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# ***ABSTRACT***

of a dissertation submitted for the award of the educational and scientific degree  
“Doctor” (in Economics) under the doctoral programme “Finance, Monetary  
Circulation, Credit and Insurance” (Finance), on the topic:

## **SUSTAINABILITY AND ENTREPRENEURSHIP IN CORPORATE GOVERNANCE**



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# I. General Characteristics of the Dissertation

## 1. Relevance of the Topic

The relevance of the topic is connected with the search for innovative and creative solutions to the most pressing problems of our time, which may otherwise lead to dramatic upheavals. The world faces unprecedented environmental, economic and social challenges that demand a radical rethinking of conventional corporate practices. Climate change, the depletion of natural resources, the growing pollution caused by plastic waste and deepening social inequalities are shaping a new paradigm, within which sustainable development is being established not only as an ethical imperative but also as a strategic factor for corporate competitiveness. The ratification of the Paris Agreement (UNEP, 2016) and the adoption of the European Green Deal have intensified regulatory pressure on corporations to decarbonise their production processes and to transition towards sustainable business models.

Plastics occupy a particular place in the global environmental debate, since conventional petroleum-based polymers are among the most significant sources of pollution and carbon emissions. Annual global plastics production exceeds 400 million tonnes, of which barely 9% is effectively recycled, while the remainder accumulates in landfills and oceans, causing long-term environmental damage. The production of bioplastics, and in particular of polylactic acid (PLA), represents a promising alternative capable of transforming the industry through a transition from fossil-based to renewable feedstocks. Maize, as the principal feedstock for PLA, opens new horizons for the circular economy and for the creation of sustainable added value for agricultural producers. A substantial body of empirical research demonstrates the existence of a positive relationship between corporate social responsibility (CSR) and the financial performance of firms. Friede et al. (2015) identify a positive effect in 63% of the 2,200 studies analysed, while Eccles et al. (2014) document a 3.2% increase in operating margins among companies with high sustainability standards. Nevertheless, the meta-analysis of Revelli and Viviani (2015) reports an average correlation of  $r = 0.14$ , which raises the question of the specific mechanisms underlying this relationship. The present dissertation addresses this gap by proposing a three-

channel model of impact, illustrated through the specific case of PLA production from maize. The relevance of the topic is further supported by the growing dynamism of the global bioplastics market. ESG standards (Environmental, Social, Governance) are becoming a mandatory element of corporate governance, and investors are increasingly directing capital towards companies with a measurable commitment to sustainability. The European Commission has invested more than EUR 500 billion in green projects as part of the Green Deal. In this context, an interdisciplinary investigation of the relationship between sustainable innovation and firm value possesses both theoretical and high practical significance. The EU 2030 framework for climate and energy constitutes an integrated and ambitious package of policies and measures to combat climate change. The regulation requires Member States to develop integrated national energy and climate plans and long-term strategies for achieving low emissions by 2050. Such initiatives help to reduce the unsustainable practices applied by large organisations, including through the taxation of carbon emissions at rising prices, which leads to a significant reduction in the revenues of polluters and creates economic incentives for a transition to green technologies. An increasing number of states offer low-interest loans for investment in improving sustainable models and shifting to green energy. From a marketing perspective, a growing number of corporations and consumers are directing their purchasing power and business intentions towards organisations with sustainable models. Many sustainability-oriented companies are taking steps of various kinds to enhance their sustainable operating model, which often leads to lower costs, higher revenues and an improved overall image. Companies that lag behind in the transition to sustainability risk forgoing potential profits, incurring short- and long-term losses, and experiencing a long-term collapse of key operations.

## 2. Object and Subject of the Research

**The object** of the research is the impact of sustainable practices on firm value in the context of contemporary corporate governance. The study encompasses both the theoretical concepts of sustainability and corporate value and the practical mechanisms for their integration into specific business models, with a focus on the biopolymer industry.

**The subject** encompasses the specific mechanisms through which the integration of environmental, social and governance (ESG) initiatives – with particular emphasis on the production of polylactic acid (PLA) from maize – affects the corporate value, profitability and long-term competitiveness of companies. Particular attention is devoted to the three-channel model of impact: a reduction in the cost of capital through an ESG-adjusted WACC, an increase in operating margins, and a premium valuation of sustainable companies in the financial markets.

### 3. Research Thesis

The **leading research thesis** is the proposition that the integration of sustainable practices into corporate governance contributes both to reducing environmental harm and to enhancing the long-term economic value of companies. The thesis challenges the traditional linear interpretation of the relationship between ESG and financial performance and proposes an alternative three-channel model of the positive impact of sustainable practices on corporate value.

The three-channel model encompasses the integral impact of the following mechanisms: a reduction in the cost of capital through an ESG-adjusted WACC; an increase in the operating margin through resource efficiency; and a valuation premium resulting from reduced risk. Specific validation is carried out through the case of the industrial use of polylactic acid derived from maize.

### 4. Aim of the Dissertation

The principal **aim** of this dissertation is to investigate and quantitatively assess the impact of sustainable practices on corporate value by revealing the causal relationships between environmental innovation, social responsibility and the financial performance of firms. The study aims to propose an integrated analytical model linking sustainability to specific financial mechanisms, and to demonstrate its practical applicability through the case of PLA production from maize. A further aim is the formulation of scientifically grounded practical recommendations for the corporate sector and for public policy.

### 5. Tasks, Methodology and Empirical Basis of the Research

The tasks, methodology and empirical basis of the research are connected with conducting a theoretical review of the various aspects of sustainability, investigating the impact of innovative sustainable practices on corporate value, and modelling and testing the impact of the industrial use of polylactic acid derived from maize. In order to achieve this aim, the following **tasks** have been set. The first task is to examine the theoretical foundations of sustainability across its three dimensions and to systematise the role of the circular economy and CSR. The second task involves an analysis of corporate value and of the mechanisms through which sustainable practices function as its driver. The third task envisages an examination of PLA as an innovative alternative to conventional plastics. The fourth task encompasses the development of a methodological framework incorporating financial modelling, scenario analysis and econometric analysis. The fifth task is the formulation of practical recommendations.

**The methodology** is based on a mixed-methods research design. The quantitative component comprises: financial modelling through NPV, IRR, payback period and ROI; the Difference-in-Differences (DiD) econometric method with Tobin's Q; sensitivity analyses under three scenarios; and life-cycle assessment (LCA) following ReCiPe 2016, integrated with a DCF valuation through carbon pricing (€80–120/tonne CO<sub>2</sub>). The qualitative component comprises a systematic literature review, thematic analysis and case studies. The research approach is conceptually and methodologically grounded through the integration of interdisciplinary strategies that correspond to the specific nature of sustainable development and to the requirements of empirical validity. A mixed-methods research design has been adopted as the principal methodological framework, combining quantitative and qualitative methods to arrive at a nuanced picture of the interactions between PLA-based corporate innovation and market competitiveness. The qualitative component includes an analysis of academic and grey literature, the conduct of expert interviews, and case studies of leading companies in biopolymer technologies. The quantitative module is implemented through the application of financial modelling, econometric analysis and the calculation of key performance indicators. The conceptual framework is built upon the integration of several key theoretical models. The Triple Bottom Line concept emphasises the need for companies to balance environmental responsibility, social equity and economic profitability. The Shared Value theory

reconceives the role of business as a generator of economic benefits combined with responsibility towards social and environmental needs. The framework is complemented by established CSR and ESG standards, which serve for the systematic monitoring and reporting of the sustainability of corporate activities.

**The empirical basis** includes data from Bloomberg, Thomson Reuters, Eurostat and FAO, reports from European Bioplastics, the European Commission and the United Nations, as well as corporate ESG reports. The key indicators encompass financial and economic measures (NPV, IRR, ROI, ROA, Tobin's Q), environmental measures (CO<sub>2</sub> emissions, carbon footprint, biodegradability) and corporate ESG indicators (social responsibility, governance practices, and the integration of sustainable initiatives into strategic planning).

## 6. Conceptual Scope of the Research

The theoretical framework of the dissertation brings together the Triple Bottom Line concept, stakeholder theory, the Shared Value concept and the ESG approach to corporate governance. On this basis, sustainability is regarded not merely as a normative or ethical category but as a managerial and financially measurable factor capable of influencing corporate value through risk reduction, improved operational efficiency and the strengthening of market reputation. The first chapter builds the theoretical foundation of sustainability through an analysis of its environmental, social and economic dimensions. The second chapter transfers this analysis to corporate value and shows how sustainability is integrated into contemporary corporate governance. The third chapter renders the research problem concrete through the example of PLA as a sustainable alternative to conventional plastics. The fourth chapter develops the empirical-methodological framework, in which the potential of PLA to create corporate value is examined through financial modelling, scenario analysis and investment appraisal. The conclusion synthesises the results and formulates practical guidelines for the corporate sector, investors and public policy. The bibliography comprises the normative acts, monographs, articles and electronic sources employed. The dissertation is supported by the author's own publications on the subject, duly indicated in the main body of the work.

## 7. Structure of the Dissertation

The dissertation has a total volume of 224 standard pages and is structured into an introduction, four chapters, a conclusion, a list of references and appendices in the form of indexes of the figures and tables. This structure reflects the logic of the research, proceeding from the theoretical clarification of sustainability and corporate value, through the analysis of polylactic acid as a sustainable alternative to conventional plastics, to the construction of an empirical-methodological framework for assessing its impact on sustainability and corporate value.

The introduction substantiates the relevance, object, subject, research thesis, aim, tasks, methodological approach and empirical basis of the dissertation. Emphasis is placed on the need for sustainability to be regarded not merely as an environmental or ethical category but as a factor that can be linked to specific financial mechanisms and to the long-term creation of corporate value.

The first chapter, entitled “Sustainability as an Integrated Concept of Environmental, Social and Economic Development”, examines the theoretical foundations of sustainability, its environmental, social and economic dimensions, its application across various sectors, and the role of the circular economy, the financial markets and sustainable agriculture. The chapter further analyses the problem of greenwashing, the interrelations among the three dimensions of sustainability, the principal challenges facing sustainable development, and the importance of international cooperation and integrated policies.

The second chapter, “Corporate Value and Sustainability in Contemporary Corporate Governance”, is devoted to the evolution of the concept of corporate value, its financial and non-financial elements, the significance of stakeholders, and the role of sustainability as a driver of firm value. It examines the impact of environmental initiatives, social sustainability and sustainable investment on the long-term financial success of companies.

The third chapter, “Polylactic Acid (PLA) as a Sustainable Alternative to Conventional Plastics: Technological, Economic and Environmental Dimensions”, examines PLA as a technological and industrial innovation. It analyses the production process, the feedstocks employed, the industrial applications of the material, its advantages over conventional plastics, and its impact on the corporate value and social legitimacy of companies. Particular

attention is devoted to maize as the feedstock basis for PLA production, as well as to the economic, social and environmental rationale of this transition.

The fourth chapter, “An Empirical-Methodological Framework for the Analysis of Polylactic Acid as a Factor of Sustainability and Corporate Value”, presents the research approach and the methods employed for data collection and analysis. It develops an assessment of the impact of sustainable innovation on corporate value through the PLA case. The emphasis is placed on financial modelling, scenarios comparing conventional and sustainable production, the investment analysis of PLA production, scenario analysis, risk management, and the integration of environmental and social factors into business models.

The conclusion summarises the principal results of the research, formulates conclusions regarding the relationship between sustainability and corporate value, and outlines practical guidelines for business, investors and public policy. The thesis is advanced that sustainable materials and innovations, when assessed through financial, environmental and social indicators, can become a genuine mechanism for the creation of long-term corporate value.

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## II. Main Content of the Dissertation

### INTRODUCTION

The introduction substantiates the relevance of the research in the context of the growing importance of sustainability for corporate governance, investment decisions and the long-term value of the firm. The point of departure is that sustainability is increasingly perceived not merely as an ethical or environmental commitment but as an economic factor capable of influencing the costs, revenues, risk, access to capital and market valuation of companies.

On the one hand, stakeholder theory and the Shared Value concept suggest a positive impact of sustainable governance on corporate value. On the other hand, the empirical literature shows that this relationship is not unambiguous and cannot be explained through a simple linear dependence. For this reason, the dissertation adopts a more specific analytical logic, according to which sustainability influences firm value through several interconnected mechanisms: a reduction in the cost of capital, an improvement in operational efficiency, a limitation of regulatory risk, and a strengthening of the company's reputational and market position. The stakeholder theory predominant in the literature (Freeman, 1984; Donaldson & Preston, 1995) and the Shared Value concept (Porter & Kramer, 2011) suggest a positive relationship, yet meta-analyses reveal considerable heterogeneity in the results. I propose a three-channel model: (1) a reduction in the cost of capital through an ESG-adjusted WACC (a reduction of 0.8–1.2 percentage points); (2) an increase in the operating margin (EBITDA +3.2%); and (3) a valuation premium (EV/EBITDA +1.3x). The model is validated through PLA derived from maize, integrating LCA following ReCiPe 2016 with a DCF valuation through carbon pricing based on EU ETS projections of €80–120/tonne CO<sub>2</sub> for the period 2025–2035.

The introduction formulates the object, subject, aim, research thesis and tasks of the dissertation. The object of the research is the impact of sustainable practices on firm value in contemporary corporate governance. The subject is directed towards the specific mechanisms through which environmental, social and

governance initiatives – with an emphasis on the production of polylactic acid (PLA) from maize – can be transformed into corporate value. The principal aim is to investigate and quantitatively assess the influence of sustainable practices on corporate value by combining theoretical analysis, the appraisal of a sustainable material, and investment-financial modelling.

The methodological framework outlined in the introduction combines a theoretical review, comparative analysis, a case-study approach and quantitative financial modelling. The empirical focus is placed on PLA as an example of a sustainable innovation that makes it possible to trace the relationship between environmental effect, production economics, investment return and corporate value.

## **CHAPTER ONE. SUSTAINABILITY AS AN INTEGRATED CONCEPT OF ENVIRONMENTAL, SOCIAL AND ECONOMIC DEVELOPMENT**

The first chapter builds the theoretical foundation of the dissertation by examining sustainability as an integrated concept that unites environmental, social and economic dimensions. It begins by clarifying the definition of sustainability and tracing the early roots of the concept, placing emphasis on the transition from the general idea of resource conservation to the contemporary understanding of sustainable development as a balance among economic growth, social equity and environmental protection.

The chapter examines the fundamental principles of economic sustainability and its application across various sectors. Particular attention is devoted to energy, the circular economy and the financial markets. The circular economy is presented as a strategic approach to sustainable development, insofar as it promotes the reuse of resources, the reduction of waste and the extension of product life cycles. The financial markets are examined through their role in channelling capital towards sustainable projects, green investment and companies with better ESG practices.

The concept of sustainability is subjected to a thorough theoretical analysis, tracing its evolution from the report of the Brundtland Commission (1987), “Our Common Future”, to contemporary understandings of total sustainability.

Sustainability is defined as a paradigm encompassing three inseparable dimensions – economic, social and environmental. The early roots of the concept are traced, along with the transition to a modern understanding that incorporates social equity and corporate responsibility. Economic sustainability is examined as the capacity to maintain long-term profitability under balanced resource use. Its applications in energy, the circular economy and the financial markets are analysed. The transition to a circular economy can increase competitiveness by up to 15% while reducing the carbon footprint. The challenges facing economic sustainability are examined, including the high initial costs of the green transition, the need for new skills and technologies, the price fluctuations of raw materials, and the short-term focus of the financial markets. The future of economic sustainability is analysed in the context of growing regulatory requirements and consumer expectations. Social sustainability is examined through the principles of equity, inclusion and equal access. Education and healthcare are key drivers for raising economic productivity (UNESCO, 2019). Demographic changes and the challenges facing sustainable pension models are examined. The applications of social sustainability are analysed across several spheres: healthcare, education, social entrepreneurship and fair trade. It is established that investment in human capital – education, vocational training and healthcare – strengthens not only the social but also the economic sustainability of societies. The challenges include the growing inequalities in access to resources, urbanisation and the ageing of populations in developed countries, as well as the need to adapt social models to a dynamic technological environment. Environmental sustainability is analysed through renewable energy sources, sustainable agriculture and biodiversity. Particular attention is devoted to greenwashing – misleading environmental claims that undermine trust in ESG. A fundamental interdependence among the three dimensions is established through the Triple Bottom Line concept. Key problems are identified: the uneven distribution of resources between developed and developing countries, technological barriers to the mass adoption of green innovation, regulatory fragmentation across jurisdictions, and deficits in international cooperation. Recommendations are formulated for overcoming these through coordinated multilateral action and harmonised regulatory frameworks. The economic challenges include the high costs of the green transition and the short-term focus of the financial markets. The social challenges

encompass growing inequalities, urbanisation and population ageing. The environmental challenges include the loss of biodiversity, the pollution of water resources and soil degradation. It is established that international cooperation, including through initiatives such as the United Nations Sustainable Development Goals, is a necessary condition for effectively addressing these complex problems.

## **CHAPTER TWO. CORPORATE VALUE AND SUSTAINABILITY IN CONTEMPORARY CORPORATE GOVERNANCE**

The second chapter transfers the analysis from the general concept of sustainability to corporate governance and firm value. It begins by tracing the historical development of the concept of corporate value as a transition from the traditional understanding, based chiefly on profit, assets, liquidity and return, to the contemporary approach in which non-financial factors, reputation, social responsibility, environmental commitment and stakeholder relations acquire ever greater significance.

The chapter systematises the principal elements of corporate value. The financial elements are examined through indicators such as profitability, liquidity and capital structure, which remain the basis for assessing the economic stability and investment attractiveness of the firm. Increasingly, however, non-financial elements complement the traditional financial analysis. Reputation, corporate social responsibility, environmental commitment and stakeholder trust are becoming assets that can influence revenues, risk, the cost of capital and market valuation.

Particular attention is devoted to stakeholders, namely shareholders, employees, customers, local communities, suppliers, creditors and regulators. The chapter shows that sustainable corporate governance entails balancing diverse interests and creating value not only for owners but also for a wider circle of participants who influence, or are affected by, the company's activities.

The historical development of corporate value is systematised, from the classical approach (Friedman, 1970) to stakeholder theory (Freeman, 1984). The financial indicators – ROE, ROA, net margin, liquidity, capital structure and WACC – are

analysed, as are the non-financial ones: reputation as an intangible asset, CSR in its evolution from philanthropy to a strategic instrument, and environmental commitment as a differentiating factor. Profitability is examined as a principal financial indicator, comprising the return on equity (ROE), the return on assets (ROA) and the net profit margin. Liquidity is analysed through the current ratio and the quick ratio, and capital structure through the debt-to-equity ratio and the weighted average cost of capital (WACC). It is established that companies with high ESG ratings benefit from a lower WACC owing to a reduced perception of risk on the part of investors. Non-financial indicators are becoming increasingly significant. Reputation is identified as a critical intangible asset whose construction requires a consistent commitment to ethical conduct and sustainable practices. Corporate social responsibility (CSR) is analysed across Carroll's (1999) four dimensions – economic, legal, ethical and philanthropic. Environmental commitment is presented as a key factor for reputational differentiation amid growing consumer and regulatory attention. The role of stakeholders is examined in detail. Shareholders increasingly incorporate ESG criteria; institutional investors such as BlackRock declare sustainability to be a priority. Some 73% of consumers prefer products from sustainable companies (Nielsen, 2021). Companies with high ESG ratings demonstrate 20% lower volatility and improved access to the capital markets (Bloomberg, 2022). A positive correlation is established between sustainable investment and long-term financial success. Sustainability functions as a driver of corporate value through three channels: a reduction in systematic risk, an enhancement of operational efficiency, and an expansion of market opportunities. These channels operate synergistically. The impact of environmental initiatives on firm value is analysed. Companies such as Tesla and Unilever demonstrate that the adoption of technologies for reducing carbon emissions not only minimises the environmental footprint but also increases attractiveness to investors. Unilever's programme of support for local communities led to a 15% increase in market share in developing markets. The role of social sustainability in strengthening the corporate image is confirmed through numerous case studies demonstrating the positive correlation between sustainable investment and long-term financial results.

## **CHAPTER THREE. POLYLACTIC ACID (PLA) AS A SUSTAINABLE ALTERNATIVE TO CONVENTIONAL PLASTICS: TECHNOLOGICAL, ECONOMIC AND ENVIRONMENTAL DIMENSIONS**

The third chapter renders the theoretical analysis concrete by examining polylactic acid (PLA) as a sustainable alternative to conventional plastics. The point of departure is that petroleum-based plastics are inexpensive, functional and widely used, yet at the same time create serious environmental problems associated with waste, carbon emissions and long-term pollution. In this context, PLA is presented as a bio-based thermoplastic polymer produced from renewable feedstocks such as maize, sugar cane and other forms of biomass. PLA is presented as a leading innovation. The process is described: hydrolysis of the starch, fermentation to lactic acid with the aid of microbes, and subsequent chemical polymerisation. PLA is classified as a thermoplastic aliphatic polyester produced entirely from renewable resources. PLA offers an approximately 75% lower carbon footprint and approximately 65% lower energy intensity (Vink et al., 2010). It is biodegradable under industrial conditions – composting generates CO<sub>2</sub>, water and biomass for reintegration into the biological cycle. The environmental benefits of PLA are systematised along several lines. First, biodegradability under industrial conditions makes it possible to significantly reduce plastic waste and to minimise long-term environmental impact. Second, the low carbon footprint makes PLA a preferred choice for companies seeking to decarbonise their production. Third, the use of renewable feedstocks promotes sustainable agriculture and creates economic incentives for farmers, building more sustainable value chains. The applications are systematised: packaging, 3D printing, medical devices, textiles and the automotive industry. The market price (approximately €2.5/kg) is declining as a result of technological improvements. Maize is a strategic feedstock owing to its high starch content and its potential for economic benefits to agrarian communities. The transition to PLA increases added value. Challenges are identified: competition for agricultural land, higher production costs and insufficient composting infrastructure. Solutions are proposed: optimisation, the use of residual biomass and investment in infrastructure. A comparative analysis is conducted between PLA and

conventional plastics across key indicators. With respect to feedstock costs, PLA relies on renewable resources with more stable long-term prices, in contrast to the volatile prices of fossil fuels. Revenues from sustainable products are higher owing to premium pricing and growing consumer preference. The regulatory advantages include fewer penalties and access to state support. The long-term risk of losing market share is significantly lower under sustainable production, given the tightening of environmental regulation in the EU and globally. The social benefits of PLA production from maize are systematised along several lines. The creation of new jobs in rural areas stimulates economic activity and reduces migration to the cities. Raising farmers' incomes through the higher added value of biopolymer production strengthens local communities. A commitment to sustainable practices increases consumer loyalty and improves corporate reputation, generating long-term market advantages.

The chapter also examines maize as the feedstock basis for PLA production. Its economic rationale, sustainable potential and connection with corporate value are analysed. On the one hand, maize makes it possible to create higher added value through industrial processing. On the other hand, its use for bioplastics raises questions concerning the competition among food, feed, energy and industrial applications. For this reason, the chapter regards PLA not as a universal solution but as part of a broader transition towards sustainable materials, the circular economy and more responsible resource management.

The third chapter concludes with a comparative analysis between PLA and conventional plastics. The economic viability of PLA, the social and environmental benefits of using maize as a feedstock, and the long-term prospects for sustainability in the plastics industry are assessed. The principal conclusion is that PLA has genuine potential to reduce the carbon footprint and to create new business opportunities, but that its successful application depends on technological optimisation, market demand, public policies, and infrastructure for composting and recycling.

## **CHAPTER FOUR. AN EMPIRICAL-METHODOLOGICAL FRAMEWORK FOR THE**

## ANALYSIS OF POLYLACTIC ACID AS A FACTOR OF SUSTAINABILITY AND CORPORATE VALUE

The fourth chapter presents the empirical-methodological framework of the research and includes both the general methodology and a specific investment analysis of PLA production, comprising financial modelling, scenario analysis, sensitivity analysis and risk management. The chapter begins by presenting a mixed-methods research design that combines qualitative and quantitative methods. The qualitative component includes a literature review, an analysis of grey literature, a case-study approach, and the systematisation of theoretical and practical arguments concerning the relationship among sustainability, PLA and corporate value. The quantitative component is built upon financial indicators, investment calculations and scenario modelling. The conceptual basis integrates the Triple Bottom Line, Shared Value and the ESG standards. The quantitative component comprises financial modelling, DiD econometric analysis and sensitivity analysis.

The principal contribution of the chapter is the investment model developed for PLA production with an annual capacity of 20,000 tonnes. The analysis comprises dynamic financial modelling with discounted cash flows, and appraisal through NPV, IRR, MIRR, payback period, profitability index, break-even selling price and break-even volume. In the base scenario, the project generates an NPV of EUR 13.08 million, an IRR of 16.6%, an MIRR of 14.2%, a simple payback period of approximately 4.9 years, a discounted payback period of approximately 6.3 years, and a profitability index of  $PI = 1.33$ . These results indicate that, under realistic market conditions, the project is investment-worthy, albeit sensitive to the price of PLA, production costs and the level of capacity utilisation.

An important element of the analysis is the inclusion of the carbon effect. When the avoided emissions are monetised through a carbon price of EUR 50/tonne CO<sub>2</sub>, the project's NPV rises from EUR 13.08 million to EUR 25.18 million, and the IRR reaches 22.1%. Under higher projected EU ETS prices of EUR 80–100/tonne CO<sub>2</sub>, the NPV exceeds EUR 32–38 million, which shows that the environmental advantages of PLA can be converted into a measurable financial asset.

The chapter also develops a scenario analysis. The pessimistic scenario assumes a lower selling price, higher production costs, the absence of a subsidy, and lower capacity utilisation. Under these conditions, the project records a negative NPV of EUR –48.99 million and a negative IRR. The base scenario remains positive, with an NPV of EUR 13.08 million and an IRR of 16.6%. The base scenario including the CO<sub>2</sub> effect improves the results to an NPV of EUR 25.18 million and an IRR of 22.1%, while the optimistic scenario reaches an NPV of EUR 80.18 million and an IRR of 46.2%. These results demonstrate that the investment attractiveness of PLA depends not only on the market price but also on the regulatory environment, carbon pricing, the scale of production and technological efficiency.

Sensitivity analysis and stress tests are additionally applied. The sensitivity matrix shows that, at a base production cost of EUR 1,850/tonne, the minimum selling price for a positive NPV is approximately EUR 2,120/tonne, with the project retaining a price buffer at market PLA prices between EUR 2,300 and EUR 2,700/tonne. The stress tests show that the project is vulnerable to a sharp price decline, a cost shock or delayed capacity utilisation, but remains viable under moderate market conditions and especially when the carbon effect is included.

The concluding part of the fourth chapter examines the integration of environmental and social factors into business models. It is argued that sustainability creates corporate value not only through direct financial indicators but also through reputation, access to ESG capital, lower regulatory risk, increased consumer loyalty and opportunities for market differentiation. In this way, the investment analysis supports the principal thesis of the dissertation: sustainable innovations can be financially measurable and can participate in the creation of long-term corporate value.

The correlation analysis between business performance and environmental indicators makes it possible to examine the strategic advantages realised through the integration of biopolymers and ESG initiatives. The qualitative aspect of the research includes a thematic analysis of the data from the literature review, corporate reports and specialised reports. The results of the qualitative analysis provide contextual information that complements the quantitative results and offers a more complete picture of the processes under study.

## CONCLUSION

The conclusion synthesises the principal results of the research. The thesis is confirmed that sustainability can be regarded as a factor of corporate value when it is connected with specific financial, environmental and social mechanisms. The theoretical analysis shows that sustainability can no longer be confined to voluntary corporate policy or to an element of public image. It is becoming a managerial framework that influences costs, revenues, risk, access to capital and long-term competitiveness.

Through the PLA case it is shown that sustainable materials can be analysed not only from an environmental but also from an investment perspective. PLA possesses the potential to reduce the carbon footprint, to replace part of conventional plastics, and to create new opportunities for producers, investors and agricultural suppliers. At the same time, the results emphasise that the economic viability of PLA is not automatic. It depends on production costs, the selling price, regulatory incentives, carbon pricing, technological improvements and waste-management infrastructure.

The financial model demonstrates that, under base conditions, the PLA production project can create positive value, and that when the carbon effect is included its investment attractiveness increases significantly. This permits the more general conclusion that environmental benefits can be transformed into a financial asset when supported by appropriate markets, policies and valuation mechanisms. The conclusion formulates practical recommendations for the corporate sector, investors and public policy, relating to the promotion of sustainable materials, the construction of composting and recycling infrastructure, the encouragement of green investment, and the development of more accurate models for assessing sustainable corporate value.

### **III. Directions for Future Research on the Dissertation Topic**

The directions for future research include several promising avenues. Extending the geographical scope towards developing markets – South-East Asia, Latin America and Africa – will make it possible to interpret global challenges in a context with a different institutional environment. Long-term empirical studies (10–15 years) will provide data for validating the scenario projections. Comparative studies among feedstocks such as sugar cane, wheat, biomass and algae will broaden the flexibility of sustainable models. Empirical case studies with real companies will validate the theoretical models. The investigation of digitalisation, AI and blockchain for sustainable value chains is a promising avenue. The analysis of the Green Deal and the EU taxonomy for sustainable finance opens new horizons. Research is also needed into the synergistic effects among different sustainable practices and their cumulative impact. Further promising avenues include: the investigation of the behavioural aspects of consumer demand for sustainable products; an analysis of the role of corporate culture in the successful integration of ESG strategies; an assessment of the impact of green bonds and sustainable finance on investment decisions; and an examination of the possibilities for applying the principles of the circular economy in developing markets, where infrastructural constraints create specific challenges and opportunities.

## IV. Statement of the Scientific and Applied Scientific Contributions of the Dissertation

**First.** An interdisciplinary theoretical-analytical framework has been developed for the study of the relationship between sustainability and corporate value. The model systematises the financial and non-financial mechanisms through which sustainable practices generate corporate value. The framework integrates the Triple Bottom Line concept, stakeholder theory, the Shared Value concept, corporate social responsibility and the ESG approach to corporate governance. Through this integration, sustainability is regarded not merely as an ethical or environmental category but as a managerial and financially relevant factor capable of influencing firm value through costs, revenues, risk, reputation, access to capital and long-term competitiveness.

**Second.** The principal mechanisms through which sustainable practices affect corporate value have been systematised. The dissertation defends the thesis that the relationship between sustainability and financial performance should not be interpreted as a simple linear dependence. Instead, a three-channel model of impact is substantiated, in which sustainable practices can create value through: a reduction in the cost of capital and regulatory risk; an improvement in operational efficiency and resource productivity; a strengthening of reputation and social legitimacy; access to ESG-oriented investors; and the possibility of premium market positioning of sustainable products. The three-channel model encompasses the impact of: (1) a reduction in the cost of capital through an ESG-adjusted WACC (a reduction of 0.8–1.2 percentage points); (2) an increase in the operating margin (EBITDA +3.2%); and (3) a valuation premium (EV/EBITDA +1.3x). The model integrates LCA with a DCF valuation through carbon pricing – a methodological contribution. Thus the model moves beyond the general assertion that “sustainability is beneficial”, linking it to specific financial and non-financial channels of value generation.

**Third.** The conceptual and applied role of polylactic acid (PLA) has been elaborated as an example of a sustainable industrial innovation. PLA has been analysed as a bio-based material that makes it possible to study the relationship among environmental innovation, production economics and corporate value. The dissertation systematises the production process, the

feedstock base, the industrial applications, and the advantages and limitations of PLA compared with conventional plastics. The contribution consists in the fact that PLA is regarded not merely as a technological alternative but as an economic and managerial case through which it is possible to assess how a sustainable material participates in the transformation of the business model, market reputation and investment attractiveness of the company. This is substantiated in the third chapter, which is devoted to the technological, economic and environmental dimensions of PLA.

**Fourth.** The strategic significance of maize for biopolymer production has been substantiated. The transition from traditional applications to PLA significantly increases added value and creates new economic opportunities for agricultural communities.

**Fifth.** A specific investment-financial model has been developed for assessing the production of PLA. An investment model has been developed for the production of PLA with a capacity of 20,000 tonnes per year, based on discounted cash flows and key investment indicators. The model includes NPV, IRR, MIRR, payback period, discounted payback period, profitability index, break-even selling price and break-even production volume. In this way, the general thesis concerning the economic applicability of PLA is converted into a specific financial assessment capable of supporting investment decisions in the biopolymer industry.

**Sixth.** The carbon effect has been integrated into the financial assessment of the sustainable material. The dissertation shows that the environmental benefits of PLA can be converted into a financially measurable effect when the avoided emissions of CO<sub>2</sub> and their potential valuation through carbon pricing are taken into account. In this way, the environmental argument is incorporated into the investment logic of the project. This makes it possible to arrive at a more precise assessment of sustainable corporate value, since the financial model accounts not only for revenues and costs but also for the effect of a lower carbon footprint, future regulatory incentives and potential access to green financing.

**Seventh.** An applicable analytical approach has been proposed for the assessment of sustainable industrial projects. A framework has been developed that can be used beyond the specific case of an industrial PLA installation. The combination of theoretical ESG analysis, the appraisal of a sustainable material, financial



modelling, scenario analysis, carbon valuation and the assessment of socio-environmental effects can be adapted to other green technologies, biomaterials and industrial investments. In this way, the dissertation offers a toolkit applicable to companies, investors, public institutions and researchers who assess the economic efficiency of sustainable innovation.

## **V. List of the Candidate's Publications**

### ***I. Studies (2)***

- 1) Bakardzhiev, Martin (2022). Sustainability and Entrepreneurship in Corporate Governance: An Analysis of the Impact of ESG Practices on Firm Value, Annual Almanac "Scientific Research of Doctoral Students", Book 18, D. A. Tsenov Academy of Economics, Svishtov.
- 2) Bakardzhiev, Martin (2026). The Evolution of Corporate Value – from Financial Indicators to Social Responsibility. Nauchen Atlas (Scientific Atlas), 15, 40–58.

### ***II. Articles (2)***

- 1) Polylactic Acid (PLA) as an Instrument for Sustainable Corporate Development: Production, Applications, Economic Viability and Financial Modelling, e-Journal VFU, Varna. In press
- 2) Financial and Non-Financial Dimensions of the Long-Term Corporate Value of the Firm in the Context of ESG Practices. In press

## **VI. Record of the Candidate's Participation in Scientific Forums**

- 1) 15th Doctoral Scientific Session, 2 December 2022, D. A. Tsenov Academy of Economics, Svishtov.
- 2) The Future of Cybersecurity in the Financial Sector, Association of Banks in Bulgaria. 3 October 2025, Sofia.
- 3) Webit: Business, technology and people in the era of AI and Web3, 26 June 2025, Sofia.

## **VII. Statement of Compliance with the National Requirements**

**Studies: 2 (sole-authored)**

*M. Bakardzhiev*

**Articles: 2 (sole-authored, in press)**

**Minimum number of points: 30**

Points achieved under Indicator 7 (Articles and reports published in non-refereed journals with scientific peer review or published in edited collective volumes), pursuant to the Appendix to Art. 1a, para. 1 of the Regulations for the Implementation of the Act on the Development of the Academic Staff in the Republic of Bulgaria, setting out the Minimum National Requirements concerning the scientific, teaching and/or artistic-creative or sporting activity of candidates for the award of a scientific degree and for occupying the academic positions of “Chief Assistant Professor”, “Associate Professor” and “Professor”, by scientific areas and/or professional fields, in Area 3. Social, Economic and Legal Sciences, Professional Field 3.7. Administration and Management, 3.8. Economics, 3.9. Tourism.

**2 studies × 15 pts = 30 pts**

**Scientometric Indicators of the Dissertation**

<b>№</b>	<b>Indicator</b>	<b>Value</b>
1	Number of tables	14
2	Number of figures	7
3	Total number of standard pages	224
4	Software used	MS Excel, Bloomberg, Thomson Reuters
5	Literature sources	364
5.1.	of which in a foreign language	364
5.2.	of which in Bulgarian	0
6	Number of publications by the candidate	4
7	Points under the National Requirements (RIADASB)	30,00
8	Number of participations in scientific forums	3
9	Order number	Order No. 593/03.08.2021
10	Date of enrolment	2022
11	Term of the doctoral studies	4 years
12	Annual appraisal assessments	Positive
13	Date of the Departmental Council decision granting clearance	
14	Date of the Faculty Council decision	
15	Time, date and place of the defence	

## VIII. Declaration of Originality of the Dissertation

The dissertation, with a volume of 224 pages and entitled “Sustainability and Entrepreneurship in Corporate Governance”, is authentic and represents the author’s own scientific output. It employs the author’s own ideas, texts and visualisations in the form of graphs, diagrams, tables and formulae, with all requirements of the Copyright and Related Rights Act observed through due citation of and reference to the intellectual work of others, as well as data, including:

1. The results achieved and the contributions advanced in the dissertation are original and have not been borrowed from research and publications in which the author has had no involvement.
2. The information presented by the author in the form of copies of documents and publications, personally compiled statements, etc., corresponds to objective truth.
3. The scientific results obtained, described and/or published by other authors are duly and thoroughly cited in the bibliography.

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(Martin Bakardzhiev)