives, targets, and limits for the assessment of environmental risk in short term, medium term, and long term and performance assessment against these objectives and limits Policies and procedures relating to direct and indirect engagement with customers on their ESG risk strategies
Risk management	Current standards that institutions use for ESG risk management Processes to identify activities and exposures sensitive to environmental, social, and governance risks taking into account relevant channels and considerations specific to each risk categories Processes to identify and monitor exposures and activities that are subject to material ESG risks

Source: own elaboration based on: EBA Consultation Paper, Draft Implementing Standards on prudential disclosures on ESG risks in accordance with Article 449a CRR, EBA/CP/2021/06 No to be given by Communications, 01 March 2021 https://www.eba.europa.eu/implementing-technical-standards-its-prudential-disclosures-esg-risks-accordance-article-449a-crr (access 27.09.2021)

entities. This situation is noticed in the era of a pandemic, when actions taken by governments radically influenced basic macroeconomic parameters and the financial situation of monetary and nonmonetary institutions. The effects of COVID-19 include limited access to employees or disruptions to supply chains, a decrease in demand, and limited consumption and participation in organized events (Raport Odpowiedzialny Biznes w Polsce. Dobre praktyki, 2020). A decline in demand and a reduction in consumption, or a complete lack thereof due to the suspension of work of selected sectors of the economy, consequentially leads to the inability to generate revenues from core activities with the necessity to incur fixed costs, which has an impact on the deteriorating financial situation of local government units, enterprises, and households and, thus, has an impact on the ability of these entities to incur and service liabilities. Governments are attempting to take measures to reduce the effects of COVID-19 on the economy (including the Anti-Crisis Shield), but the scale of the pandemic's impact is so wide that government aid is dedicated to selected groups of entities. The role of banks as financial intermediaries means that the challenges posed by ESG factors for the financial system require them to take adjustment measures. The scope of these activities includes the development and implementation of ESG risk management systems; methodologies; the adjustment of the product and service offer so as to ensure support and promotion of good practices in the field of sustainable development; and, finally, the implementation of a business model based on creating sustainable value (Gerstlberger, 2014, p. 7). ESG risk management by including the risk of nonfinancial factors in the decision-making process of financial institutions requires the development and implementation of an ESG management strategy determined by the adopted model of ESG factor integration. The development of such a strategy is preceded by an analysis during which the financial institution determines the level of expectations and integration of ESG factors in the decision-making process and the type of ESG risk to which the financial institution is exposed. These activities are carried out in five steps (Gerstlberger, 2014, p. 22):

- Determining the level of expectations regarding the degree of integration of ESG factors
- Identification of risk exposure
- Determining the level of ESG risk acceptable to the institution
- Risk response
- Development of the ESG policy framework and implementation of the ESG strategy

Depending on the results of the analyses carried out in phases 1 and 2, financial institutions distinguish processes based on which they manage ESG factors and identify sectors they cooperate with that are exposed to ESG risk. For each of the financial institutions, Phase 1 will have a different dimension, depending on the specifics of its operations and customer segment. The banking sector (mainly banks) will focus on the qualitative analysis in terms of credit and political risk, and the capital market (e.g., funds and brokerage houses) will focus on the qualitative analysis in terms of investment risk, portfolio risk, and political risk. Similarly, Phase

2 in financial forecasting and modeling for banking sector institutions and capital market institutions will be based on other assumptions, including anticipated changes in regulations, macro- and microeconomic factors, and nonfinancial factors. As a result of these activities, decision-making processes are designed, and the importance of each factor (environmental, social, and managerial) for the institution is determined.

3 ESG Risk and Its Impact on the Performance of Enterprises and Financial Market Institutions

With the growing awareness and sensitivity to ESG issues among the general public, consumers, business partners, and investors, these issues increasingly affect economic operators, the ways they run their business activity, and their market environment. The Global Risk Reports 2010–2021 show the growing significance of environmental and societal risks in terms of both likelihood and impact. These risks are now ahead of economic, geopolitical, or technological risks. In 2021, among the five top-impact risks were infectious diseases, climate action failure, weapons of mass destruction, biodiversity loss, and natural resource crises. The risks with the highest likelihood, in turn, were extreme weather, climate action failure, human environmental damage, infectious diseases, and biodiversity loss.

The implementation of ESG factors in the operating strategies of enterprises and financial market institutions now becomes an inseparable element of building their long-term competitive advantage (Do sustainable banks outperform? Driving value creation through ESG practices, 2019; Cramer et al., 2018). The inclusion of environmental, social and governance factors in an entity's business model is a challenge for managers, especially in terms of the integration of ESG risk factors in the risk management model and model risk management.

Effective ESG risk management requires the entity to identify ESG risks to which it is exposed, taking into account the specificity of its activity, the adopted business model, and the implemented strategy. Although ESG factors are not a new concept, there is no single universal definition of ESG factors, nor is there a single definition of ESG risks or their types. According to the EBA Report on management and supervision of ESG risks for credit institutions and investment firms (2021), financial institutions use definitions contained in various international rules, and some follow their in-house definitions. EBA defines ESG factors as "The risks of any negative financial impact on the institution stemming from the current or prospective impacts of environmental factors on its counterparties or invested assets," while ESG risks are understood as "risks of any negative financial impact on the institution stemming from the current or prospective impacts of ESG factors on its counterparties or invested assets." ESG risks can be classified

by various criteria, such as asset classes, counterparties, sectors, products, or territories.

The ESG risks comprise environmental, social and governance risks. Each of these risk types entails the occurrence of specific risk drivers, has its transmission channels, and impacts on the organization.

Environmental risks are risks that have the greatest impact on enterprises and financial institutions. Most often they are understood as risks associated with a negative impact on the environment and overexploitation of natural resources (Hancock, 2001) and described as a combination of the likelihood of an environmental incident and its effects. A characterization of the environmental risk should include dynamics of this risk, as they show the tendencies for risk changes over time.

The environmental risks include:

- Physical risks—related to the impact of climate change and extreme weather events leading, among others, to damage to infrastructure, destruction of crops, and disruptions in the supply chain. The drivers of this type of risk are extreme weather phenomena (cyclones, typhoons), air pollution, soil degradation, rising sea levels, and water shortage. Physical risk can materialize as acute (i.e., irregular, individualized, due to weather-related events (weather disasters)) or as chronic (resulting from progressive climate change).
- Transition risks—resulting from the need to adapt the economy to climate change, in particular, to use low-emission, sustainable solutions. This risk may materialize, among others, through the need to adapt to new policies and technological changes, but also as a market risk resulting from the disruption of the current structure of demand and supply of electricity, natural resources, products, and services.

An example of the impact of environmental factors on enterprises and financial institutions is presented in Fig. 4.1.

The result of the materialization of environmental risk may be a reduction in the scope of an enterprise's business and a drop in its financial results, which causes the company's profitability to decline, and so does its creditworthiness. The credit risk of a lending financial institution increases. For financial market institutions and enterprises acting as investors, this creates a market risk, that is, a risk related to the volatility of the price of a share.

The exposure to environmental risk can translate into financial risk (Fig. 4.2)

The impact of environmental risks (physical and transition risks) on the financial risks of financial institutions (acting as lending institutions and investors) and enterprises (acting as investors) can be considered from a macro- and microeconomic point of view. From a macroeconomic perspective, the environmental risks can affect the size and structure of investments, productivity, prices of natural resources and goods and services, labor market, and the volume of demand and supply in the market. The intensity and frequency of extreme weather events as well as the value of the resulting damage have triggered an increase in the demand for insurance against adverse weather conditions, such as floods, hurricanes, and droughts. From

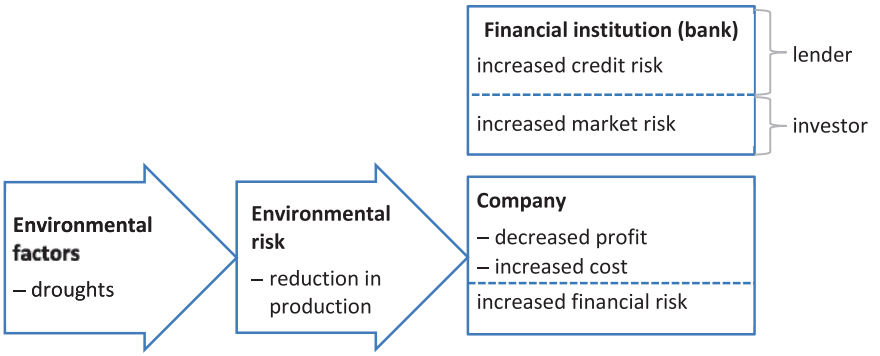

Fig. 4.1 Impact of environmental risk on the enterprises and financial market institutions. (Source: Adapted from EBA Report on management and supervision of ESG risks for credit institutions and investment firms, EBA, 2021, https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Reports/2021/1015656/EBA%20Report%20on%20ESG%20risks%20management%20and%20supervision.pdf)

a microeconomic perspective, the effects of extreme weather events (acute risk) can lead to business disruptions and material damage, thus harming enterprises' creditworthiness and the size of their surplus cash. Chronic effects associated with climate change may hinder business in specific areas (growing costs) or affect the productivity of labor and capital. Such changes will necessitate adaptation efforts to be taken by businesses, households, and governments.

Social factors are usually understood as issues related to the rights, well-being, and interests of individuals and communities and include factors such as (in)equality, health, work, workplace safety, and human right. The European Pillar of Social Rights defines social factors by means of 20 principles relating to, among others, equal opportunities and access to the labor market (including gender equality), social protection and social inclusion (including childcare and support to children, unemployment benefits, access to essential services and a minimum income), and decent and just working conditions (including pay and work).

In March 2021, the European Commission published the European Pillar of Social Rights Action Plan, which presents a list of actions that implement the adopted principles. Despite these efforts, social factors are still defined differently by various entities. Asset managers, investors, and rating agencies most often refer them to social criteria, such as violation of human rights, employee relations, customer interactions, etc. The analysis of these criteria aims to answer the question of how an analyzed company manages its relations with employees and external entities (customers, counterparties, local communities) (EBA Report on management and supervision of ESG risks for credit institutions and investment firms, 2021).

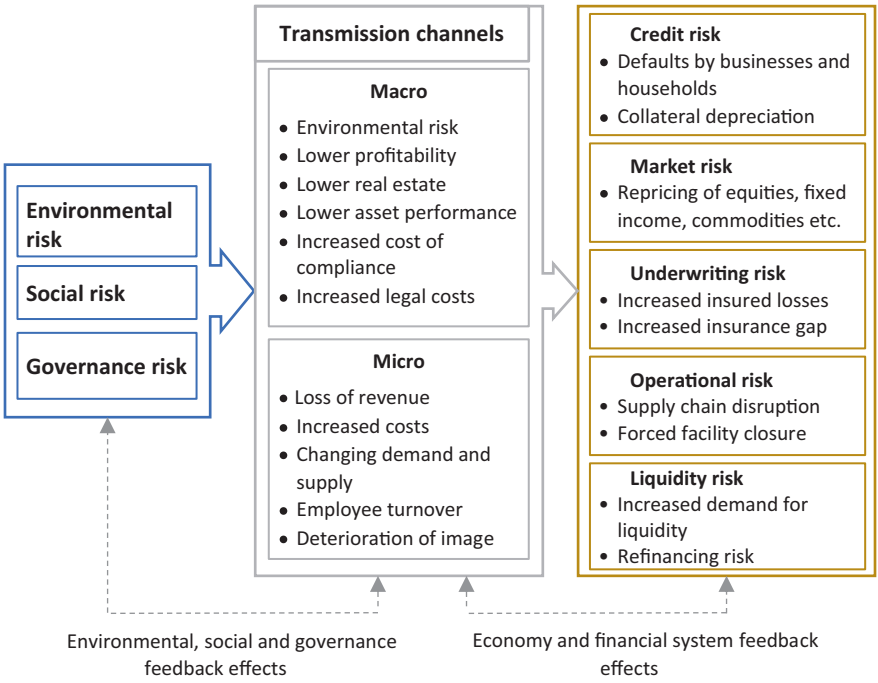

Fig. 4.2 Impact of ESG risk on the financial risk of enterprises and financial institutions. (Source: Adapted from "Overview of Environmental Risk Analysis by Financial Institutions, Network for Greening the Financial System," September 2020, p. 7)

An example of the impact of social factors on enterprises and financial market institutions is presented in Fig. 4.3.

Breach of employee rights (materialization of social risk) may result in employees leaving their job, difficulties in recruiting qualified employees, and loss of reputation. These problems cause the company's profitability to decline, and so does its creditworthiness and increasing credit risk of lending financial institution. An entity's loss of reputation may generate a market risk for investors.

Governance risks are risks related to the management of an enterprise, covering such issues as the independence of the management board, shareholders' rights, anti-corruption procedures, policies for the transparency of transactions, and regulatory compliance. There is no one-size-fits-all framework for governance factors. Most often they are governed by national legislation and are published in the form of good practices. At the EU level, in February 2021, a public consultation process was closed on "Sustainable corporate governance," which sets out to improve the EU regulatory framework for company law and corporate governance.

An example of the impact of governance risk on enterprises and financial market institutions is presented in Fig. 4.4.

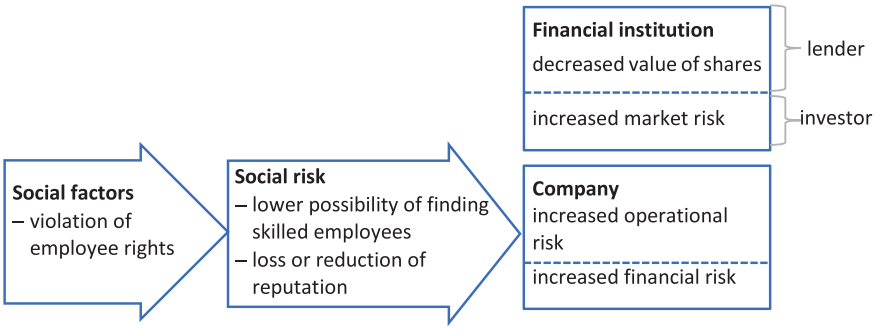

Fig. 4.3 Impact of social factors on enterprises and financial institutions. (Source: Adapted from EBA Report on management and supervision of ESG risks for credit institutions and investment firms, EBA, 2021, https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Reports/2021/1015656/EBA%20Report%20on%20ESG%20risks%20management%20and%20supervision.pdf)

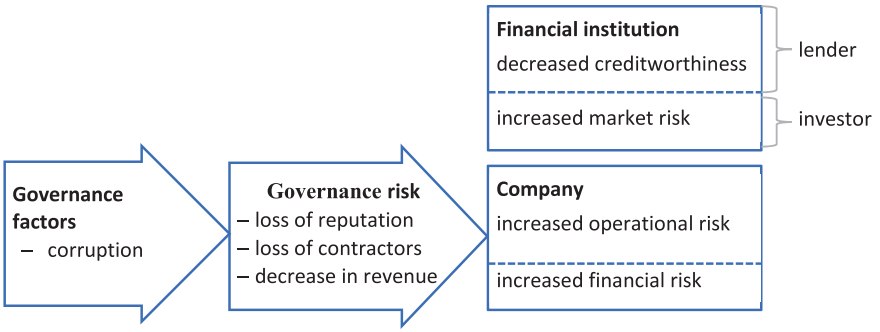

Fig. 4.4 Impact of governance risk on enterprises and financial market institutions. (Source: Adapted from EBA Report on management and supervision of ESG risks for credit institutions and investment firms, EBA, 2021, https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Reports/2021/1015656/EBA%20Report%20on%20ESG%20risks%20management%20and%20supervision.pdf)

In addition to identifying individual types of risks and determining their potential impact, an entity should also analyze the interdependencies between risks.

Regulations play an important role in protection against ESG risk. Some of them are mandatory and others voluntary. Frameworks addressing ESG factors are presented in Table. 4.3.

Regulations play an important role in hedging against ESG risk. The scope of including ESG factors in individual regulations and their impact on sustainable finance varies (Table 4.4).

The activities of the EBA are extremely important in the ESG risk management process for financial institutions. Their aim is to improve the current regulatory framework for financial market institutions (and thus contribute to the achievement of the SDGs and ESG risk management) and to introduce the concept of sustainable

Table 4.3 Frameworks concerning ESG factors currently used by financial market institutions

Frameworks addressing ESG factors	The United Nations Sustainable Development Goals (SDGs) The Principles for Responsible Investment (PRI) The United Nations Environment Programme Finance Initiative (UNEP FI) Principles for Responsible Banking The Global Sustainability Standards Board Global Reporting Initiative (GRI) The Equator Principles The World Economic Forum (WEF) report on Measuring Stakeholder Capitalism The International Integrated Reporting Council (IIRC) Integrated Reporting Framework The International Finance Corporation Environmental and Social Performance Standards (IFC Performance Standards) The OECD Due Diligence Guidance for Responsible Business Conduct The Committee of Sponsoring Organizations of the Treadway Commission (COSO) and the World Business Council for Sustainable Development (WBCSD) Guidance for Applying Enterprise Risk Management to ESG-related risks The Sustainability Accounting Standards Board (SASB) Standards
Frameworks specifically addressing environmental factors	The Natural Capital Protocol + Supplement (Finance) The recommendations of the Financial Stability Board Taskforce on Climate-related Financial Disclosures (TCFD) The Climate Bond Initiative Climate Bonds Standard The International Capital Market Association Green Bond Principles The Partnership for Carbon Accounting Financials Global GHG Accounting and Reporting Standard for the Financial Industry The Climate Disclosure Project (CDP), UN Global Compact (UNGC), World Resources Institute (WRI), and World Wildlife Fund (WWF) Science-Based Targets initiative (SBTi)
Frameworks specifically addressing social factors	The UN Guiding Principles on Business and Human Rights The UN Guiding Principles on Business and Human Rights The UN Guiding Principles on Business and Human Rights
Frameworks specifically addressing governance factors	COM (2012) Action Plan: European company law and corporate governance—a modern legal framework for more engaged shareholders and sustainable enterprises, Global Governance Principles—CalPERS, OECD Principles of Corporate Governance or ICGN Global Governance Principles

Source: Adapted from EBA report on management and supervision of ESG risks for credit institutions and investment firms eba/rep/2021/18, https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Reports/2021/1015656/EBA%20Report%20on%20ESG%20risks%20management%20and%20supervision.pdf (access 27.09.2021)

Table 4.4 Relationship between sustainable finance regulations and ESG factors

Regulation/criterion	Regulation (eu) 2019/2089 of the European Parliament and of the council of 27 November 2019	Regulation (eu) 2019/2088 of the European Parliament and of the council of 27 November 2019	Regulation (eu) 2016/1011 of the European Parliament and of the council of 8 June 2016	Directive (eu) 2017/828 of the European Parliament and of the council of 17 May 2017	Directive 2014/95/eu of the European Parliament and of the council of 22 October 2014	Revised Capital Requirements Regulation (CRR 2) and Capital Requirements Directive (CRD 5	Mifid II (Markets in Financial Instruments Directive) directive 2014/65/eu of the European Parliament and of the council of 15 May 2014
Dedicated[a] risk	E	E,S,G,	G	G	G	E	G
Comprehensive regulation in the context of ESG	Partial	Full	Partial	Partial	Partial	Partial	Partial
Coherence of implementation in individual institutions	Yes	Yes	Yes	Yes	Yes	Yes	difficult to achieve (differences in competence verification)
Impact on sustainable finances	Strong	Strong	Moderate	Strong	Moderate	Strong	Moderate

Source: Zioło M., (2020), Finanse zrównoważone, PWE, p. 124

[a]*E* environmental, *S* social, *G* governance

development into the institution's strategy and risk management, as well as to provide supervisors the appropriate tools to understand, monitor, and assess ESG risk in their supervisory practices (EBA action plan on sustainable finance, 2019). Overview of EBA mandates on sustainable finance is presented in Fig. 4.5.

The existence of many standards and guidelines for ESG reporting on the market significantly hindered the comparability of information published by financial institutions, thus reducing their credibility and usefulness (looking into the crystal ball of what the future holds for ESG reporting). The efforts of supervisors to develop uniform standards (e.g. Sustainable Finance Disclosures Regulation) that ESG-related risks, in particular the risk related to climate change, should be

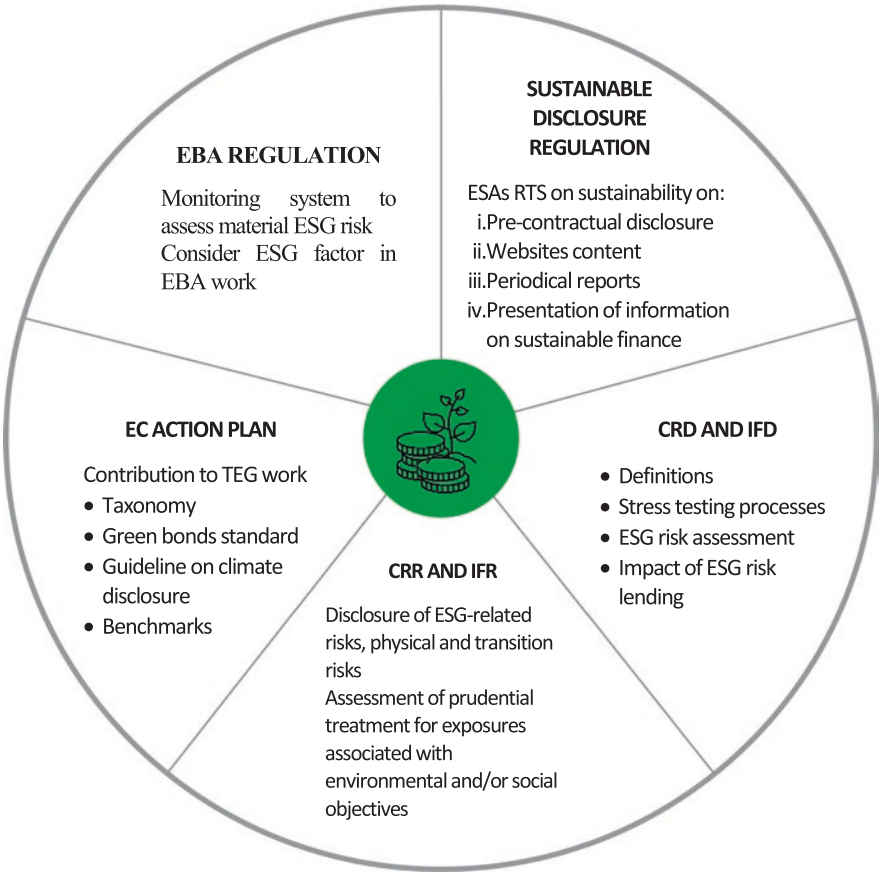

Fig. 4.5 EBA mandates on sustainable finance. (Source: 1. EBA action plan on sustainable finance (2019) European Banking Authority, December 2019, https://www.eba.europa.eu/sites/default/documents/files/document_library/EBA%20Action%20plan%20on%20sustainable%20finance.pdf. Accessed 27 Sep 2021)

comprehensively included in the risk management strategies and policies applied by institutions and should be treated equally to other risks.

4 ESG Risk in Financial Decisions Made by Financial Market Institutions

ESG risk management means the inclusion of ESG risk in the decision-making processes of organizations and requires the development and then implementation of an ESG management strategy (COSO, 2018). The basis for the development of such a strategy is to define the level of institution's expectations of the degree of integration of ESG factors, identification of risk exposure, determination of the risk level acceptable to institutions, and reaction to ESG risk (WWF, 2014; Zioło, 2016).

A financial market institution first identifies its goals regarding the inclusion of ESG factors in the decision-making process. Then, the exposure to ESG risk needs to be identified and assessed. Knowledge about the type of risk and the scale of exposure is the basis for making decisions in the field of product offer, rating, or contractual provisions in the form of contractual clauses and the choice of legal security for repayment. Tools for measuring this type of risk may include, for example, aggregated measures, indices, scoring, and ratings. The level of ESG risk acceptable to institutions on the financial market is determined by many factors, which include, among others, applicable legal regulations, the bank's current level of ESG risk, the desired (target) level of ESG risk integration, adaptation of the institution's mission and strategy to ESG risk requirements, the bank's reputation, its market position, and competitive advantage, as well as opinions and relations with stakeholders.

There are five levels of integration and foundations of institutions in the financial market with regard to the inclusion of ESG risk in the decision-making process (Fig. 4.6).

Financial market institutions react differently to ESG risks. Their reaction depends on many factors, and to the large extent, it depends on the type of financial institution (investment funds react differently from banks). One of the ways to minimize the ESG risks is adjustment of the product offer. Another is utilization of ESG ratings to make investment decisions, which is in line with the concept of socially responsible investment. Ratings created by rating agencies reduce the asymmetry of information and thus the risk associated with financial transactions.

Over the last decade, the correlation between a company's performance in terms of ESG factors and its investment value has become more and more visible. Research by Deloitte shows that 65% of investors in the capital market declare that they regularly use ESG ratings (at least once a week). Sustainable credit rating agencies evaluate enterprises' performance in terms of their impact on sustainability. Some agencies base their ratings solely on nonfinancial information, while others

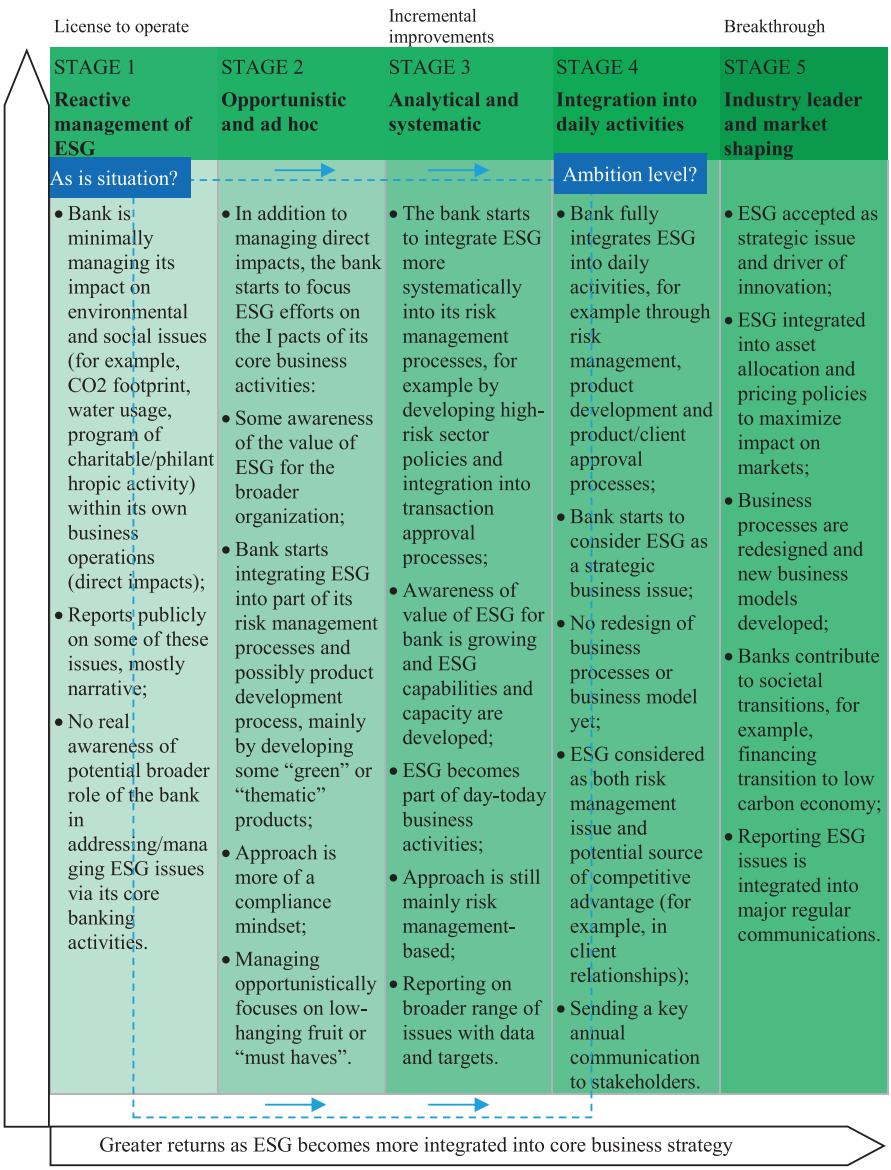

Fig. 4.6 ESG maturity grid model. (Source: WWF (2014) Environmental, Social and governance integration for banks: A guide to starting implementation. https://wwfint.awsassets.panda.org/downloads/wwf_environmental_social_governance_banks_guide_report.pdf. Accessed 27 Sep 2021)

combine financial and nonfinancial data. A big problem is the lack of consistency in the scope of the analysis and the quality of the data used to provide it (Pichola et al., 2021; Boiral et al., 2020). This is because not all entities report nonfinancial information, and if they do, the differences between their reporting make comparison of the results obtained very difficult.

The importance of ESG ratings causes that the activities of rating agencies are monitored by the European Commission. The legislative package on credit rating agencies, consisting of Regulation No 462/2013 and Directive 2013/14 / EU, aims to improve the quality of the rating process and make credit rating agencies more accountable for their activities, as well as reduce over-reliance on credit ratings and prevent conflicts of interest. This package is intended to attract more actors to operate in the field of credit ratings and increase transparency on sovereign debt ratings (regulating credit rating agencies).

The use of a credit rating agency can increase the credibility of the activities in the area of the ESG strategy. Companies can use their ESG risk assessment to obtain external capital and implement projects in line with the concept of sustainable development and for internal and external image-building activities.

The financial market institution can use one of the responsible investment strategies, i.e., best in class, engagement and voting, ESG integration, exclusion, impact investing, norms-based screening, and sustainability-themed investment.

5 Implementation and Management of ESG Risk in Enterprises and Financial Market Institutions

To ensure the effectiveness of the ESG risk management system in companies and financial market institutions, it must be comprehensive, transparent, and consistent with the risk management model in a given entity. The individual stages of developing an ESG risk management system should include definition and scoping of ESG risk management objectives, definition of standards to be adopted in this regard, design of ESG risk identification, valuation and management procedures, development of policies and procedures for employees (at individual levels) to understand the impact of ESG risks on operations of an entity, and development of procedures to be followed in the event of ESG risk (Lorenzo & Netto, 2014).

The main phases of ESG risk management include risk analysis and risk control, as shown in Fig. 4.7 (Smith, 2013).

Risk analysis is one of the main tools in ESG risk management in economic operators. It is primarily aimed at providing reliable information about the impact of ESG risks on an entity's business, determining the likelihood of specific ESG risks, determining the losses for the entity that may occur in the event of ESG risk materialization, and proposing appropriate actions to mitigate the likelihood of risk occurrence or the size of the losses suffered when it occurs.

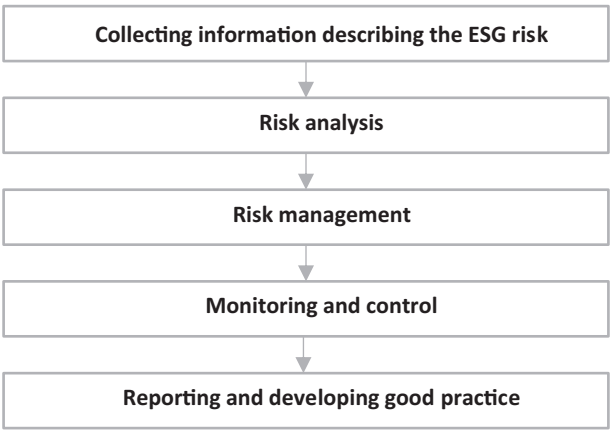

Fig. 4.7 ESG risk management phases in enterprises and financial institutions. (Source: Adapted from Smith K., *Environmental Hazards: Assessing Risk and Reducing Disaster*, London, Routledge, 2013)

The first stage of ESG risk analysis consists in making a detailed inventory of resources and drivers related to the occurrence of a specific risk, together with the assessment of the severity of an ESG-related resource for the business of an economic operator. Then, potential risks to each of the previously identified resources are determined. Special checklists can be used for this purpose. The next step of ESG risk analysis is to determine whether the identified potential risk may negatively affect the entity's business, and if yes, how. The last step of the analysis is to identify the ESG risk itself, which can be expressed either in qualitative (low/medium/high environmental risk) or quantitative terms (specific numerical values, e.g., quantifying financial losses) (Măzăreanu, 2007).

Effective ESG risk management requires a holistic approach to the process of integrating ESG risk into an entity's risk management system. A proper structure and operation of an entity's risk management system are fundamental. The scope of the necessary adjustments will depend on whether the ESG risk will apply to all or only to specific departments. Depending on the scope of ESG risk management, the roles and responsibilities within the existing entities should be defined.

The impact of ESG risk on an entity's business should be analyzed from the financial perspective, that is, from the point of view of its impact on the profits and costs generated, and adequately integrated into the system of forecasting financial results and building customer offers. From this perspective, the focus should be put on financial and reputational risks.

ESG risk management must be built into existing processes in an enterprise. The ESG risk management system also includes the Risk Control, Compliance, and Business Continuity Management (BCM) functions. The responsibility of the Risk Control Department is to develop methods, processes, and tools to deal with ESG risks and to report the results as appropriate. The Compliance Department will in turn verify whether the designed ESG risk management system meets the legal

requirements imposed on entities in this area. One should note at this point that the number of ESG regulations grows every year. Since 2018, 170 regulations have been passed in this respect, two-thirds of which were in Europe. Effective from 10 March 2021, the Sustainable Finance Disclosure Regulation imposes new obligations on financial institutions, including banks, in terms of transparency and disclosure of the approach to managing sustainable development risks as part of their investment activities and investment decisions made by an entity. According to the regulation, disclosures should include at least information about policies on the integration of sustainability risks in the investment decision-making process, disclosures on adverse sustainability impacts from investment decisions made, and information on remuneration policies in relation to the integration of sustainability risks.

The ESG risk management system is covered by the internal audit process, the objective of which is to verify that all relevant processes put in place follow the established procedures and that the adopted procedures are optimal (Fig. 4.8).

The ESG risk strategy adopted by an entity must be closely linked to its business strategy and must be continuously updated. The ESG risk management strategy should also be operationalized or detailed as regards specific actions taken within specified time limits. ESG risk planning horizons are usually much longer than 3–5 years (or the periods traditionally covered in business strategies). This applies in particular to the environmental aspects of ESG risk.

When planning an ESG risk management system, it is very important to both design it for each of the risks individually and take into account their cross-impacts. A similar approach should be used for risk identification.

The measurement and assessment of ESG risk are key processes. Noteworthy, ESG risks materialize in other types of risk and/or in other entities. For example, extreme weather conditions can manifest as financial risk in an enterprise and credit risk in a lending financial institution. Interconnectedness between market players may lead to the transmission or transfer of ESG risk to another entity. The main challenges in measuring ESG risk include:

- Acquisition and analysis of new data sources – the data on ESG risks must be collected, aggregated, and prepared for the development and use of ESG risk models.
- Integration – which covers the collection of data sets which have never been integrated before; harmonization of taxonomy, classification, and measurement used; non-harmonization of reporting frameworks in different jurisdictions; and non-adaptation of existing systems to the storage of ESG data.
- Standardization – no standardization in ESG risk measurement methodologies and no possibility to verify ratings provided by external entities.
- Data management – lack of experience in ESG reporting and maintaining transparency in the process of collecting and processing ESG data.

Forecasting the impact and assessing ESG risk require a wide range of expertise and are therefore an expensive process. From the point of view of financial market institutions, a key step in the ESG risk measurement and assessment process is the assessment of the current ESG exposure. This includes the integration of ESG risks

Risk strategy and appetite
- Consider ESG-related risks while establishing business objectives at various levels that align and support the strategies of the company

Risk governance
- Enhance terms of reference of current risks board committees to oversee ESG issues.
- Define roles and responsibilities on ESG issues for each function across the company.

Risk assessment and measurement
- Review material issues identified in the ESG report and review their accuracy. Consider how their related risks can be incorporated into current ERM process.
- Identify material ESG risks as part of the risk management from (i) current ERM processes, such as surveys, interviews, and workshops by expanding the scopes; and (ii) various analysis, such as megatrend analysis and materiality analysis to gauge feedbacks from stakeholders on material ESG topics.
- Tailor risk assessment criteria, in terms of impact and likelihood to assess and prioritise ESG risks.
- Obtain advice / insights from experts on ESG topics and potential risk responses, such as physical risks and transition risks of climate change.

Risk management and monitoring
- Set specific Key Performance Indicators (KPI) or directional / forward looking statements on ESG targets, including environmental- and social-related risks.

Risk reporting and insights
- Leverage existing ERM reporting mechanisms to set the frequency and form of reporting on ESG performance to the board / board committees.
- Enhance disclosure of ESG risks and discussion on how ESG issues are related to the business in the Directors' Report on ESG issues for each function across the company.

Risk culture
- Enhance an ESG risk awareness culture by embedding ESG elements into the mission, objectives and core values of the company

Data and technology
- Review current KPI tools for ERM to further enable ESG KPI reporting in terms of data availability and reliability.
- Enable automation to store, manage and report real-time risk data on KPIs, including ESG.

Fig. 4.8 Risk management system that considers ESG. (Source: *Environmental, Social and Governance An integration to long-term strategy via risk management,* KPMG, 2020, https://assets.kpmg/content/dam/kpmg/cn/pdf/en/2020/04/esg-an-integration-to-long-term-strategy-via-risk-management.pdf)

in the assessment of capital adequacy and calculation of an entity's regulatory and economic capital.

There are many methods for assessing ESG risk. For some types of risk, the solution may be to adjust the parameters of existing risk models (credit risk) or design new models. The assessment can be qualitative or quantitative. Quantification of sustainability risks in an accurate, rigorous, and credible way is difficult and in some cases even impossible (Boiral et al., 2020). For ESG, scenario analysis is the preferred method. It is worth remembering that the key element in the risk assessment process in an organization is the consistency of the adopted approach (ESG risks in banks. Effective strategies to use opportunities and mitigate risk, 2021).

The discussed issues are confirmed in practice, for example, the KPMG research from 2017, conducted on 36 banks. The presented report shows that over 88% of the banks planned to introduce regulations in the field of ESG risk management. Almost half of the surveyed banks considered risk assessment and measurement to be the most important and most difficult issue related to nonfinancial risk, and compliance risk was considered the most important type of nonfinancial risk (Navigating through uncertainty, 2017). A similar survey in 2020 was conducted by BCG and the International Association of Credit Portfolio Managers (IACPM) on 45 financial institutions. Financial institutions see nonfinancial risk as an economic issue and a regulatory imperative. However, these institutions draw attention to the complexity and difficulty of the process of integrating nonfinancial risk into the entity's existing risk management systems. The most important limitation is the lack or nonuniformity of legal regulations and taxonomies in force. Another but significant limitation is the lack or insufficient quantity or quality of ESG data. The lack of uniform regulations in the field of ESG makes it difficult to compare the data even if it can be obtained (Boiral et al., 2020; Alekseeva et al., 2021).

6 Conclusions

The growing impact of ESG risk on the operation of market entities (financial and nonfinancial) makes the system of its identification, measurement, and assessment, and then its effective management, a key challenge both in a micro- and macroeconomic context. From a macroeconomic perspective, the growing number of regulations is aimed at limiting the impact of this risk on the stability of the economy, especially in the financial sector. In terms of microeconomics, it has an impact on the operating conditions of economic entities and their financial performance.

The impact of ESG risks on the business of economic operators causes this risk to be more and more often integrated into the risk management system of organization. The measurement and assessment of ESG risk are among the biggest challenges in this area. The lack of uniformity and mutual compatibility of the introduced legal regulations, ranging from the definition of ESG factors to the ESG reporting rules, undoubtedly also hinders this process.

Financial institutions and enterprises, aware of the growing importance and impact of nonfinancial risk on their activities, undertake actions aimed at mitigating or preventing the materialization of ESG risks. Such activities may be undertaken at the individual or supply chain level.

From the perspective of an entity, a tool for reducing ESG risk is reviewing the applicable regulations, guidelines, and good practices in the field of ESG in terms of their validity in relation to the applicable law and their adequacy to the organization. Enterprises and financial institutions should include in their organizational structure and risk management system units responsible for ESG issues and disclosures made in this area. The scope and quality of ESG reporting—both mandatory and voluntary—affect the security and transparency of economic transactions, especially those of an investment nature. Therefore, entities should endeavor to ensure that ESG reporting is accurate, clear, and timely. A great facilitation for businesses is to develop and adopt appropriate good practices in area of ESG reporting and control their application on a regular basis (Lokuwaduge & Heenetigala, 2017).

ESG risk management should be addressed in a holistic way, i.e., throughout the entire supply chain. Entities can mitigate risks determining the standards and practices they expect from suppliers and then regularly monitoring compliance with these policies.

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Chapter 5
Analyzing the Links Between Financial Markets' ESG Risk Assessment Process and Corporate Sustainability

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Abstract The European Union fosters the integration of environmental, social, and governance (ESG) risks in investment decision processes being credit rating agencies crucial in this process. This chapter provides insights on how the financial markets, through credit rating agencies, are integrating ESG risks into the corporate sustainability assessment processes to find out if the ESG risk analysis criteria used by the ratings are aligned with the most important global risks for organizations. To address this, the authors carried out a secondary data analysis of the growth and consolidation of sustainability rating agencies into the sustainable investment market, focusing on explaining how credit rating agencies have integrated ESG risks in their assessment processes. The study shows that in the last years, credit rating agencies have increased the efforts to integrate ESG risks into the corporate sustainability assessment process through the incorporation of the sustainability rating agencies' assessment methodologies, which entail changes in the decision-making process of companies. However, ESG risk assessments do not seem to be well aligned with the priority global ESG risks to corporate sustainability management.

1 Introduction

Proper risk assessment and management is a critical aspect for companies and investors (Boiral et al., 2020). The academic literature reflects that investors and business managers assess and manage risks differently. Thus, in the case of non-systemic risks, i.e., those that affect a specific group of organizations and not all of them together, investors respond through an adequate diversification of their

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portfolios, so that the risk associated with the possible companies affected is see diluted in the whole portfolio. Instead, from the perspective of organizational managers, risks need to be actively managed, considering that the survival of their organizations may be limited to their ability to reduce those risks.

Under these premises, it is to be expected that company managers with the capacity to manage all the risks can make the difference between the bankruptcy of the company and its survival. In the same way, it is expected that those investors – capable of incorporating in their investment valuations a broad set of risks beyond those historically used – will achieve better results in the long term, by adequately managing not only profitability and risk in their portfolios but also returns and risks in the environmental, social, and governance spheres.

The management and assessment of environmental, social, and corporate (ESG) risks acquire, on the one hand, great importance for the survival of companies and, on the other hand, for the financial markets that should integrate ESG risks into their assessment processes to achieve more accurate valuations of financial assets. In the financial markets, to represent risk associated with ESG concerns, the terms "sustainability risk" and "ESG risk" are used interchangeably. Sustainability risks are based on the estimation of the probability of the occurrence of environmental and social events and their impacts (Boiral et al., 2020) that could affect sustainable development.

In March 2018, the European Commission published its Action Plan for Financing Sustainable Growth introducing sustainability in the political agenda for the capital markets. This Action Plan (European Commission, 2018) requires the European Securities and Markets Authority (ESMA) to foster the integration of environmental, social, and governance (ESG) risks in the investment decision processes being credit rating agencies (CRAs) crucial in this process.

As Toscano (2020) highlights, academic literature has focused on analyzing the role of CRAs, their ratings assigned to companies and securities, and accuracy. However, the new global challenges facing companies, the transition to sustainable development that has increased the interest of the European Union to integrate sustainability in the financial market, and an active long-term investor that tries to safeguard their investors' interests have pushed CRAs to establish methodologies for integrating ESG factors into their credit rating assessments.

Up till now, ESG risk assessment has been developed in the financial market by the so-called sustainability rating agencies (SRAs). SRAs evaluate the performance of organizations in terms of sustainability. In recent years, numerous studies on SRAs have emerged. Most of them have focused on their assessment methodologies (Escrig-Olmedo et al., 2010, 2014, 2019; Chatterji et al., 2016; Saadaoui & Soobaroyen, 2018; Diez-Cañamero et al., 2020). More recently, other authors have tried to advance in the analysis of how SRAs integrate ESG risk measurement into their assessment processes (Boiral et al., 2020; Hübel & Scholz, 2020). However, there has been little to no research focusing on analyzing whether the ESG risk analysis carried out by the financial markets is aligned with the most important global risks for companies and therefore facilitates help to manage corporate sustainability.

The objective of this chapter is to provide detailed insight into how the financial market, through CRAs, is integrating ESG risks into the corporate sustainability assessment processes to find out if the ESG risk analysis criteria used by the ratings are aligned with the most important global risks for organizations.

To address this objective, first, focusing on SAM and Vigeo Eiris (V.E), as providers of ESG information for two of the main CRAs in the United States and Europe, the authors carried out a secondary data analysis of the growth and consolidation of SRAs into the sustainable investment market, focusing on explaining how CRAs have integrated ESG risks in their assessment processes. Second, the main ESG criteria used by SAM and V.E to assess risks are identified and compared with the main global risks.

The study discusses how in the last years, CRAs have increased the efforts to integrate ESG risks into the corporate sustainability assessment process through the incorporation of the sustainability rating agencies' assessment methodologies, which entails changes in the decision-making process of companies. However, such ESG risk assessments are not entirely aligned with what companies consider priority ESG risks for their management. In fact, only the analysis of environmental risks by the financial market seems to be aligned with the main global risks identified by organizations.

The remainder of this chapter is organized as follows. Section 2 briefly reviews the related literature. Section 3 describes the methodology. Section 4 presents our main results and Sect. 5 concludes the chapter.

2 Theoretical Framework

Following Dyllick and Muff's (2016) "input-process-output" proposed model, the rationale of this research is summarized as follows (Fig. 5.1):

2.1 CRAs and ESG Risk Assessment

Credit rating agencies have a fundamental role in financial markets (Kisgen, 2019). In the last years, CRAs are increasing their efforts to identify corporate sustainability risks through the integration of the assessment methodologies of sustainability rating agencies. Concretely, in 2019, Moody's acquired the ESG data provider Vigeo Eiris, and Fitch Ratings designed a scoring system that allows knowing how ESG issues impact individual credit rating decisions. At the beginning of 2020, Standard & Poor's acquired the ESG Ratings Business from SAM, and Morningstar announced that it will take over Sustainalytics.

This shows, as Escrig-Olmedo et al. (2019) highlight, a consolidation process of the ESG evaluation industry. In 2008, after the global financial crisis, which revealed the need to define new evaluation systems incorporating other variables beyond the

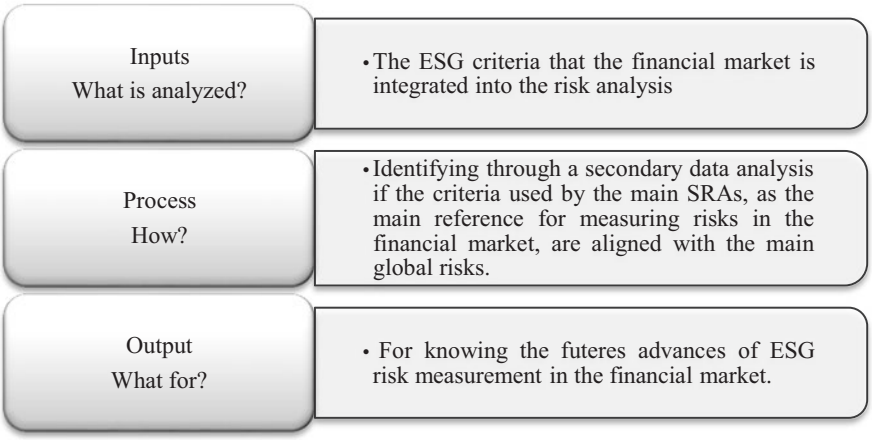

Fig. 5.1 Input-process-output research definition. (Source: Adapted from Dyllick and Muff (2016))

financials, a large number of sustainability rating agencies appeared in the financial market. Subsequently, to generate multidisciplinary work teams that designed more accurate corporate assessment models, which allow a better measurement of ESG impacts, a process of mergers and acquisitions between the sustainability rating agencies takes place.

Sustainability rating agencies have been working on incorporating risk analysis teams specialized in the analysis of ESG risks (Escrig-Olmedo et al., 2019). Nevertheless, it is a complex process considering the challenges related to the sustainability risks' measurement process – such as methodological issues related to the complexity of the concept, measurement processes, multidimensionality issues, and unpredictability of sustainability risks (Boiral et al., 2020). In the current context, the financial market needs to define more suitable methodologies to assess such risks (Aziz et al., 2015; Weber et al., 2015; Boiral et al., 2020).

One of the main problems faced by SRAs is the definition of ESG analysis criteria that will allow the extraction of adequate information from companies for risk assessment. According to the study carried out by Muñoz-Torres et al. (2019), which analyzes the sustainability evaluation criteria and methodologies used by the main sustainability analysis agencies, some heterogeneity is observed between the ESG criteria, although some criteria do seem to be analyzed by most of the SRAs. Regarding environmental aspects, the most used analysis criteria were environmental policy/management, water use and management, and the protection of biodiversity. Furthermore, in recent years, the aspect that has been substantially incorporated into the evaluation process of the ESG rating agencies has been climate change. With respect to social aspects, the criteria that have been substantially considered in the evaluation process of ESG rating agencies were quality working conditions, health and safety, labor management, and human rights. Finally, the three aspects of corporate governance considered by most of the ESG rating agencies were corporate governance functions and committees, prevention of corruption and bribery,

and transparency. However, the research question (RQ) that arises is: *Are these criteria, used by SRAs to extract the information required for their ESG risk analysis, sufficient to measure the main global risks that allow companies to manage their corporate sustainability in the current context?*

2.2 Global Risks

Every year the World Economic Forum publishes its report with the main global risks, based on the answers given by opinion leaders surveyed from the business, academic, and social fields.

According to the Annual Report of the World Economic Forum (2021) on Global Risks, on the one hand, among the most likely risks of the next 10 years are extreme weather events, climate action failure, environmental damage caused by the human population, digital power concentration, digital inequality, and the lack of cybersecurity. On the other hand, among the risks with the greatest impact in the next decade are infectious diseases, followed by climate action failure and other environmental risks, weapons of mass destruction, livelihood crises, debt, and the breakdown of information technology infrastructures (see Table 5.1).

The imminent threats, meaning the most likely in the next 2 years, include the employment and livelihood crisis, widespread youth disillusionment, digital inequality, economic stagnation, human environmental damage, social cohesion erosion, and terrorist attacks.

Economic risks feature prominently in the 3–5-year period, including asset bubble burst, price volatility, commodity shocks, and debt crises. They are followed by geopolitical risks, including conflicts and relations fracture between states, and the resource geopolitization.

Table 5.1 Global risks

	Top Risks by likelihood		Top Risks by impact
1	Extreme weather	1	Infectious diseases
2	Climate action failure	2	Climate action failure
3	Human environmental damage	3	Weapons of mass destruction
4	Infectious diseases	4	Biodiversity loss
5	Biodiversity loss	5	Natural resource crisis
6	Digital power concentration	6	Human environmental damage
7	Digital inequality	7	Livelihood crisis
8	Interstate relations fracture	8	Extreme weather
9	Cybersecurity failure	9	Debt crisis
10	Livelihood crisis	10	IT infrastructure breakdown

Source: Adapted from World Economic Forum (2021)
Risk categories: Economic, Environmental, Geopolitical, Societal, Technological

In a horizon of 5–10 years, environmental risks such as biodiversity loss, natural resource crises, and climate action failure are the dominant ones. Additionally, there are weapons of mass destruction, the adverse effects of technology, and the social security or multilateralism collapse.

The results of the Annual Report of the World Economic Forum (2021) highlight how important ESG risks are and the need for companies to actively manage these risks. The use of ESG risk criteria in business management is the best way to manage an organization according to the increasing demands for transparency and accountability. It will be in a position to foresee results that would not be foreseeable under other forms of management. Therefore, it could anticipate risks and opportunities that would not otherwise be detectable, that is, it could establish a risk control system that would allow it to detect and therefore manage not only its "economic" results but also other impacts not so "monetizable" or tangible.

In this line, Fernández-Izquierdo et al. (2014) propose the integration of the corporate sustainability approach into the Enterprise Risk Management Framework (ERM), elaborated by the Committee of the Sponsoring Organizations of the Treadway Commission (COSO). Specifically, the study proposes to extend the COSO model (2004, updated in 2017) to ensure that organizations can integrate ESG criteria with financial criteria through the ERM components in order to achieve the three categories of objectives (operational, communicational, and regulatory compliance) in financial-economic, social, environmental, and governance terms, that is, to integrate ESG risks into the ERM Integrated Framework.

However, there has been little to no research focusing on analyzing whether the ESG risk analysis carried out by the financial markets is aligned with the most important global risks for companies and therefore facilitates help to manage corporate sustainability.

3 Methodology

The authors carried out a secondary data analysis of the case of two of the most important sustainability rating agencies in the financial market, considering their usefulness and quality, according to SustainAbility Institute (2020) and the results published in its Rate the Raters report, 2020. The rating agencies analyzed were SAM (which recently transferred its ESG rating business to S&P Global) and Vigeo. Eiris (V.E). Concretely, the SAM evaluations were rated by investors and experts as the highest quality and useful. Meanwhile, V.E evaluations were rated very positively by investors, ranking eighth among the highest quality sustainability rating agencies and in the tenth place regarding its usefulness (SustainAbility Institute, 2020). It should also be noted that the choice of these two SRAs is also determined by the fact that their ratings are being used by the most important CRAs.

Public information available on the corporate websites of the sustainability rating agencies, as well as other public reports on their evaluation methodologies from February–July 2021, were used as bases for the analysis.

The aspects analyzed were (i) the process of constitution of the current sustainability rating agencies to date, (ii) their corporate sustainability assessment criteria, and (iii) the relationship with global ESG risks that are a priority for companies according to the Annual Report of the World Economic Forum (2021).

4 Results

This section presents, firstly, an analysis of the creation process of the current sustainability rating agencies and, secondly, an analysis of the main ESG criteria used in risk assessment by the financial market, through the SRAs, and the main global risks.

4.1 Corporate Sustainability Assessment Market

Figure 5.2 shows how the current sustainability rating agencies are the result of a series of mergers and acquisitions that have occurred in the financial market, which corroborates the conclusions presented in the research study of Escrig-Olmedo et al. (2019). As the results of this analysis reveal, this process culminates in 2020 with the entry of the traditional credit rating agencies in the ESG industry, which have integrated the sustainability rating agencies' evaluation systems into their corporate assessment models. In the current research, focusing on SAM and V.E rating agencies, we can extrapolate interesting conclusions about market behavior.

In 2006, Robeco acquired SAM Group, one of the leading companies in the socially responsible investment industry. In 2013, SAM Group was renamed RobecoSAM. However, in 2019, RobecoSAM transferred its ESG ratings and index business to the credit agency S&P Global. One of its main activities is to assess corporate sustainability using the "S&P Global Corporate Sustainability Assessment (CSA)" tool, the former "SAM CSA." Currently, S&P Global evaluates, in terms of sustainability, the components of the Dow Jones sustainability indices.

CSA uses a rule-based methodology depending on the industry. To carry out the evaluation, the information is collected through a questionnaire of approximately 100 questions on 23 different topics or criteria grouped in the pillars: environmental, social, and governance and economy. CSA provides an overall and per-pillar assessment.

Figure 5.2 shows how SAM has opted for risk assessment with the integration of RepRisk, which is an information services provider specializing in ESG risks. It is updated daily to make timely and actionable decisions on ESG and business conduct risks.

Sustainability rating agencies Vigeo and EIRIS merged on December 22, 2015, to create a single European agency with global reach. In this way, in 2020 the current V.E is constituted as a global provider of environmental, social, and governance

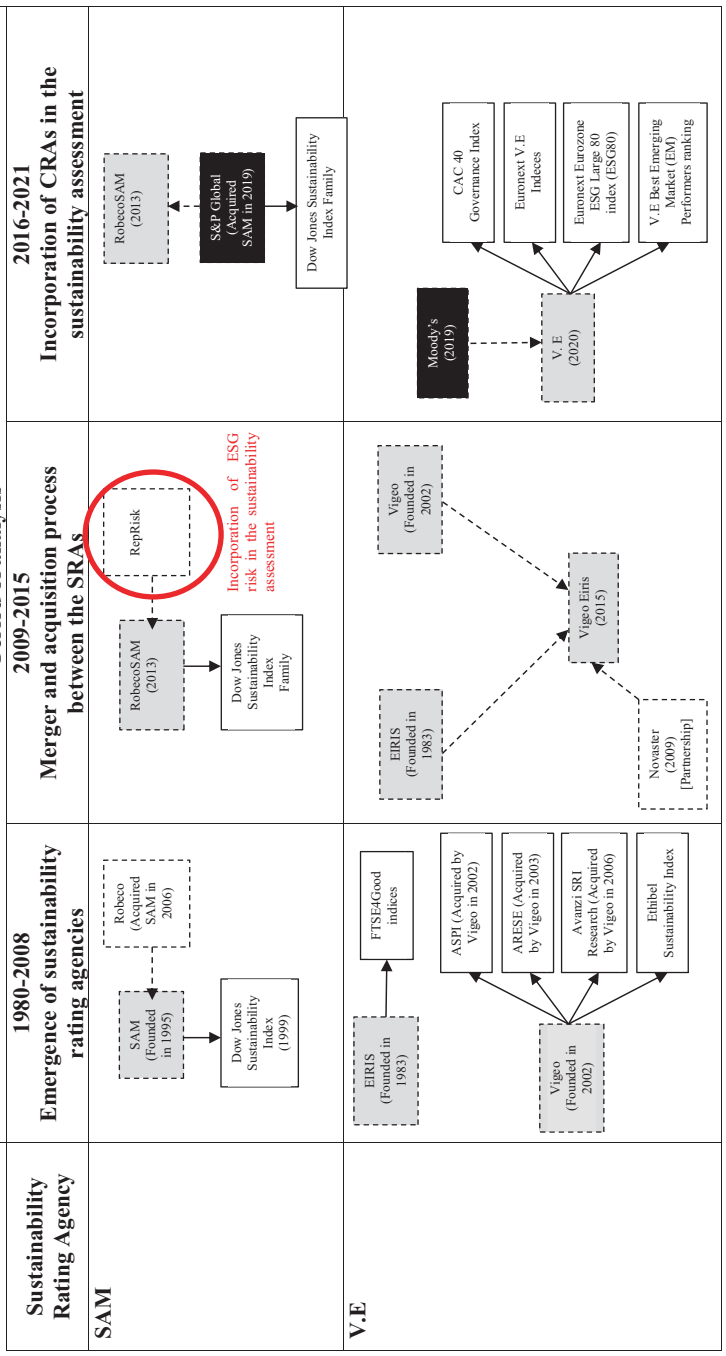

Fig. 5.2 Evolution of the sustainability rating agencies of the sample

information for investors and public and private companies. V.E is present in Hong Kong, Paris, London, Boston, Brussels, Casablanca, Milan, Montreal, and Santiago (Chile) and has a large team of professionals. In addition, since 2019 it has become an affiliate of Moody's.

V.E measures the sustainability of companies using 38 ESG criteria and 250 data points grouped into environmental, social, and governance factors. It also carries out a materiality analysis of the different ESG criteria depending on the industry. The overall weight of the criterion is determined by reference to a sum of the numerical levels assigned to the three aspects: nature of rights, stakeholder risks, and company risks. Before this analysis, V.E compiles the relevant information through a questionnaire that it carries out to the company and from different public reports, the press, and the stakeholders to proceed to evaluate the performance of the organization in terms of sustainability.

The results show that the evaluation of extra-financial risks has been integrated into the traditional risk assessment, which the financial market has carried out up to now through credit rating agencies. Traditional CRAs begin to integrate into their assessment models the expert knowledge of the SRAs. However, is the ESG risk assessment carried out by the financial market aligned with the main global risks? Do these evaluations allow adequately valuing assets and managing corporate sustainability?

4.2 ESG Risks Analyzed by Rating Agencies vs. Current Global Risks

SAM and V.E analysis criteria were analyzed and compared with the main global risks presented in the Annual Report of the World Economic Forum (2021) to analyze if the SRAs are using the appropriate ESG criteria to measure the most important global risks for organizations that allow them to manage their corporate sustainability.

Figure 5.3 reflects how the ESG criteria, used by sustainability rating agencies to measure ESG risks, are partially aligned with the main global risks (in terms of probability and impact), which are key to the management of organizations today.

Only the big global environmental risks "Climate action failure" and "Biodiversity loss" seem to be considered in the systematic risk analysis carried out by SAM and V.E. Risks related to "Extreme weather" seem to be only integrated in the SAM analysis, and those related to "Human environmental damage" seem to be only considered in the case of VE, although there are no specific indicators.

With the public information available, it is not observed that any of the analyzed sustainability rating agencies assesses the priority global risks related to the risk categories: economic, geopolitical, and societal. Only SAM seems to integrate other global risks linked to the technological category, such as "Cybersecurity failure" and "IT infrastructure breakdown."

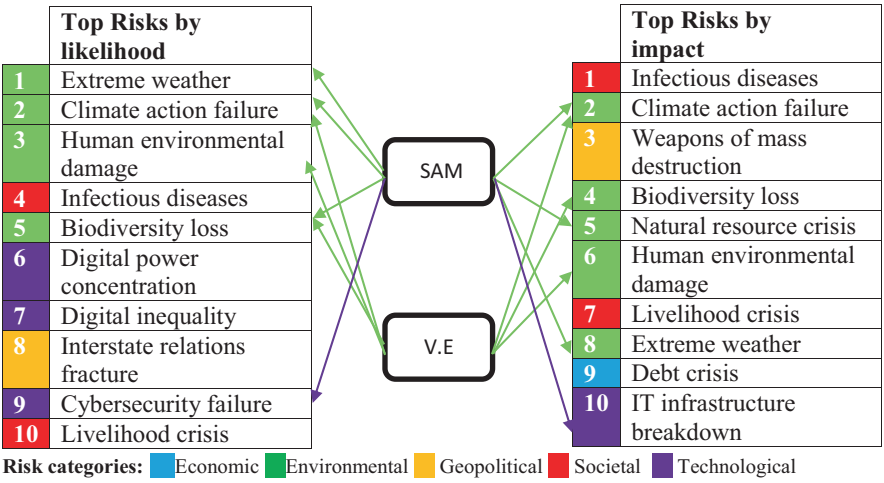

Fig. 5.3 Global risks analyzed by SRAs. The arrows indicate that global risks are considered in the SRA assessment processes

Appendix I shows in detail those aspects analyzed by SAM and V.E that are directly related to the priority global risks highlighted in the Annual Report of the World Economic Forum (2021).

In the questionnaire that SAM sends to the companies that are evaluated, SAM requires companies to indicate "two important long-term (3–5 years+) emerging risks that company identifies as having the most significant impact on the business in the future, and the actions that company has taken in light of these risks" grouped into five categories economic, environmental, geopolitical, societal, and technological, taking as a frame of reference World Economic Forum Global Risk Report. However, this analysis of the main global risks seems superficial, partial, and not systematized with concrete indicators that allow us to say that SAM integrates the main global risks in its assessment process.

5 Conclusions

This new global context, coupled with the current financial and humanitarian crisis caused by Covid-19, has forced financial markets to rethink their risk assessment models (Aziz et al., 2015; Weber et al., 2015; Boiral et al., 2020). Credit rating agencies have increased the efforts to integrate sustainability risks into the corporate sustainability assessment process (Escrig-Olmedo et al., 2019) through the integration of the sustainability rating agencies' assessment methodologies. However, *is the ESG risk assessment carried out by the financial market aligned with the main global risks?*

This chapter provides insights into how the financial markets are evaluating the ESG risks associated with global risks. To do this, the authors carried out a secondary data analysis of the case of two of the main SRAs: SAM and V.E. The results of this research suggest that traditional credit rating agencies are integrating into their risk assessment models the sustainability assessments made by sustainability rating agencies. However, the ESG analysis criteria used by the SRAs do not allow an assessment of the main global risks for organizations in the current context. Only some global environmental risks appear to be considered in the SRA assessment processes.

These results question whether the assessments provided by the financial market can help corporate sustainability through risk management. In fact, with the public information available, it seems that latent risks that at the moment are especially relevant for organizations, since they have a direct impact on the survival of the company, such as infectious diseases, are not considered in the evaluations made by the financial market. On the other hand, there is the underlying idea that ESG risk management reverts to an increase in profitability for the investor.

The financial markets, and concretely the CRAs, should make efforts to define financial and extra-financial risk assessment models that are aligned with the main global challenges that organizations face.

This study provides a novel approach to the analysis of how the financial markets are integrating ESG risks. From a practical perspective, the results of this study could be of interest to policymakers, investors, and companies. First, this is a relevant issue considering the changing European regulatory framework, which will foster the European financial market to mainstream sustainability into risk management. Second, investors require comparable and measurable information to consider sustainability issues in their risk assessment processes. Third, companies need a framework that could be used for corporate risk management.

This work presents several limitations to consider and that open up new avenues of research. It is worth noting the constant changes in the sustainability assessment market with multiple processes of mergers, acquisitions, and the disappearance of ESG rating agencies, as well as the selection of a limited series of cases for analysis that may not show all the particularities of sustainability rating agencies, although we believe that the sample covers the main trend. Furthermore, this study, which is based on the information provided on the websites of these agencies, is limited by the lack of public and detailed information on the corporate sustainability assessments carried out by sustainability rating agencies and by the biased researchers in interpreting the data.

Future work is expected to address these limitations by expanding the sample and deepening not only the ESG analysis criteria used for risk assessment but also the risk assessment methodologies used by the financial market.

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Appendix I: Global Risks Analyzed by SRAs

	Top Risks by likelihood	SAM	VE		Top Risks by impact	SAM	VE
1	**Extreme weather**	Physical risks: may arise from dramatic extreme weather events or subtle changes in weather patterns.		1	**Infectious diseases**		
2	**Climate action failure**	• Direct Greenhouse Gas Emissions (Scope 1) • Indirect Greenhouse Gas Emissions (Scope 2) • Scope 3 GHG Emissions • Climate Risk Management • Climate Risk Assessment • Climate Change Strategy	• GHG emissions from T&D • Carbon Footprint & Energy Transition	2	**Climate action failure**	• Direct Greenhouse Gas Emissions (Scope 1) • Indirect Greenhouse Gas Emissions (Scope 2) • Scope 3 GHG Emissions • Climate Risk Management • Climate Risk Assessment • Climate Change Strategy	• GHG emissions from T&D • Carbon Footprint & Energy Transition
3	**Human environmental damage**		Industrial accidents and pollution	3	**Weapons of mass destruction**		
4	**Infectious diseases**			4	**Biodiversity loss**	Biodiversity Exposure	Protection of biodiversity
5	**Biodiversity loss**	Biodiversity Exposure	Protection of biodiversity	5	**Natural resource crisis**		
6	**Digital power concentration**			6	**Human environmental damage**		Industrial accidents and pollution
7	**Digital inequality**			7	**Livelihood crisis**		
8	**Interstate relations fracture**			8	**Extreme weather**	Physical risks: may arise from dramatic extreme weather events or subtle changes in weather patterns.	
9	**Cybersecurity failure**	• Information Security/ • Cybersecurity & System Availability		9	**Debt crisis**		
10	**Livelihood crisis**			10	**IT infrastructure breakdown**	• IT systems and data. IT Security • Cybersecurity Process & Infrastructure	

Risk categories: Economic Environmental Geopolitical Societal Technological

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Chapter 6
Business Models for Sustainable Value Creation in Companies and Financial Markets

Blanka Tundys

Abstract The Triple Layered Business Model Canvas (TLBMC) has been proposed in response to the need for new innovative business models that address the three pillars of sustainability: the economic, social and environmental aspects. A business model can use different tools to support sustainability through an outside-in or inside-out approach. The triple bottom line (TBL) perspective, which has been incorporated into the standard Canvas model, expands the possibilities of using management tools in innovative ways. This article demonstrates how introducing environmental, social, economic and managerial value elements contributes to value creation. The aggregated EGS indicators used in the assessment of companies by the financial market on the basis of environmental, social and corporate governance aspects are presented. They are linked to a modern management support tool, TLBMC. The links, as well as the advantages of the introduced solutions, foster the development of a holistic approach and, in the long term, can bring mutual benefits for all stakeholders, both measurable and non-measurable. Stakeholders play an important role in promoting, demanding and initiating various types of initiatives, including those related to sustainable development.

1 Introduction

The business environment is constantly changing (Schoneveld, 2020, p. 1–13). Businesses and financial markets are facing new and different challenges, pressures and emerging issues (Miryala & Aluvala, 2015). Solutions must be sought that address the various risks while, at the same time, providing an opportunity to implement innovation. In order to meet these requirements, organisations and the financial markets that operate and support their activities need to integrate eco-efficient

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and eco-effective innovations as creatively as possible, integrated into their core business. At the same time, such measures will protect environmental, financial and social resources (Castelló & Lozano, 2011, p. 11–29). New business strategies require innovative approaches and, above all, an orientation towards sustainability. Innovation in the strategy is to create sustainable value by identifying strategies and practices that contribute to a more sustainable world by viewing global sustainability challenges through an appropriate set of business tools and using these strategies and practices to increase shareholder value (Manda et al., 2016, 337–351).

Changes in business models must involve the entire organisation and its stakeholders (Joyce & Paquin, 2016 p. 1474–1486; Adams et al., 2016, p. 180–205). TLBMC can become an effective means of implementing innovative business strategies (Joyce & Paquin, 2016, p. 1474–1486) and represents a practical tool for the integration of social, environmental, and economic aspects into a model (Osterwalder & Pigneur, 2010). Additional layers of the model allow for the effective implementation of social and environmental aspects together with a typically economic orientation. The creation of sustainable innovative business models meets the ESG criteria, which allow the financial, environmental and social impact of the organisation to be measured and can be a determinant of decision-making within the financial sector.

Furthermore, the indicated sustainability elements can form the basis of the organisation's business model. Such an approach also supports the requirements of external stakeholders, who expect new approaches and stakeholder, process and activity management systems that conceptualise different perspectives in business models. Opportunities and strategies should therefore be sought that use innovative business management tools to support triple bottom line (3BL). Consequently, the question arises as to how the key components of a business strategy can support the creation of value for the customer, individual stakeholders and the supply chain and how the 3BL elements can create this value. It is necessary to consider whether combining, applying and implementing sustainability principles (economic, social and environmental) in business strategies is an optimal solution.

2 The Triple Layered Business Model Canvas (TLBMC) as an Example of Sustainable Business Model Management

2.1 Business Models: Approaching, Definitions and Concepts

Transparent business models with well-defined goals, understood by the organisation and its stakeholders, can become an element of competitive advantage (Khan et al., 2021, p. 1–16). New relationships can create new value. Previously overlooked linkages and attention to other value-creating elements can become elements of competitive advantage. A turbulent environment, changes in management methods and the strong impact of stakeholders on the organisation's activity force

organisations to address new challenges associated with creating, transforming and using innovative business models in their operations, which will create a competitive advantage conditioning the effectiveness of their business activity (Leon, 2017).

In conducting business, methods and tools are used that are currently supported by appropriately selected business models. The model reflects the defined goals and tasks of the organisation, indicating, at the same time, the stages of the undertaken operational activities. The model is intended to allow the organisation to survive and to build a sustainable competitive advantage and create value. The task of the model as a value creator is a specific combination of tangible assets and properly used intellectual capital. In this approach, value can be increased through the attractiveness of the organisation, and this can be ensured by applying innovative solutions and matching market trends and stakeholder expectations. A key feature of a model is that it is constantly changing; it is dynamic, and the changing environment influences value creation. A business model is a combination of the company's strategy and methods for its practical implementation, which are necessary elements when building a value chain, allowing for the exploitation and renewal of resources and skills. Models determine the specific characteristics of the organisation, building its image, which, in consequence, may contribute to the growth of the company's value. The creation and effective use of a business model are influenced not only by the organisation but also by its environment (closer and further, min. market mechanisms, political and legal conditions, demographic situation, socio-cultural factors, competition, customers/customers, financial sector) and stakeholders. The broad business model is described by Osterwalder et al. (2005a, s. 3). The authors pointed out that a business model is a conceptual tool that contains the components and the relationships between them to represent the logic of a company's business. It describes how a company creates and profits from the value created. At the same time, the authors described the elements that are necessary to create a complete business model (Osterwalder & Pigneur, 2010, 2012). These should include a customer segment, value proposition, distribution channels, customer relationships, revenue streams, key resources, key activities, key partners and cost structure.

The implementation of innovative business models based on the available tools for their modelling, assessment and, at the same time, creation can effectively reorient the strategic activities of an organisation, leading to new, value-creating objectives that will allow it to function effectively on the market; therefore, innovation is important for the creation of business models. When implementing a model, it is necessary to take into account the dependencies between the assumptions of the model, the business itself, its structure and environment and above all to locate people in the central place, because it is they who are the creators of all actions taken; the staff plays the central and most responsible role in the functioning of the model of a given organisation (Afuah, 2014; Massa et al., 2017, p. 73–104). In order to ensure a model's effectiveness, it is necessary to acquire an in-depth understanding of the organisation's environment and surroundings, as well as the impact and expectations of stakeholders. Customers and regulators of the financial system have a great influence on the organisation's activities. The study of conditions affecting the organisation itself and the expectations of stakeholders, who also create changes

and indicate trends in activity, determines the creation and adjustment of business models.

When designing new business models, it is necessary to pay great attention to and take into account not only suppliers, customers and regulators but also business support organisations (financial sector) and to appropriately adjust the concept and design of the implementation of the assumed objectives and activities within the framework of the specified processes; the external conditions, including market problems; the factors shaping it; the needs of the market; the costs of changes; revenue attractiveness; the infrastructure resources of the economy; and internal conditions, i.e. competition, cost structure, strengths and weaknesses. All organisations that exist in the value chain of a given industry and all stakeholders who may have an impact on the ability of the organisation to function and shape an appropriate business model must be considered. Business models are determined by expected and observed trends: these may be technological, social, cultural or legislative. Material and non-material resources that make up the processes performed in an organisation are also an important element, as are the possibilities of using R&D processes, which combine innovation processes and research and development works. Innovations in business models provide financial and business benefits (Geissdoerfer et al., 2018, 401–416; Grieco et al., 2021) by reducing costs and improving flexibility, being, at the same time, a means of avoiding threats from competitors.

A business model is more than simply an appropriate and logical tool for conducting business, as it must first and foremost be oriented towards the users' needs, be difficult for competitors to imitate and be firmly based on reality and the conditions in which the company operates (Teece, 2010, p. 172–194).

In general, business models can be considered from three perspectives: financial, operational and strategic (Morris et al., 2005, p. 726–735). These approaches indicate the type of decisions to be made regarding the model to be implemented, and their application should lead to the creation of a sustainable competitive advantage, taking into account decision variables as well as observed market trends. Models should be tailored to the sector, industry and nature of the organisation. Other activities will be highlighted in models for e-business, others for innovation or technology management and still others for strategic issues related to value creation, competitive advantage or organisational performance (Massa et al., 2018, p. 59–71; Zott et al., 2011, p. 1019–1042). The last solution in fact applies to organisations in general, as it addresses strategic issues related to competitive advantage, the value chain as well as value creation and business performance. It is in this area that actions are sought to determine how to do business and how to work with customers, partners or suppliers; this approach requires going beyond the organisation, and designing this system requires consideration of two types of parameters: design parameters (such as scope, structure and management) and thematic parameters (novelty, customer retention, complementarity and effectiveness) (Zott & Amit, 2010, p. 216–226). A business model must define how the company delivers value to its stakeholders. Models consist of different components that are interrelated: the customer value proposition, the profit formula, key resources and key processes

(Johnson et al., 2008, p.57–68; they can also include resources and competences and organisational structure, including the value chain and value network (relationships with suppliers, customers and competitors) and customer value proposition (Plé et al., 2010, p. 226–265; Demil & Lecocq, 2010, p. 227–246). The model can also be defined by answering four questions: who is the company's customer (who?), what does the company sell (what?), how does it produce products and services (how?), why is its business profitable (why?) (Gassmann et al., 2014, p. 89–97). Finally, Osterwalder et al. (2011) indicate that the creation of a business model can be divided into areas and elements within these areas. The elements include value propositions, customer segments, distribution channels, customer relationships, key resources, key activities, key partners, revenue streams and cost structure.

It is possible to distinguish a diverse range of business models; new types or forms of models are associated with the use of new forms of communication (e.g. the Internet) or the creation of new products, services or means of conducting business, especially based on the redesign of the enterprise value chain. In the classic approach of M. E. Porter (2001, p. 50–66), the value chain is a sequence of consecutive activities related to the production of products or provision of services: from resources and competences to the final products satisfying the customers' needs. Its structure consists of basic elements (internal logistics, operational activities, external logistics, marketing and sales, service) and supporting activities (company infrastructure, human resources management, technology development, procurement). In addition to the company's value chain, the value system can be distinguished, which consists of the value chain of the supplier, distributor and purchaser (Porter, 2008). The literature on the subject indicates that new business models are variations and combinations of the traditional value chain, and contemporary expectations require adaptation to economic needs and trends. At the same time, some have discussed the so-called modern value chain, which is the inversion of the traditional value chain and starts with the customer and ends with resources and competencies (Slywotzky et al., 2000). Within this chain, different profit models can be distinguished. Different classifications and types of business models can be found in the literature (Osterwalder et al., 2005b, 2011 p. 22–30; Johnson, 2010; Gassmann et al., 2014, p. 89–97; Linder & Cantrell, 2000, p. 1–13), which are generally open-ended. Economic practice generates new forms of such models or contributes to the improvement of already known solutions. Business models therefore require a creative approach, innovation, the addition of new dimensions (e.g. environmental, social) and the elimination or modification of already existing solutions, reducing the role of, for example, traditional profit factors. The customer's perspective and the business environment are changing, and the organisation's offerings must be adapted to the changing expectations and value creation. Such an approach requires the ability to define and redefine the enterprise's business model, which should be counted among the key competences that foster the creation of enterprise value. The system of connections and causal links between individual components of the business model should allow for the implementation of the assumed objectives of the enterprise. The architecture of the business model should be flexible and favourable

to modification and innovation. With this approach, you can achieve a competitive advantage. It can achieve business, social and environmental goals at the same time. The source of value creation should be sought in (Amit & Schoemaker, 1993, p. 33–46, Amit & Zott, 2001, p. 493–520) efficiency, complementarity, lock-in (related to repeatability and customer retention) and innovation.

3 The Role of 3BL Aspects in Implementing Innovative Business Models

The implementation and integration of non-economic factors into business model concepts have been discussed and questioned for many years since the publication of the Brundtland report (Brundtland, 1987, p. 291–294.). In order to increase awareness of sustainability, it is pointed out that sustainable business models need to be built that contribute responsibly to economic returns. Models must take into account environmental; social, including social responsibility; and economic aspects. These goals can be implemented at company, industry or supply chain level. Business models, as a specific conceptual tool, are required to support the integration of the identified sustainability objectives into business practice. Companies adapting the principles and assumptions of sustainable business models to their activities must develop internal structures and organisational culture to achieve sustainability at the company level, while collaborating with external stakeholders can achieve sustainability of the system of which they are part (Stubbs & Cocklin, 2008, 103–127).

Within this context, one can discuss sustainable business models that adapt to sustainability determinants, objectives and solutions, taking into account a wide range of stakeholders and their needs and requirements, assigning a special role to the environment and society. Sustainable business models are relevant to the implementation of innovation for sustainable development and help to integrate it into business objectives and processes, using this as a source of competitive advantage (Bocken et al., 2014, p. 42–56). The creation of innovative pro-environmental and pro-social business models goes beyond the preparation and implementation of individual projects in the above-mentioned areas, but it requires decision-making at every level of management, from operational to strategic. Stakeholders play an extremely important role in this context, as they, among others, contribute to and often motivate or expect changes. An important element is the approach to value generation and current environmental and social challenges, which must be reflected in the organisation's strategies and goals, including financial considerations, e.g. developing an environmental cost analysis, or taking initiatives to tackle pollution (Osterwalder et al., 2005b). There is no single, generally applicable or universal model that can indicate which elements should be taken into account in order to generate a sustainable business model; some of the actions taken are carefully planned, and some are undefined and result from the desire to adapt to market

trends, which may be a reflection of the desire to improve the image or a marketing effort. Such analysis indicates that changes are not always sustainable and models do not always take the 3BL criteria into account.

Expectations of stakeholders, the market as well as the need to adapt to legal requirements, which are clearly related to sustainable development, are most strongly reflected in those areas of business where the impact on the environment and society is the greatest. These include the transport, clothing, chemical, pharmaceutical and mining industries. Increasingly safety-conscious and safety-sensitive customers also require changes to strategies and business models, as is often the case in the food industry. Actions taken, expectations and requirements result in the creation of standards, guidelines or initiatives whose task is to indicate directions and specific solutions that should be applied both by individual organisations and entire supply chains or industries. A good example is the OECD guidelines related to due diligence in supply chains with high social and environmental risk (Liberti, 2012; Lawal, 2019, p. 1–3).

In an approach that implements the principles of sustainable development, particular attention is paid to building relationships with customers and other stakeholders, involving a variety of activities – for example, communicating 3BL-related content in the context of the product offered, service provided or process performed. Changing to a more sustainable business model is also an opportunity to generate financial benefits from a preventive approach to the environment. It is important that a sustainable business model is not only based on the implementation of legal provisions, as social aspects are also important, such as relations with employees, the culture of the organisation, local development, participation in the activities of the local community, planning environmentally friendly infrastructure investments, involvement in such projects and co-participation. An innovative and modern approach to business management including sustainable development requires conveying and sharing information with customers, including complete information about the extent to which a given organisation realises this model. This should be a priority and a motivator, because it is the long-term assessment of an organisation's activities by its stakeholders that can increase its competitiveness and value. Economic, social and environmental value should complement each other. All three elements have common goals, values and responsibilities and should be complementary and integrated. Nowadays, in order to meet trends, social and environmental aspects are an indispensable element in creating a multidimensional and interdisciplinary value creation construct. Modern business models serve to create shareholder value, but, more broadly, they serve societies. Sustainable business models generate strategic value, which, in some cases, is transformed into valuable objects or services and sometimes creates higher-level social and environmental value. Sustainable business models go beyond traditional economics, pointing to the intangible nature of value (especially considering the social aspect), providing a basis for building cooperation between different stakeholder groups in a networked environment and creating conditions for the effective reception of sustainable business activities (Fig. 6.1).

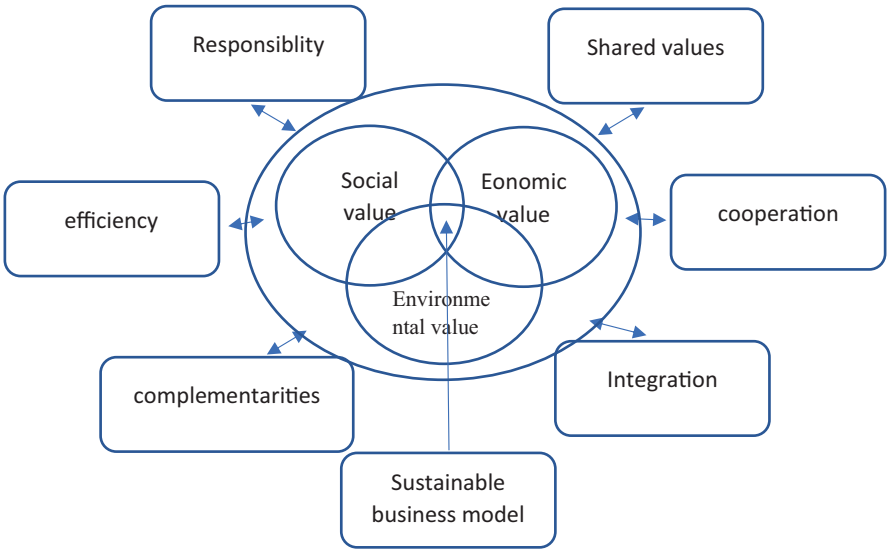

Fig. 6.1 Elements of sustainable business model – value approach

An important element that helps to further elucidate the idea of creating sustainable business models is the archetypes presented in the literature (Bocken et al., 2014, p. 42–56). Their identification allows for a value management approach, which means developing products and services that require less resource consumption, waste and emissions into the environment, with the delivery of similar functionalities; creating and delivering value mean undertaking partnership activities aimed at saving resources; eliminating waste, emissions and pollution; exploiting innovation; as well as building new forms of partnership and value networks by reconfiguring and improving the efficiency of the value chain. The final element is value capture, which involves reducing costs through the efficient and optimal use of materials and emissions, leading to increased profitability and price competitiveness. The archetypes of sustainable business models can be shaped by innovative solutions through technological, social and organisational aspects (Fig. 6.2). In terms of technical aspects, the grouping includes activities that use technology to maximise materials and energy efficiency, create value from waste and replace traditional processes with renewable energy sources and natural processes (Calvo & Villarreal, 2018, p. 26–39). In social terms, integration is achieved by actively supporting the creation of two-way links between stakeholder networks, which is currently taking place in the digital economy through the building of interactions between the social fabric of entrepreneurial ecosystems and the emergence of sustainable business models (Neumeyer & Santos, 2018, p. 4565–4579). Regarding the organisational aspect, changes in the implementation of organisational innovations are the dominant component.

Economic changes that determine the effectiveness of business activities mean that organisations do not have to use a single business model; it is preferable to use

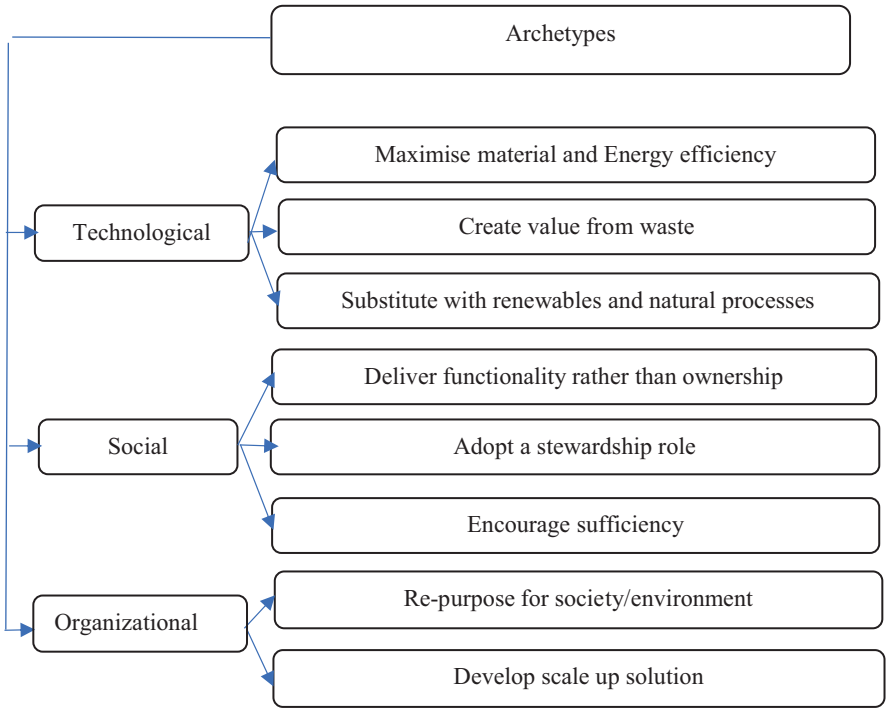

Fig. 6.2 Types of archetypes of sustainable business models. (Source: Adapted from Bocken et al., 2014, p. 42–56)

hybrid solutions, and it is possible to rely on several solutions so as to ensure an optimal balance of benefits for the industry and other stakeholders. The literature on sustainable business models suggests that there are holistic models of sustainable entrepreneurship in which social, environmental and economic value can support each other (Lans et al., 2014, 37–47; Lozano, 2018, 1159–1166). It can therefore be considered that holistic hybrid business models are becoming a key mechanism for sustainable value extraction for companies (Davies & Chambers, 2018, 378–386). Reference to innovative business models, in the context of the use of hybrid models in the literature, refers to management structures (Battilana & Lee, 2014, 397–441) or organisational management in general approaches (Doherty et al., 2014, 417–436). In terms of sustainable business models, the hybrid approach is described in the literature (adapted from: Davies & Chambers, 2018, 378–386) as components of the above concepts relating to, inter alia, value propositions (Osterwalder et al., 2014; Austin et al., 2006, 1–22; Hahn & Ince, 2016, 33–52; Dey & Teasdale, 2016, 485–504), value creation and delivery (Dacin et al., 2011; Battilana & Lee, 2014, 397–441; Doherty et al., 2014, 417–436; Davies et al., 2019, 1616–1636; Davies & Crane, 2010, 126–139; Santos et al., 2015, Austin et al., 2006, 1–22; Lehner & Nicholls, 2014, 271–286; Davies et al., 2019, 1616–1636; Dean & McMullen, 2007, 50–76; Anner, 2012, 609–644; Short et al., 2009, 161–194) and value capture

(Lüdeke-Freund & Dembek, 2017, 1668–1678; Santos et al., 2015; Lüdeke-Freund et al., 2017, 169–206). However, this is a space that has not been explored in sufficient depth to date. There are attempts to indicate to what extent sustainable entrepreneurs use traditional and hybrid models and whether a holistic approach to sustainability facilitates value creation on multiple levels.

Changes in business models must be based on a modification of the existing approach, its appropriate planning and implementation of the change. Theory says that for organisations to be considered sustainable, the neoclassical model of organisation must be transformed rather than supplemented by social and environmental aspects (Stubbs & Cocklin, 2008, 103–127). Designing a new, innovative model (including in the context of its sustainability) requires an approach that optimises and mutually reinforces all the elements that make up such a model. Business models are complex, and their success can be attributed to the interaction of seemingly minor relevant elements (Osterwalder et al., 2005b).

Sustainable business models draw on the economic, environmental and social aspects of sustainability in defining the organisation's purpose; in terms of performance measurement, they draw on the principles of 3BL; at the same time, they consider the needs of all stakeholders rather than giving priority to shareholder expectations and what is very important is they treat nature as a stakeholder and promote environmental management (Stubbs & Cocklin, 2008, 103–127). Sustainable business models help to describe, analyse, manage and communicate a company's sustainable value proposition to its customers and all other stakeholders. They are therefore not only limited to the structural framework of the organisation but also indicate how it creates and delivers this value and how it captures economic value while maintaining or regenerating natural, social and economic capital beyond its organisational boundaries (Schaltegger et al., 2016, 3–10).

Recent literature is moving away from the traditional approach to sustainable business models (Lozano, 2018, 1159–1166) in which the focus is on value proposition, creation and delivery in order to understand value as four flows: material resources and energy (as inputs) and products and services (as outputs), economic value, human resources and environmental value. In this sense, more sustainable business models (MSBMs) will be defined as: 'A holistic and systemic reflection of how a company operationalises its strategy, based on resource efficiency (through operations and production, management and strategy, organizational systems, governance, assessment and reporting, and change), so the outputs have more value and contribute to sustainability more than the inputs (with regard to material and resources that are transformed into products and services, economic value, human resources, and environmental value). The business model is affected by the company's resources (tangible and intangible), the supply chain and the company's stakeholders (internal, interconnecting and external), including the environment (inside and outside the company)' (Lozano, 2018, 1159–1166). Business models are subject to modification, and the ability to apply them is perceived as a necessary condition connected to coping with changes in the environment, crises or other factors influencing business activity, both on the demand side (social and consumer

trends) and the supply side (change in supply structure, emergence of new branches, products and types of enterprises).

4 Innovative Tools for Managing Sustainable Business Models

Proposed by Joyce and Paquin (2016, p. 1474–1486), the TLBMC model constitutes an excellent tool with which to implement an innovative business strategy based on 3BL criteria and also to understand the essence of innovative, pro-environmental and pro-social solutions, elements and criteria in shaping modern business. Nowadays, the application of innovation in business management and the development of models go beyond merely focusing on economic aspects. It is necessary to integrate and search for value in economic, environmental and social aspects within the individual activities of business organisations (Bocken et al., 2013; Willard, 2012). TLBMC is a practical and easy-to-use tool that supports the development, visualisation and communication of sustainable business model innovations in a modern way (Stubbs & Cocklin, 2008). The difficulty in implementing innovative business models is related to the increasing complexity of interactions between producers and consumers, legal requirements and economic trends. Moreover, the use of a tool that points to opportunities for economic, environmental and social value creation while at the same time forming the basis of an organisation's business model seems to be an excellent solution. In the areas of sustainability, the tool connects value creation opportunities, conceptualising them by analysing life cycle and stakeholder management perspectives. Contemporary businesses and entire economies are challenged to meet the principles and requirements of sustainability (Shrivastava & Statler, 2012). Thus, knowledge of the assumptions, planes and areas of the TLBMC tool, which links innovations contained in business models (Zott et al., 2011, p. 1019–1042) and business model sustainability (Boons & Lüdeke-Freund, 2013, p. 9–19), should be used to assist organisations in creatively and holistically seeking change in order to support competitiveness (Joyce & Paquin, 2016, p. 1474–1486).

A sustainability oriented business must overcome the barriers that are placed in front of it. Creative re-conceptualisation and the implementation of innovations can overcome related problems (Lozano, 2013, p. 275–295). Only such an approach makes it possible now and will make it possible in the future to achieve a competitive advantage, gain value and compete with these very elements.

The use of this tool allows for the identification of problems in the areas of sustainable development, which should be reflected in the business strategies of modern organisations; the elimination of gaps and understanding of relations and connections that occur between particular planes and thus a holistic view of the business model, sustainable development, elements creating an innovative approach to managing the organisation and at the same time new possibilities of creating

economic, environmental and social value indicate the high usefulness of this approach. The planes of the model visualise the differentiation of the model and the discussion of the various effects of the actions taken in the organisation. Identifying the three layers of the model allows for the horizontal exploration of economic, environmental and social value within each plane and in linking the three planes together by vertically integrating all layers of the model (Joyce & Paquin, 2016, p. 1474–1486).

Modern tools and innovations applied to business models make it possible to highlight other, new and previously unidentified opportunities for value creation by modifying already existing relationships, combining them anew, undertaking other activities or redefining business strategies. The TLBMC model is a tool for understanding how to adjust an organisation's activities towards a more sustainable approach at a strategic level.

Using innovative tools to create value in sustainable business models allows the creation of a kind of platform for building an effective business model based on ecological, social and economic criteria and their interrelationships. It allows the implementation of the concept of increasing the enterprise value through the dynamics of using ecological, social and economic criteria in order to meet the requirements of the stakeholders. In this respect, it is also the creation of activities that will lead to a balance between business needs and stakeholders in the elements of sustainable development that are treated as key success factors.

An innovative approach to business management and its models is also the effective possibility of using a combination of the tangible and intangible resources of the company in the context of the adopted ecological, social and economic criteria. At the same time, this can be a source of creating ecological, social and economic innovations for strategic development and value creation, being a link between the internal and external environment. Such an approach lowers the company's business risk by improving creditworthiness, improving business credibility and lowering the process risk of the company's strategic resources while effectively using the company's intellectual capital and all types of organisation resources.

Exposing sustainable development factors in the company's strategy and building business models based on these criteria allow the generation of value based on these criteria, which take into account the internal and external assumptions of doing business with regard to the 3BL criteria, assumptions concerning activities for meeting the needs of external and internal stakeholders and assumptions concerning creating internal procedures for using 3BL, which support the setting of a strategic trajectory that allows for the measurement and monitoring of the strategy based on sustainable development criteria.

The TLBMC model was created by supplementing the classic BMC model with additional elements related to the concept of sustainable development in the three areas of responsibility with simultaneous economic, social and environmental (TBL) objectives, interacting with each other. This allowed a visual depiction of the logic of the organisation's functioning, within which parts and elements were linked

and complemented one another, enabling a logical understanding of the processes of the operation and survival and development of the organisation, including an indication of the mechanisms of value creation.

In the TLBMC model, each layer supports an integrated and balanced approach to examining an organisation's economic, social and environmental impact by highlighting key activities and relationships across the nine components of each layer. At the same time, the combination of the three layers provides vertical coherence. The linked components of each layer, with their counterparts in the other layers, indicate the key activities and their impact on each layer. The integration of all layers supports a holistic approach to the business model, indicating a systemic perspective of sustainability-oriented innovation (Joyce & Paquin, 2016, p. 1474–1486). The TLBMC provides 'horizontal' coherence within each canvas layer, in order to explore economic, environmental and social value individually, and 'vertical' coherence integrating value creation across the three canvas layers, which supports the development of a deeper understanding of an organisation's value creation (Lozano, 2008, p. 1838–1846). TLBMC visualises business model planes and elements, identifying interfaces for communication and collaboration in the innovation of more sustainable business models (Boons & Lüdeke-Freund, 2013, p. 9–19). The TLMBC model is presented in Fig. 6.3.

Such an approach to the business model issue allows searching for value in both horizontal and vertical relationships, in newly defined areas.

Innovative business models and tools supporting them allow the creation of sources of competitive advantage, a basis for development and a platform for the realisation of the enterprise's strategy, serving to distinguish the company within the market, by means of creating a positive image and reputation, being a basis for building the organisation's value, a social dialogue and balance between all stakeholders, at the same time constituting an excellent comparative criterion for assessing the competitiveness of the enterprise. Using the tools and models, it is necessary to redefine the business values to include the analysis of stakeholders' needs in order to build the sustainable value of an organisation that is environmentally, socially and economically responsible.

5 ESG Criteria: The Context of How Financial Markets Impact an Organisation's Operations

5.1 ESG: Definition, Criteria and Areas

ESG criteria and indicators are beginning to play an increasingly important role, both in the context of how an organisation operates and in the reporting of sustainability issues, which are becoming as important as financial reporting. Non-financial aspects relating to environmental protection, social aspects and corporate

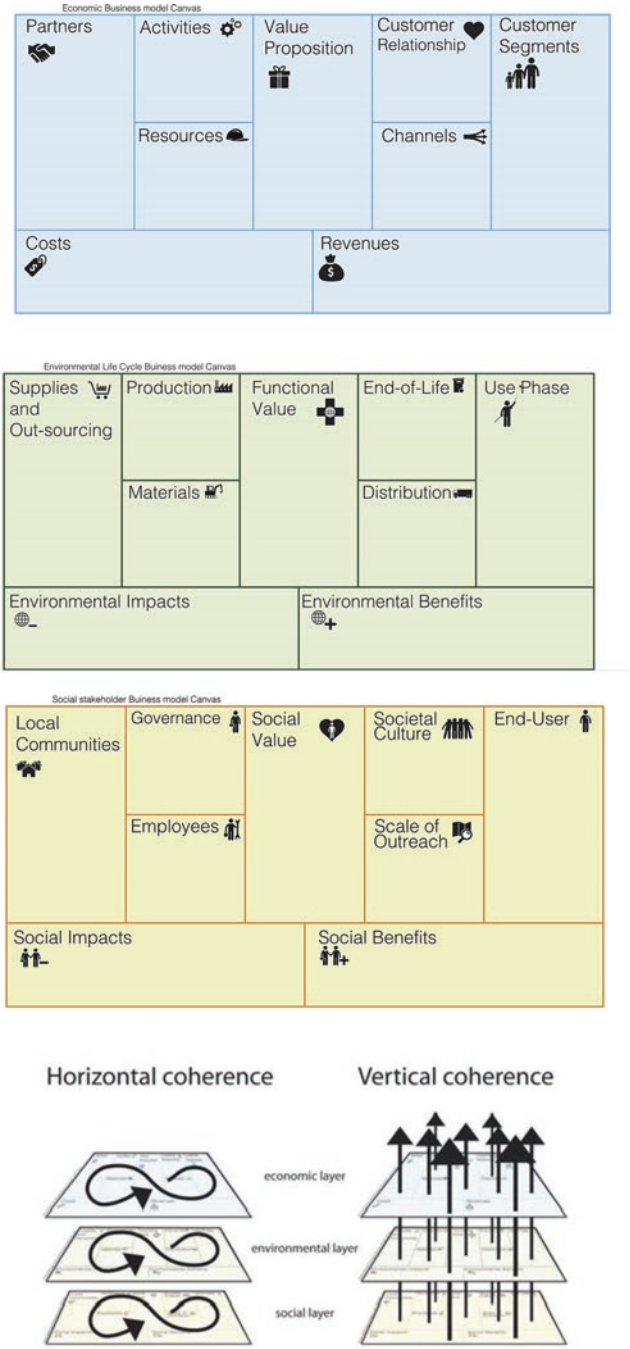

Fig. 6.3 Visualisation of TLBMC. (Source: Joyce et al. (2015))

governance will form the basis for investment decisions, including those of a financial nature. The aim of the introduced changes and expectations is to standardise and increase the transparency of information communication by organisations, including unambiguous reporting of ESG indicators. Achieving sustainable development is a central element and guideline of modern economies. In addition, the direction of sustainable finance is being set, such as the establishment of a classification system for environmentally sustainable business activities under the EU Environmental Taxonomy Regulation and the establishment of a regulation on sustainability-related disclosures in the financial services sector. Linking financial and non-financial sustainability factors with innovative organisational models should meet the objectives of modern economies and bring value to all stakeholders. In the context of organising and linking the required reporting to the guidelines of the financial markets, it is crucial to prepare a new strategy and business model in accordance with the guidelines of sustainable development and to implement it consistently. In linking innovative business models to ESG indicators, it is important to collect data that, in the context of non-financial reporting, come from different areas. This means that data are often scattered and time-consuming to organise, analyse and verify for consistency and relevance. ESG reports must be embedded in the business model, and their quality depends on the preparation of the entire organisation, including the management, awareness and involvement of employees at every level of the organisation. Actions taken must bring tangible benefits, and awareness must be present in all those involved in the life cycle of the organisation. ESG criteria are used as an element of socially conscious inverters and shareholders to select investments and assess an organisation's impact on the environment. They are designed to indicate how and which organisations will attract funding from investment funds when they have a sustainable investment strategy in place. ESG can refer to reporting, the publication of data on the fulfilment of ESG criteria, the performance of organisations covered by ESG indicators and assessment (ESG scoring) by external organisations. The ESG criteria can be divided into three categories, within which specific criteria can be highlighted. Thus, in terms of the environment, a distinction can be made between climate change, the ecological footprint, resource use and pollution. In terms of social criteria, the following can be distinguished: health and safety, customer responsibility, community impact and labour standards. In terms of the final criterion of governance, the following can be distinguished: shareholder rights, risk management, tax transparency and anticorruption. These criteria are important and allow benefits to be realised as the organisation becomes more attractive to investors; they achieve better productivity and better financial indicators, as well as adaptability, adjustment to new regulations, innovation and improved brand image. The most important criteria are presented in Table 6.1.

Table 6.1 ESG criteria

ESG factors		
Environmental	Social	Governance
Natural resource use	Workforce	Management
Carbon emissions	Human rights	Shareholders
Energy efficiency	Diversity	CSR strategy
Pollution/waste	Supply chain	Corporate governance
Environmental opportunities	Product responsibility	Corporate behaviour
Innovations	Community	Cumulative voting
Climate changeResource depletion	Human capital	Executive compensations
	Product liability	Shareholder's rights
	Stakeholder opposition	Takeover defence
	Social opportunities	Staggered boards
	Discrimination	Board interdependence
	Political contributions	Board diversity
		Corporate ethics

Source: Boffo and Patalano (2020)

5.2 Stakeholders' Roles in Implementing ESG in Innovative Business Models

In implementing innovative business models and solutions, it is useful to know and identify all stakeholders, together with their needs and requirements, to which innovative solutions often need to be adapted. It is they who influence the entire business system, and the role of an organisation is, among other things, to anticipate their needs, influence the system and the environment or shape their expectations. Stakeholders include all parties of the business environment, external and internal, which have a direct or indirect influence on specific actions taken in the business model, organisation or supply chain. It should be remembered that in studying the relationship between stakeholders and organisations, feedback should be sought that will create value for all parties. Stakeholders are interested in organisational development, value creation and growth. Therefore, it is important to know their needs and requirements in order to achieve synergetic effects. They can directly or indirectly influence the system; in a sense, they assume responsibility for the system's activities and its impact on the environment (e.g. according to the economic, social and environmental criteria of society's needs, they are also interested in value creation, value exchange and new value creation, which is connected with achieving certain results within the organisation or the value chain). Stakeholders have particular requirements, points of view and directions, which they articulate and present to organisations and which should be implemented in the system. According to their requirements and, often, their preferences, in order to create value, they can influence the shape of the business model in its life cycle and the life of the entire system. Modern and sustainable business models cannot work without cooperation with stakeholders (Schaltegger et al., 2016, 3–10). A management model must include the organisation (system), stakeholders, business model, responsibility and

risk. These elements must permeate each other and create feedback and build relationships.

Innovative business models must include a link to sustainability using 3BL and include a risk assessment of the business. This approach allows the organisation to report in an integrated way, in line with stakeholder expectations and the requirements of EU directives (Directive, 2014/95/EU of the European Parliament, EU Taxonomy, Corporate Sustainability Reporting, Sustainability Preferences and Fiduciary Duties: Directing finance towards the European Green Deal, COM/2021/188 final). This approach also addresses the information needs of key stakeholders on sustainability issues, which have a significant impact on an organisation's ability to create and benefit from the value created.

5.3 Advantages and Disadvantages of Implementing ESG Criteria in Organisations

As the ESG criteria are still in the implementation phase, arguments both for and against their application can be highlighted. In terms of arguments against them, in general, only their imperfections and imprecision should be noted. For example, assessments and ratings are not yet sufficiently precise and are not understood equally in every industry and every company, especially when attempting to integrate separate indicators into a single ESG rating (EU Taxonomy, Corporate Sustainability Reporting, Sustainability Preferences and Fiduciary Duties: Directing finance towards the European Green Deal, COM/2021/188 final). It is also important to establish comparable ratings so that the assessments made can be properly interpreted.

The combination of individual elements does not fully support investment analysis as the ratings used are not transparent. The unambiguous identification of the individual ESG elements should facilitate the collection and interpretation of rating data so that users are aware of the underlying data, how to weigh it and how to adjust it for investment purposes. Companies have only recently begun reporting on sustainability KPIs.

Therefore, the disclosure of ESG information, along with its standardisation, will allow it to be standardised and assessments to be more consistent. Some companies are more advanced in this process than others, but as the topic has evolved, companies have had to adapt and find ways to capture new data. This means that even if all assessments were homogeneous and the users of the assessments knew perfectly well what was behind the assessments, if the data were flawed, the output would also be flawed. Thus far, organisations have not provided precise data; the ESG requirement will contribute to more and better data being made public and rating providers will be forced to refine their methodologies in the context of making them more transparent, and this in turn will allow investors to invest in those businesses that will be positioned high in the ESG rankings and the various indicators

will be met by them. These criteria will help investors and the companies themselves to align their investments with the new sustainability values.

On the other hand, not all activities that declare ESG compliance are already profitable, and redirecting funds may involve high investment risk. Declared sustainable business models do not yet have much experience, which increases the risk of investment. ESG factors can affect credit risk and investment performance in the shorter term. They are often intangible, which contributes to the need to analyse a more complex process for credit analysts (in the context of using a quantitative ESG framework). Therefore, the availability and reliability of data and the modelling of relatively new risks are important to enhance the credibility of ESG factors in credit assessment. In addition, consistent disclosure by companies can help analysts to conduct a credible peer analysis on ESG credit factors. Currently, one drawback of using ESG criteria is the measurement techniques.

The ESG criteria rating system is still innovative, and this means that both asset owners and asset managers need to understand the limitations of the existing investment process. The most significant challenge is as follows: due to the incalculability of ESG factors, not all ESG factors are easily quantifiable; consequently, they do not translate directly into financial results, profit growth or improved organisational performance.

The current publication of corporate sustainability information is heavily biased towards processes and procedures rather than actual results. This means that, in many cases, it indicates whether, for example, a sustainability policy is in place in the organisation, rather than measuring the level of commitment to it. Another challenge is in applying the same set of factors to companies in different geographical locations and industries with different business practices. Companies have different business models. Some outsource parts of their value chains, while others prefer the vertical integration route. In order for ESG indicators to fulfil their purpose, they need to be fully standardised and unified. Different geographical regions, countries and sectors present different levels of data quality. The information disclosed must be verified and audited so that there is no doubt about its quality. There is also a need to add Big Data information in order to fully perform the triangulation of information within organisations. It is also important that the study of ESG criteria is continuous and is constantly modified to reflect real needs and changes in sustainability practices.

The key benefits include the ability to create new value. ESG management thinking is more proactive. ESG in business models and cash flows can be combined in a variety of ways. This can facilitate revenue growth, reduce costs, minimise regulatory and legal interventions, increase employee productivity and optimise investment and capital expenditure. The key drivers for applying ESG include the following (Boffo & Patalano, 2020): improved long-term returns; brand image and reputation; decreased investment risk; regulatory/disclosure demands; external stakeholder requirement; attraction of new talent; altruistic values; board/activist investor pressure; and diversification of the product offer.

There are significant differences among industries in the application of ESG criteria. Financial performance, particularly in terms of stock returns, is presented by

those industries that have higher ESG rankings. This may mean that a lower ranking will imply additional risk. Depending on the sector, both sustainable business models and attention to ESG criteria contribute to reducing the cost of services, implementing a recycling programme, increasing the sustainability of other operational programmes and selling green products and services. The advantage of sustainable business models will certainly lead to a visible difference in energy allocation. The wide range of tools, practices and solutions available allows sustainable solutions to be implemented in all areas of an organisation. It is important that even small changes can have positive effects; creativity and the reuse of, for example, equipment foster not only an innovative but also an ecological approach. A green approach attracts not only new investors and customers but also new employees, who identify with the company's new approach. Innovative business models create a higher level of skill, enabling employees to carry out their duties and achieve excellent results.

6 SD, TLBMC and ESG in the Context of Value Addition and the Win–Win Paradigm

Sustainable development (SD), innovative organisational management tools (TLMBC) and ESG requirements complement each other, permeate each other and are the result of taking action in the field of sustainable business. The ESG criteria complement each other perfectly and, in each area, they support the sustainability aspects (Fig. 6.4). Linking these elements and incorporating them into innovative

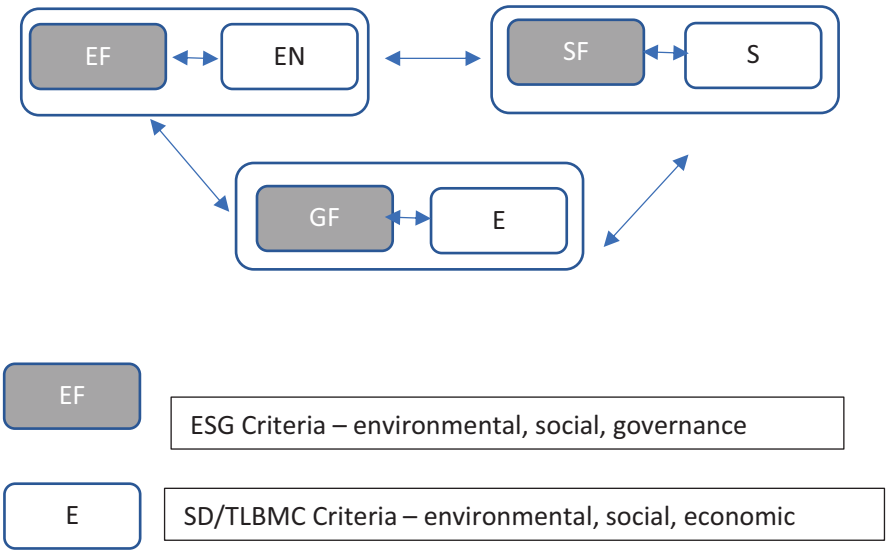

Fig. 6.4 Link between ESG and SD criteria

management tools such as TLBMC can have positive effects and create added value. The goal of sustainable business models is to create, protect and grow long-term environmental, social and economic value for all stakeholders involved in bringing products and services to market. These stakeholders, through their requirements but also their expectations, become the stimulus for innovative actions.

ESG lead to value creation via (1) facilitating top-line growth, (2) reducing costs, (3) minimising regulatory and legal interventions, (4) increasing employee productivity and (5) optimising investment and capital expenditures (Henisz et al., 2019); see Table 6.2. This approach can be linked to sustainable business models that also aim to achieve value creation. As ESG criteria are increasingly supported and demanded by the financial market, these elements should be linked and used to realise new business models supported by modern tools such as TLBMC (Fig. 6.5). Companies around the world recognise that sustainability challenges in their supply chains represent a risk but also an excellent, innovative management opportunity. As a result, it has become normal practice for companies to include environmental, social and related governance (ESG) risk management programmes in their supply chains. Most reputable global companies have supply chain sustainability

Table 6.2 A strong environmental, social and governance (ESG) proposition links to value creation

	Strong ESG proposition (examples)	Weak ESG proposition (examples)
Top-line growth	Attract B2B and B2C customers with more sustainable products Achieve better access to resources through stronger community and government relations	Lose customers through poor sustainability practices (e.g. human rights, supply chain) or a perception of unsustainable/unsafe products Lose access to resources (including from operational shutdowns) as a result of poor community and labour relations
Cost reductions	Lower energy consumption Reduce water intake	Generate unnecessary waste and pay correspondingly higher waste-disposal costs Expend more in packaging costs
Regulatory and legal interventions	Achieve greater strategic freedom through deregulation Earn subsidies and government support	Suffer restrictions on advertising and point of sale Incur fines, penalties and enforcement actions
Productivity uplift	Boost employee motivation Attract talent through greater social credibility	Deal with ‘social stigma’ which restricts talent pool Lose talent as a result of weak purpose
Investment and asset	Enhance investment returns by better allocating capital for the long term (e.g. more sustainable plant and equipment) Avoid investments that may not pay or because of longer-term environmental issues	Reduction of stranded assets as a result of premature write-downs Fall behind competitors that have invested to be less ‘energy hungry’

Source: Henisz et al. (2019)

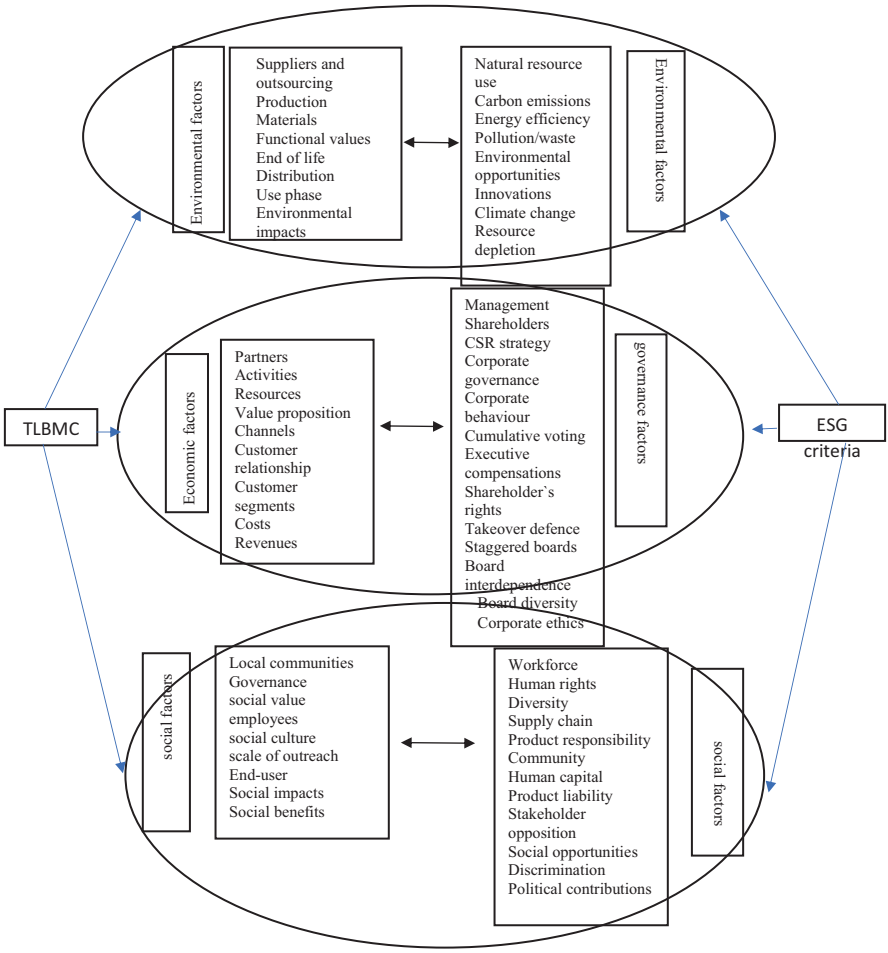

Fig. 6.5 TLBMC and ESG criteria – types of coupling. (Source: own elaboration)

programmes. These are implemented to assess and manage human rights, labour, governance, environmental and other risks. These programmes largely address risk management activities such as supplier assessments and audits, but they also address environmental, human rights and governance issues that remain pervasive in global supply chains. It is therefore important to implement the ESG criteria required by the financial market, which means focusing not only on balancing supply chain processes and individual organisations but also sustainable financing. This can contribute to increasing the efficiency of the entire chain. It has great supply chain potential because supply chains are evolving very rapidly, becoming more virtual, digital and innovative. Their solutions are not perfect; there is still great potential for savings and many opportunities for the implementation of new ideas related to sustainability. In this context, the financial markets could be useful, as they already

offer tools and solutions that integrate existing activities and propose new solutions and assessments from a sustainability perspective.

The weaknesses identified should therefore be addressed by linking to innovative, sustainable business models and their tools in order to implement a win–win strategy.

Sustainable liability financing solutions include the integration of ESG performance criteria [https://www.bsr.org/en/our-insights/report-view/win-win-win-the-sustainable-supply-chain-finance-opportunity] with buyer-led supply chain finance programmes, enabling global buyers to be rewarded and earn tangible benefits (e.g. better discount rates) when selecting certain suppliers (e.g. those with good sustainability records). This type of solution applies to global companies that have or are establishing supply chain finance programmes and wish to offer direct incentives to their own suppliers. Another solution is to offer sustainable trade loans to a supplier or seller of goods or services to trade in goods that have proven sustainability attributes or environmental or social benefits. This solution applies when a supplier needs financing for sustainable goods and projects. Additionally, smart contract solutions have been introduced, which are self-executing contracts with the terms of the agreement between buyer and seller directly written in lines of code, including a distributed, decentralised blockchain network. Smart contracts make transactions traceable, transparent and irreversible, which are the foundation of a sustainable supply chain. This solution would be best applied when multiple participants in a vertical supply chain wish to create sustainable change. As is clear, the solutions described above support the implementation of win–win and even win–win–win strategies.

Achieving a win–win–win strategy using a green and social approach certainly requires the development of common goals between departments in the organisation as well as in inter-organisational relations. Certainly, all stakeholders need to be familiar with the system of incentives and benefits. It is also important to recognise the financial market itself and the service providers from whom services will be purchased, as this will clearly indicate their requirements. When implementing a strategy to achieve co-benefits, it is important to identify which elements of sustainability are most important and which will be included in analyses, e.g. regarding supplier evaluation or product development, and whether they coincide with ESG goals and principles. It is important to identify the source of performance data and a benchmarking system for stakeholders. The clarity of the information provided is also important. Sustainable supply chain finance is an opportunity to improve supply chains while achieving sustainability goals. The most important supply chain challenges are exponential growth in the complexity of the supply chain and cost savings fatigue driven by a relentless and unsustainable pursuit of achieving bottom-line growth by constantly cutting costs. A holistic supply chain approach enables organisations to achieve higher levels of optimisation when supply chain partners work together for continuous improvement and innovation, including from a sustainability perspective. This requires supply chain partners to shift from traditional transactional business models with a focus on cost savings to models that shift the focus to value creation, including pro-environmental and pro-social value.

In order to implement this shift, organisations must first understand the fundamental differences in value extraction, value exchange and value creation and recognise that it is the intersellers who determine the trends that organisations and their supply chains need to take into account.

Achieving win–win and perhaps even win–win–win, where a third win is considered to be achieved when aspects of sustainability are implemented and achieved, is possible when partners operate with a more transparent, win–win attitude; parties can identify opportunities that they simply do not see, working without links to other stakeholders. A long-term strategic focus, combined with transparency and a win–win approach, motivates suppliers to invest in win–win solutions. Collaborative models must be based on sustainability rather than a traditional transactional approach.

Sustainable business models can be implemented in any sector. It is worth considering them from the point of view of both the recipient and beneficiary of a given model, as well as the creator of new solutions. This can be achieved, for example, by considering financial markets as, on the one hand, recipients of modern and innovative business strategies, which they can apply at home, and, on the other hand, as a stakeholder who sets trends and expectations in relation to organisations and companies that will benefit from financial support. The use of ESG criteria favoured and expected by financial markets to assess and rate individual sectors during decision-making can drive decisions on model changes in other sectors. In general, the use of ESG criteria supports a broad spectrum of implementation of sustainable business model tools such as TLBMC in different sectors of the economy. Moreover, the use of both elements can further contribute to the implementation of sustainability strategies, bringing benefits to all parties and achieving a win–win outcome.

The development of modern technologies, the internet of things, the use of artificial intelligence to manage the supply chain as well as individual organisations may contribute to a more efficient and easier implementation of ESG criteria also in the financial context. It seems that this aspect is not a threat; on the contrary, it becomes a motivator, because thanks to modern solutions, sustainability and ESG criteria can be implemented more easily and efficiently. Modern technologies also have a positive impact in the context of ESG financing. The speed of cash flow, the absence of paper circulation, the transparency of sources and the possibility of monitoring strongly encourage the implementation of innovative models and reduce the risk of irregularities.

7 Conclusion

The need for organisations to change towards a more sustainable approach and the requirements set by stakeholders influencing the activities of organisations (e.g. the financial market) and entire supply chains contribute to the creation of a different,

new type of added value, realising the win–win paradigm. Aggregate value measurement and the indexing of ESG indicators considered by financial markets in their analysis can become a new determinant and instrument for supporting sustainable business models. Financial and social perspectives are now important criteria for modern management. The value that they bring, not always directly financial in the long term, can be identified not only with changes in image and alignment with market trends but also with profits.

The one type of risks by implementation of sustainable business models refers to economic, social and environmental aspects. The importance of each depends on a number of factors (e.g. level of socio-economic development of the region, industry, market position, impact of the regulator, practices of competitors, size of the company, organisational culture, dependencies and constraints in the supply chain, strength of stakeholder influence). Examples of risks in this area include non-compliance with applicable laws and social norms, lawsuits, penalties, loss of customers, increased supervision costs, complaints, loss of reputation, irreversible and costly environmental changes, costly remediation and natural compensation, inefficient use of environmental resources resulting in increased costs, extension or stoppage of ongoing infrastructure projects, low corporate customer ratings, loss of customers, higher capital acquisition costs if investors withdraw, consumer boycotts, increased cost of capital due to reduced investor confidence, higher procurement expenses due to reduced supplier and subcontractor confidence. The catalogue of existing and possible risks is vast; however, there are many factors that speak in favour of introducing ESG criteria into an organisation's operations and making them a core element of the business model. Introducing effective risk management mechanisms, keeping these risks within defined limits, being aware of their occurrence and providing simple, clear and unambiguous information, as well as risk-sensitive decision-making, can bring positive effects. Knowledge of the catalogue of possible disruptions and the introduction of procedures related to the reaction to early warning signals, as well as consistent action and focus on objectives, will become a guarantee of success in implementing and mitigating the negative effects of doing business in different areas.

New means of assessing organisations and implementing innovative tools, considering ESG and sustainability criteria, indicate how to adapt traditional management tools to the new approach. A holistic, broad-based approach implementing different solutions and the active participation of change-provoking stakeholders can contribute to the long-term success of organisations and entire supply chains.

This approach should include holistic value optimisation that can dynamically anticipate and meet demands, synchronise the supply chain and align it with overall trends and maximise value for customers, investors and other stakeholders (e.g. financial markets).

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Chapter 7
Sustainable Adaptation of Companies Through Financial Markets

Magdalena Ziolo and Anna Spoz

Abstract This chapter presents the concept of sustainable adaptation, based on a literature review. The chapter discusses the importance of financial markets for the firm to adapt its business model under conditions of threat as well as opportunity. The factors influencing the choice of a bank by an enterprise were identified, and it was described to what extent the cooperation with the bank influences the business model of the enterprise. The motives of sustainable business adaptation are explained. The adaptation processes are assessed taking into account their impact on sustainable value. The chapter is aimed at assessing the impact of financial markets on building sustainable value in business models of enterprises in the context of sustainable adaptation. The research methods used in this study relied on literature review, case study, and triangulation. The chapter discusses the importance of financial markets in the process of transforming business models of enterprises towards building sustainable value. It describes the tools that financial markets can use to influence the business models of enterprises (product offer, dedicated financial products, margin policy). The factors influencing the decisions about choosing the bank were identified, and it was described how the cooperation with the bank changed the functioning of the company. The study shows that entrepreneurs are aware of the impact of financial markets on their business activities, but they do not see the potential of banks as advisors in building sustainable value in the business model. Among the archetypes highlighted by entrepreneurs to build sustainable business models, the dominant one is based on the social factor.

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1 Introduction

Events taking place in the real economy are reflected in the financial sphere, and the financial sphere, through appropriate tools, can stimulate economic entities to take specific actions and thus influence the direction of their development (Park & Kim, 2020).

Modern enterprises operate in an extremely dynamic environment, which forces them to adapt. The growing awareness of the meaning of impact of human activity on the environment and the subsequent concept of sustainability make enterprises decide to undertake adaptation measures aimed at responding to environmental (climate) changes (Ziolo, 2021).

The climate change impact on a given enterprise and the resulting scope of adaptation processes depend on the specificity of the enterprise as well as the sector and industry in which it operates (Agrawala et al., 2011). Adaptation actions should be well-thought-out and take into account short- and long-term effects of the introduced changes (Fazey et al., 2010). Mirfenderesk and Corkill (2009) describe adaptive strategic plan that allows a company to quickly and flexibly react to threats resulting from climate change.

Mertz et al. (2009) point out that organizations rarely adapt "autonomously," since their adaptive behavior is influenced by regulations and market conditions. In the adaptation process, enterprises often use the aid of external entities. Bates et al. (2013) show that, in the opinion of entrepreneurs, the lack of government guidance on the interpretation of climate change policy is an obstacle, but access to the knowledge and experience of other entities was recognized as a potential driver of change.

The private sector plays a key role in the process of adapting to climate change (World Resources Institute, 2015). About 70–85% of global investments in infrastructure (buildings, machinery, equipment) are carried out by the private sector (UNISDR, 2013). What, when and how it will be built affects not only the company's commitment but also the entire society (Surminski, 2013). The success of the adaptation process depends on social factors. Organizational culture and employees' attitude to changes may determine the possibility of introducing them (O'Brien & Wolf, 2010). Social and cultural factors can significantly influence the perception of risk related to the process of implementing changes (Wolf et al., 2013).

Climate change is increasingly affecting the operation of private sector entities. It can cause disruptions in production and contribute to a rise in the prices of raw materials and semi-finished products and, consequently, to increased operating costs and reduced revenues (Goldstein et al., 2019). Sustainable adaptation therefore requires identifying, measuring, and assessing non-financial risk (Goldstein et al., 2019) and then incorporating it into the company's risk management system. The way of perceiving non-financial risk and its assessment should be reflected in the company's reporting, which is one of the most frequently used sources of information about the company for the market (Ndamani & Watanabe, 2017).

The sustainable business model literature is a broad subject (Lozano, 2018; Osterwalder et al., 2005; Schaltegger et al., 2016; Stubbs & Cocklin, 2008). For the purpose of the analysis, there was used Bocken's approach. The process of developing sustainable business models by companies can be based on the eight archetypes identified by Bocken et al. (2014). Archetypes are classified as technological, social, and organizational depending on the main type of innovation in the business model. The choice of the model depends on the internal conditions of the entity and external factors.

The aim of the study is to assess the impact of individual financial institutions on building permanent value in business models of enterprises in the context of sustainable adaptation. The role of financed institutions in stimulating enterprises to sustainable adaptation is presented, the tools with which financial institutions can influence the business models of enterprises (product offer, dedicated financial products, margin policy) were identified, and the decisive factors were identified. It also identified archetypes that companies would like to use to build sustainable business models.

The remainder of this chapter is organized as follows. Section 2 briefly reviews the related literature. Section 3 describes alternative scenarios of sustainable adaptation of enterprises through the financial market, and Sect. 4 concludes the chapter.

2 Sustainable Adaptation[1]

Sustainable adaptation functions are based on research in literature, primarily in the context of discussions on ongoing climatic changes and the need to adapt to climate change (Ziolo, 2021). Therefore, adaptation is a response to environmental changes (including climate change) and is treated as a process of responding to these changes, not a set of separate actions or initiatives (Eriksen & Brown, 2011). Assuming that adaptation is a process, one should take into account the effects that this process causes in the environmental and social dimensions. It is noted that these effects can be both positive and negative. Thus, adaptation can take the form of sustainable adaptation (positive effects) and unsustainable adaptation (negative effects). The effects of adaptation are assessed in the context of their impact on environmental and social aspects, which is a premise for comparative analyses and searching for common ground for the concept of sustainable adaptation and sustainable development (Eriksen & Brown, 2011). Sustainable adaptation should, therefore, be perceived as participation in the process of sustainable development in the form of activities influencing the environmental and social pillar of this development, accounting for and fulfilling the criteria of social justice and environmental integrity simultaneously. Systematics of the literature review on the issue of

[1] The problem was discussed in more detail as a part of the monograph Ziolo (2020).

sustainable adaptation indicate several dominant trends in this area, including considerations on the following:

1. Premises, conditions, and implications of the phenomenon of sustainable adaptation.

In this line of considerations, the issues of how to conduct the adaptation process are discussed, bearing in mind the potential consequences of this process for key social and environmental challenges, including poverty, social justice, or environmental integration. In the discussion, particular attention is paid to the threat related to the adaptation process, consisting in the fact that not all activities within the adaptation process in a given place and time must produce positive effects and may even result in negative consequences. Considering the possible negative consequences, it is necessary to strive to ensure that the process of sustainable adaptation results in flexible social changes, which will support and harmonize with lower emissions (Brown, 2011; Eriksen & Brown, 2011).

2. Searching for relationships between sustainable development and adaptation.

The discussion mainly concerns deliberations and the search for answers to the question of whether criticism of the concept of sustainable adaptation can take place on the same basis as criticism of the postulates of sustainable development. On the basis of the considerations, questions arise as to whether adaptation and sustainable development are concepts that harmonize with each other and are compatible and how they should be integrated with each other (Brown, 2011).

3. Searching for empirical evidence and explanations answering the question of how to interpret, define, understand and perceive adaptation through the prism of sustainable development.

The adaptation process in this context is analyzed in terms of ensuring social equality and environmental integrity. Such actions are not possible without ensuring appropriate policies favoring sustainable adaptation and eliminating its potential negative impact on the social and environmental pillars. It is postulated that social and environmental policies should be considered jointly in the context of the adaptation activities carried out.

4. Challenges for sustainable adaptation, policies, and practical implications.

This line of considerations emphasizes the interdisciplinary nature of sustainable adaptation and the need for an integrated approach to this concept. Particular attention is paid to the political, cultural, social, and environmental factors that play a role and influence the course of sustainable adaptation.

There is an ongoing debate in the literature about defining and understanding sustainable adaptation as a process (Brown, 2011, Eriksen & Brown, 2011). It is indicated that this concept should be equated with interventions undertaken in parallel and aimed at addressing activities minimizing the effects of climate change, poverty and negative externalities affecting the development process. As a working

definition of sustainable adaptation, K. Brown adopted that which contributes most to ensuring both social equality and environmental integrity – the two pillars of sustainable development. Such an understanding of sustainable adaptation is based on its similarity to the concept of sustainable development. This similarity is visible on two scopes:

- The first indicating that synergy is possible between two seemingly excluded and conflicting spheres – social and environmental
- The second emphasizing the integrity and common ground for policies and intervention in both spheres

The processes of synergy and integrity are the basis for understanding and discussing the concept of sustainable adaptation, which is viewed as planned and undertaken externally. Practice shows that adaptation interventions are often unsustainable. The reason for this is the lack of sufficient knowledge about the relationship between adaptation to climate change and reducing the level of poverty; hence, the search for synergy between these processes is difficult.

According to the definition proposed by O'Brien and Leichenko (2007), this process should be seen as a combination of the concepts of "adaptation" and "sustainability," which, in turn, entails a reduction of negative externalities of a social (especially poverty) and environmental character (especially climate change). Thus, sustainable adaptation includes a number of actions (responses) to the need to combat poverty (reduction) and other negative externalities. In this context, the authors indicate that interventions undertaken as part of sustainable adaptation should focus on the following:

- Risk reduction and welfare
- Enhancing the adaptability of poverty-stricken groups
- Disseminating information on the causes of poverty and prevention options among vulnerable groups

Sustainable adaptation should lead to a reduction in poverty level in such a way that it ensures positive changes on the part of society and the environment. The literature emphasizes and highlights the following types of adaptation determined by its scope:

- Pro-poor climate change
- A community-based approach
- Climate change adaptation, which actively helps to reduce poverty (O'Brien & Leichenko, 2007)

Starting with the first distinction (adaptation to climate change), it is adaptation in the narrowest sense of the word, referring only to the environmental dimension of sustainability. The last type of adaptation, on the other hand, has the broadest context and concerns both environmental and social pillars. The second classification distinguishes adaptive actions based on the causative factor. In this approach, the following types of adaptation are distinguished (Brown, 2011):

- Autonomous adaptation
- Market-based adaptation
- Public policy-driven adaptation

Adaptation activities are selected in relation to the target group they concern. In the case of the social sphere, some groups are distinguished (Brown, 2011):

- Permanently poor
- Usually poor
- Cyclically poor
- Incidentally poor

In the indicated groups, separate behaviors and actions are noticeable, which is particularly noticeable in the case of autonomous adaptation. From the financial point of view, their role is most significant in the fight against poverty in the field of market-based adaptation. In this case, microfinance plays a key role, especially loans and credits but also insurance. In the case of adaptation based on public policies, the dominant entity determining the effectiveness of adaptation measures is the government and local government. These units are responsible for developing the formal and legal framework for adaptation activities. This applies to both social policy and environmental policy. Sustainability is a key challenge in designing public interventions for adaptation. The condition for sustainable adaptation is its positive impact on both the social and environmental order. It is very difficult to achieve, especially in the case of the so-called adaptation autonomy implied in extreme poverty. Social groups struggling with the problem of poverty, wanting to ensure a minimum of subsistence, very often lead to destructive activities, violating the environmental order and permanently destroying ecosystems. However, actions within the framework of public policies may lead to disturbance of the environmental order they concern inter alia. Scope of activities in agriculture lead to the transformation of land use for cultivation and interference with natural ecosystems. Therefore, when making decisions about adaptation, one should remember the necessity of its sustainability and, thus, designing activities in such a way that they meet the criteria of synergy and integrity. Reducing the impact is possible through fiscal stimulus, in particular tax policy, but also through financial instruments offered by the financial market. Sustainable adaptation in the scope of finance (adaptation finance) encompasses environmental and social adaptation and adaptive governance (activities) (Table 7.1).

Table 7.1 Sustainable adaptation – financial markets perspective

Environment	Society	Governance
Climate – aligned – finance	Social finance	Ethical finance
Climate finance	Responsible finance	Financial governance
ESG disclosure policy	ESG disclosure policy	ESG disclosure
ESG strategies	ESG strategies	ESG strategies
Environmental policy	Social policy	Governance policy

3 Alternative Scenarios of Sustainable Adaptation of Enterprises Through the Financial Market: Case Study.

In this part of the chapter, alternative scenarios for the sustainable adaptation of enterprises through financial institutions will be presented. The proposed scenarios are intended to show, in a model, simplified way, the main channels of impact of financial institutions on companies in the context of their sustainable adaptation, as well as the motives and scope of adaptation measures taken.

Sustainable adaptation processes are the company's response to environmental and social changes. They have a unique and individual character for each enterprise. The decision-making process to initiate the sustainable adaptation and its effects is presented in Fig. 7.1.

Financial institutions and enterprises may utilize sustainable adaptation to build sustainable value. A list of entities classified as financial institutions, types of enterprises, and the examples of tools for sustainable adaptations are presented in Table 7.2.

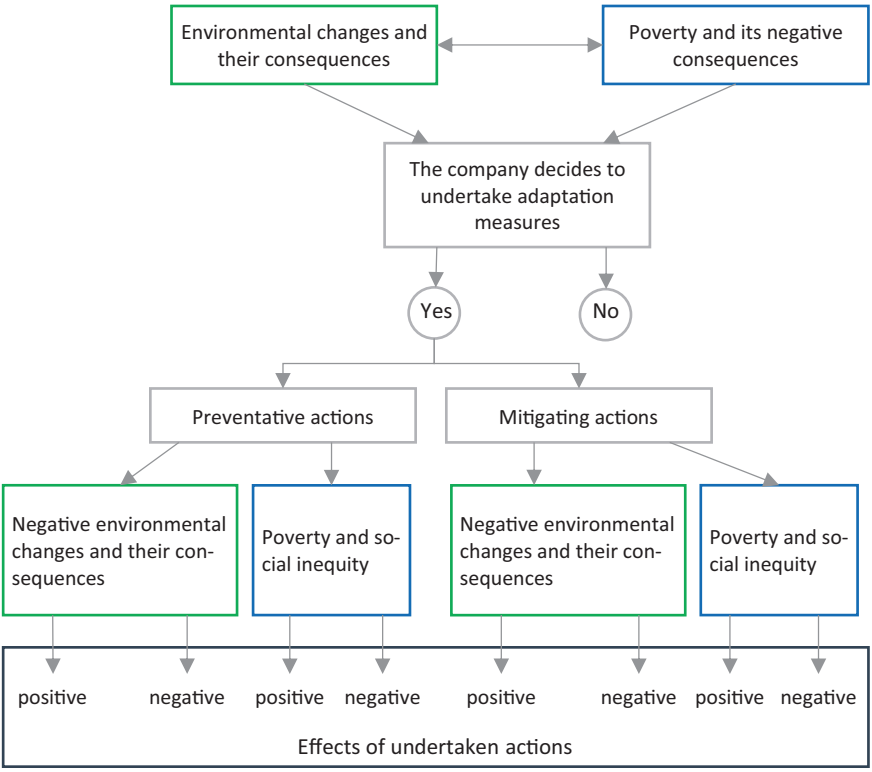

Fig. 7.1 Decision-making process on initiation of sustainable adaptation by enterprises and its effects

Table 7.2 Entities types and measures of sustainable adaptation used

Financial institutions	Enterprises	Measures of sustainable adaptation
Banks, asset management, stock exchange, investment fund, insurance companies, pension funds, securities firm	Sole proprietorship, partnership, limited partnership, corporation, limited liability company (LLC), nonprofit organization, cooperative (Co-op)	Process digitalization, green office model, materials and energy savings, recycling, offer of sustainable products and services, use of social packages, corporate governance, compliance, sustainability reporting

Table 7.3 Examples of adaptation measures as part of adaptation to climate change and adaptation reducing poverty undertaken by financial institutions and enterprises

Financial institutions	Enterprises	Measures of sustainable adaptation	Archetypes group
✓	✓	Process digitalization	Technological
✓	✓	Green office model	Technological
	✓	Materials and energy savings, recycling	Technological
✓	✓	Materials and energy savings, recycling	Technological
	✓	Result-oriented PSS-pay per use	Social
	✓	Open innovation	Social
✓	✓	Adapting the supply chain for sustainability	Social
✓	✓	Offer of sustainable products and services	Organizational
	✓	Green and social financing	Organizational
	✓	Crowdsourcing and crowdfunding	Organizational
✓	✓	Respecting human and employee rights	Social
✓	✓	Use of social packages	Social
✓	✓	Taking care of relations with clients and contractors	Social
✓	✓	Corporate governance	Organizational
		Compliance	Organizational
✓		ESG rating, scoring methods	Organizational
✓	✓	Sustainability reporting	Organizational
✓	✓	Risk management system incorporating ESG risk	Organizational
✓	✓	Ethics	Social
✓	✓	Involvement in social campaigns and charity events	Social
✓		Financial innovations (blockchain)	Technological

Source: Own study based on Bocken et al. (2014)

Sustainable adaptation is an individual process for each entity. Measures of sustainable adaptation take into account the specificity of a given entity and the type and scope of environmental changes. Examples of measures of sustainable adaptation used by enterprises and financial institutions with a reference to the sustainable business model archetypes developed by Bocken are presented in Table 7.3.

The decision to initiate adaptation, as well as the pace and scope of this process, is determined by many factors, which include, among others, the strength of the impact of climate change on the company's operations and its financial results, organizational culture of the entity and knowledge of the concept of sustainability among its employees, ownership structure of the entity stakeholder expectations, legal regulations and the model of the banking system. The effects of adaptation processes can be positive (sustainable adaptation) or negative (unsustainable adaptation).

3.1 Scenario of a Sustainable Bank Adaptation: The Example of BNP Paribas

This section covers the process of sustainable adaptation of a financial institution. The issue was discussed on the example of the BNP Paribas Bank, which has been strongly identified with activities for sustainable development for many years. Bank BNP Paribas has been involved for many years in pro-ecological activities to minimize the impact of its operation on the environment and to counteract climate change. Since 2011, the bank's key priority has been activities to prevent climate change and the implementation of activities for biodiversity, water, air, natural resources, and the circular economy. This was reflected in the BNP Paribas Bank's Corporate Social Responsibility (CSR) and Sustainable Development Strategy, which includes 12 commitments implemented in 4 areas: economy (effective financing of the economy), employees (responsible approach to employees and their development), society and environment (supporting energy transformation and counteracting climate change). All activities in this field are carried out in accordance with the principles of corporate governance (see Fig. 7.2).

One of the BNP Paribas's strategic goals is the long-term support of development of the economy by financing the projects of individual and business clients supporting their growth and taking into account the environmental impact of these projects. This goal is achieved through the product offer complying with the assumptions of sustainable development consisting of:

- Financing pro-ecological investments, e.g., in renewable energy – at the turn of 2019/2020, the bank financed "Perfect Wind" projects, and in May 2020 it signed loan agreements for financing wind farms and solar farms.
- Supporting the issue of green bonds – in 2020 the bank acted as a co-organizer of Cyfrowy Polsat green bonds issue and co-maintained the book of demand for the bonds. The issue received a certificate of compliance with the Green Bond Principles 2018, certified by the expert company Sustainalytics.
- Creating accounts for non-profit business, i.e., financing social organizations. Under the agreement with the bank, the organization receives a current settlement account in PLN, a placement account, term deposit accounts, access to mobile and Internet banking, comprehensive banking advisor care, and

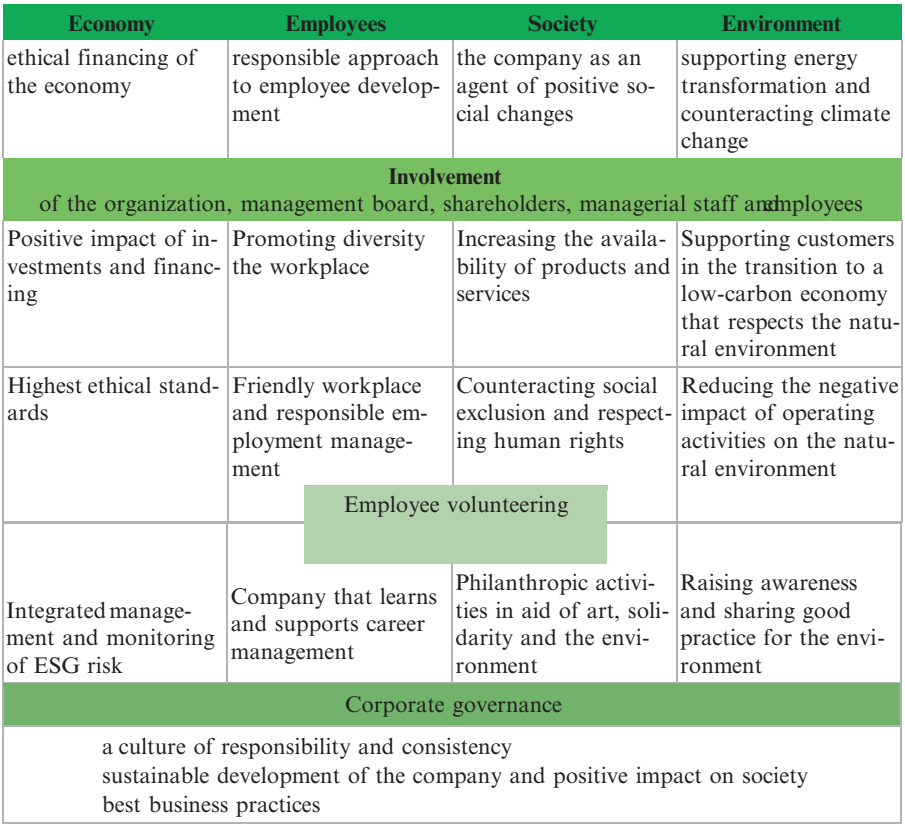

Fig. 7.2 Areas and activities of adaptation to sustainable development concept. (Source: https://www.bnpparibas.pl/csr/strategia-csr. Accessed 20 Sep 2021)

preferential terms of services. The BNP Paribas Group is a global leader in the field of financing social enterprises, which has introduced an appropriate financing policy for this type of enterprises.

- "Samodzielniak" (self-dependent) account and "Mission Independence" – in the case of children up to 13 years old, this account is used only for saving, but older children can use the account on similarly to adults. The creation of the "Samodzielniak" account is a part of the implementation of the "Mission Independence," the aim of which is to help parents in building children's independence and awareness in the financial dimension.
- Sustainable investment products – in 2020, the offer of the bank's Brokerage House included products that fit the Socially Responsible Investing concept.

The bank is open to innovations and actively supports their financing. As the first bank in Poland, it developed the Code of Cooperation with Startups, i.e., a document facilitating the bank's cooperation with young companies. Companies get a chance to convince bankers to financially support their idea, and banks to

familiarize themselves with modern and often environmentally friendly solutions. The bank also cooperates with the Innovation Incubator of the Warsaw University of Technology. Young technology companies have long been partners for the bank in its digital transformation.

The bank implements the concept of a green office by digitizing the processes carried out in the bank. In 2020, BNP Paribas invested in fintech Autenti, offering a platform for electronic contract signing and electronic document flow. In addition, it takes measures to reduce the consumption of paper (e-statements, e-invoices, and leaflets are printed on recycled paper and the use of eco-friendly paper with a reduced grammage), water, and electricity (using energy-saving solutions, from 2021 energy is obtained from renewable energy sources). Furniture and office equipment from closed or renovated facilities are donated to social organizations, schools, and hospitals.

In order to reduce the emission of substances harmful to the environment, the bank introduced hybrid cars to the car fleet and promotes bicycles as an ecological means of transport used in everyday commuting.

The bank's activities in line with the implementation of the sustainable development concept are also visible in the social aspect. On the bank's website, you can read that the bank undertakes to promote diversity in the workplace. These assumptions are reflected in practice, as the bank's employees established the initiative "Women Changing BNP Paribas," the aim of which is to strengthen the role of women in the organization and to promote the idea of diversity and inclusion. As part of its efforts to promote gender equality, the bank aims to achieve equal pay and minimize the gender pay gap.

The bank also declares its willingness to create a friendly workplace and responsible management of labor resources. The bank's organizational culture is based on a focus on cooperation and building relationships, caring for a good working climate, mutual support in the organization, and providing feedback. The bank also respects human rights and undertakes actions to counteract social exclusion. Such activities include the Local Grants Program, the program of the bank's local ambassadors, and support for refugees.

BNP Paribas is actively involved in charity actions. In 2020, BNP Paribas Bank Polska S.A. also took part in the Reforest Action campaign, which aimed to plant one tree for every €1000 invested in socially responsible investment. The Bank also established the BNP Paribas Foundation, which operates in the field of education, social solidarity, and increasing the accessibility of culture and art.

Due to the growing impact of ESG factors on the bank's operations and to implement the mission of sustainable development more effectively, in October 2020, the Chief Sustainability Officer was appointed. His or her role is to manage and coordinate the organization's activities in the field of ESG, sustainable development, and preventing climate change. A Sustainability Council was also established, which is responsible for defining and monitoring strategies in the field of ESG aspects, supervising the development of sustainable banking products and services, and combining initiatives taken in various areas of activity. The ESG risk has been included in the company's risk management system.

3.2 Scenario of a Sustainable Adaptation of the Stock Exchange: The Example of Luxembourg Stock Exchange

The Luxembourg Stock Exchange was founded in 1928 and is now a world leader in the listing of international securities. It is also a leading and innovative financial institution offering sustainable financial services. The first green bonds were listed on LuxSE in 2007, but in June 2016, the largest in the Eurozone amount of green bonds was issued, quoted in three currencies.

The stock exchange has separate segments dedicated to sustainable financial instruments. Today, the Luxembourg Green Exchange is the world's leading platform dedicated exclusively to sustainable securities. LuxSE carries out adjustment processes to the concept of sustainable development on two levels: as a business entity and as a platform for sustainable securities. Currently, the stock exchange has the largest market share of green, social, and sustainability bonds listed worldwide.

Recognizing the growing interest of investors in sustainable investments and to facilitate the investment process, pro-ecological and pro-social project LuxSE cares about the credibility, transparency, and availability of information on products and investment opportunities. To this end, specific criteria for ETFs and mutual funds have been developed. LGX offers dedicated windows for best-in-class ESG Funds, Balanced Funds, and ESG ETFs. All potential issuers must disclose detailed information on the use of funds raised from the bond issue and/or investment policy assumptions. Appropriate documentation is also required (external reviews and prospectuses are published on the LGX platform). Issuers of debt instruments listed on LGX are also required to monitor and report the funds raised.

The introduced requirements help potential investors to gain easy access to sustainable financial instruments, and thanks to the applied eligibility criteria, the process of comparability of sustainable financial instruments is improved. LuxSE's Guide to ESG Reporting was also developed, which is a comprehensive study for issuers, investors, and companies in identifying ESG activities and defining strategies in this area.

The stock exchange's activities are also pro-social. In order to popularize knowledge in the field of sustainable financial instruments and thus direct the interest of potential investors towards pro-social and pro-ecological projects, in 2020, the LGX Academy was established. Through lectures and seminars, the academy provides knowledge in the field of sustainable development and dedicated market instruments for people already working or wishing to start a career in the capital market.

As part of its activities, the Luxembourg Stock Exchange takes initiatives to protect the environment. The report "LuxSE sustainability report 2020" reveals that although as a provider of services to the capital market, the stock exchange has a rather small direct impact on the environment, it undertakes actions to protect it. A green office model was implemented, consisting in the digitization of processes and savings in material consumption (resource-efficient rooms and special baskets) and energy (Table 7.4). There are also programs based on the reduction and recycling of waste.

Table 7.4 Adaptation measures as part of adaptation to climate change LuxSE (status 2020)

	2020	2019
Responsible purchasing in procurement	The use of the quality label SuperDrecksKëscht and 100% use of Ecolabel certified or non-chemical cleaning products or products recommended by Clever Akafen	
Zero single-use plastic containers	For events and drink containers	
Reduce paper consumption	50% reduction in paper consumption with 66% saved thanks to a decrease in business brochures printing and 44% of individual printing	3% reduction in paper consumption with 22% saved, thanks to a decrease in business brochures printing
Waste reduction and recycling	57% reduction of individual waste and 7% recycling increase	14% reduction of individual waste and 11% recycling increase
Collection and use of rainwater for toilet flushing	Usage according to rainfall	
Sustainable building electricity consumption	Green electricity (Enovos certificates) 11% reduction of (green) electricity consumption	Green electricity (Enovos certificates) 1% increase due to electric charging stations instalment
Employees' mobility (domicile – work premises)	Drastic reduction as 59% WFH (74% during COVID-19 period)	Targeted 2025 benchmark for Luxembourg 1 achieved
CO_2 emissions of car lease fleet consumption	Average of 93.67 CO_2 emissions (NEDC) 41% reduction of carbon footprint total car lease fleet consumption (91.12 tons of CO_2 equivalent)	Average of 105.82 CO_2 emissions (NEDC) 155 tons of CO_2 equivalent for total car lease fleet consumption
e-Car sharing	On hold due to COVID-19	
Responsible car leasing policy	New responsible car leasing policy	–
Reduction of business trips	90% reduction (21 tons of CO_2 equivalent)	203 tons of CO_2 equivalent

Source: Sustainability Report 2020, (2020), Luxembourg Stock Exchange, https://www.bourse.lu/csr. Accessed 18 Aug 2021

The stock exchange also engages in cooperation with nongovernmental organizations to support local and international pro-social initiatives (Diversity Charter Lëtzebuerg, Equilibre My Pledge "No Women = No panel") and pro-ecological initiatives (IMS Zero Single-Use Plastic Pledge). It actively cooperates with local communities. In this way, it deepens and tightens contacts with stakeholders and learns about their expectations towards LuxSE. It is also involved in philanthropic initiatives, in line with the concept of sustainable development. Furthermore, it supports selected charities in their work and contributes to the creation of a more inclusive society. Additionally, LuxSE undertakes educational activities in the field of sustainable finance.

The stock exchange also declares respect for human and employee rights. Fair and non-discriminatory methods are used in the recruitment process. Job applications will not be rejected on the basis of a candidate's gender, age, religious beliefs, ethnicity, political opinions, family circumstances, sexual orientation, or background. The document on preventing and combating harassment, violence, and discrimination at work has also been implemented. To ensure the comfort at work, flexible working hours have been introduced (between 7 a.m. and 8 p.m.), as well as flexible lunch breaks and remuneration for overtime. The stock exchange also cares about the development of employees by offering them training and informal talks with HR about their individual career path.

3.3 Scenario of a Sustainable Adaptation of Enterprises: The Example of Grupa Azoty Zakłady Azotowe "Puławy" Spółka Akcyjna

Grupa Azoty Zakłady Azotowe "Puławy" Spółka Akcyjna is a leader in the Polish fertilizer and chemical industry and one of the most modern chemical plants in Central and Eastern Europe. The implementation of the sustainable development concept manifests itself in an integrated approach to actions taken to ensure economic efficiency, responsibility for employees and the environment, and relations with the environment.

Due to the specific nature of its operations, the enterprise is aware of the possibility of influencing the natural environment and the resulting climate changes; therefore, it undertakes activities aimed at minimizing the negative impact on the environment (including the climate). For this purpose, the company declares investing in research and searching for innovative technological solutions (expenditure on environmentally friendly installations reducing the emission of substances into the atmosphere), extending the product value chain (chemicals and plastics), increasing the environmental and cost efficiency of processes (reducing energy and water consumption and emissions), and developing a circular economy.

The company's activity in the field of environmental protection is strictly regulated and depends on a number of legal requirements. The company has implemented an "Environmental Management System compliant with ISO 14001," which supports activities in the area of environmental protection and pollution prevention. The company reduces water consumption and ensures the proper quality of the discharged sewage.

For years, the company has also been reducing the number of raw materials used in production, focusing on greater efficiency with less consumption. It runs a well-thought-out purchasing policy in line with ESG. The use of energy from hard coal is gradually reduced by the company. It also undertakes numerous activities to

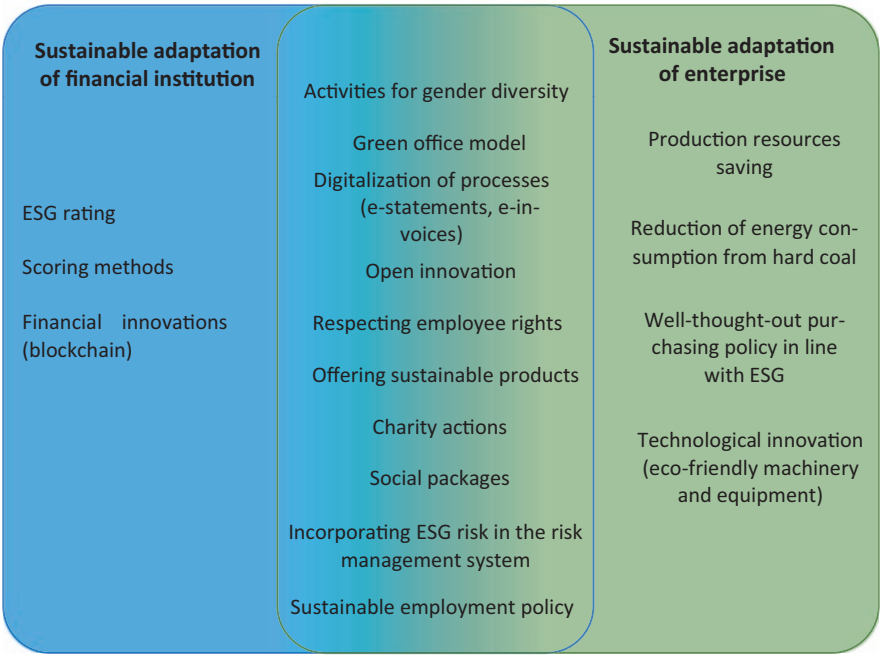

Fig. 7.3 Sustainable adaptation activities of financial institutions and enterprises

improve the energy efficiency of technological processes, i.e., it redesigns and improves processes, replaces equipment with more energy-efficient ones, and optimizes operational processes. Due to the use of modern technologies, the company noted a noticeable decrease in substances emitted into the air. The changes that are positive for the environment mainly concern the emission of nitrogen oxides, the emission of which in 2020 was over 25% lower than in relation to 2019.

Zakłady Azotowe "Puławy" also take actions in the social sphere such as initiatives for building and improving relations with clients, ensuring the safety of employees, and caring for the development of their intellectual capital. Employees have access to training and a social package.

The company actively engages in conducting educational campaigns among farmers and sponsoring local initiatives. As an example of a pro-ecological attitude and a concern for the environment, the company provides a place on the plant chimney for a nesting box for a peregrine falcon.

The aforementioned goals are to be achieved by building a coherent organizational culture based on a system of values and a code of ethics, increasing employee involvement and innovation, and participation in initiatives and reviews of ESG factors as well as monitoring key indicators and integrated reporting in accordance with generally recognized standards.

3.4 Sustainable Adaptation Towards Building Sustainable Value of Enterprises and Financial Institutions

The process of sustainable adaptation is carried out by both financial institutions and enterprises. The measures of sustainable adaptation, divided into groups of entities using them, are presented in Fig. 7.3. Financial institutions employ ESG ratings, scoring methods, and financial innovations.

Production resources saving, reduction of energy consumption from hard coal, well-thought-out purchasing policy in line with ESG, and technological innovation are examples of measures of sustainable adaptation carried out by enterprises. There is also a large group of adaptation measures that are common to both categories of entities.

4 Conclusion

Sustainable adaptation and finance are inextricably linked. Finance plays a key role in ensuring sustainable, market-driven, and policy-driven adaptation. In the case of adaptation based on the market mechanism, the market financial system plays a key role, and in the case of adaptation based on public policies, the public financial system. Measures currently taking place in finance for sustainable adaptation and sustainable development concern, inter alia, the separation of markets and instruments dedicated to sustainable financing, as well as the adjustment of business models of financial institutions in such a way that they correspond to the greatest possible extent to activities ensuring social equality and environmental integrity and, therefore, correspond to the elimination of negative externalities affecting the social and environmental pillar of sustainable development. Among the numerous adjustment measures in finance, those of a systemic and subjective nature deserve attention. As far as systemic activities are concerned, attention should be paid to those related to the adjustment of the financial system, while subjective activities are adjustment activities focused on the level of individual institutions.

Among the systemic actions, the most important are issues related to ESG risk management, i.e., adapting the financial system to quick detection and response to this type of risk. In turn, subjective activities are a series of projects at the level of the business model. The aim of these projects may be building sustainable value and shaping the product offer. The results of in-depth interviews conducted on a group of 36 financial managers from the Polish and foreign financial sector show that banks and capital market institutions are decisively responsible for disseminating good practices in the field of sustainable financing and, thus, for supporting sustainable adaptation. Less important in the dissemination of good practices process are insurance companies and rating agencies (Ziolo, 2020).

Conversely, the motives of financial institutions in this respect are disturbing, as they most strongly motivate their actions with image-related premises (perception

by clients) and regulatory premises – the existence of regulations that oblige financial institutions to undertake specific actions and behaviors. Fewer institutions justify their actions with the mission of functioning, according to which they state that they voluntarily and fully consciously want to prevent harmful climate change and harmful social changes. There is a visible difference in the approach of foreign managers, who consider the profit-making and competitive premises as more significant in building a sustainable financial system than do local managers. The difference in perception results from the perspective and maturity of the financial market, which, in terms of sustainable financing, is far more developed abroad compared with the Polish experience. This is confirmed by the answers obtained to the question about the key barriers to the construction and development of sustainable financial systems, among which the lack of qualified staff familiar with the issues of sustainable finance, in the case of Poland, was a more significant barrier compared with the perception of decision-makers managing finance abroad. Coincidentally, in both cases, the lack of knowledge and social and political awareness about the need to introduce changes in the financial system to sustainable financing was indicated.

Considerations about sustainable adaptation and its relationship with finance indicate that these are highly interdependent categories. Sustainable finances, in particular, a balanced financial system, are a factor that has a significant impact on the effects of actions within the scope of sustainable adaptation. Without a developed system of financing environmental protection and social finances, it is impossible to effectively carry out activities in the field of sustainable adaptation. Each of the initiatives in this area requires dedicated financing. These are extremely capital-intensive activities and carry an additional, specific type of risk – ESG risk, which can be reduced only within the framework of sustainable finance by considering this type of risk in the risk assessment. At the same time, sustainable adaptation determines the effectiveness of actions to ensure sustainable development. Therefore, sustainable development, sustainable adaptation, and sustainable financing to ensure the effectiveness of undertaken endeavors must be considered jointly.

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