Investment attractiveness of European Oil and Gas firms: A Triple Bottom Line perspective

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Abstract

The European energy sector depends heavily on oil and gas (O&G) operations yet faces an urgent need to unite economic success with environmental protection and social accountability. The current system of corporate performance evaluation focuses mainly on financial indicators which creates a deficiency for assessing sustainability performance and transition readiness of firms. The assessment of this knowledge gap stands essential for all stakeholders who want to succeed in the low-carbon transition.

The research develops and tests an Investment Attractiveness Model (IAM) for the oil and gas industry which uses the Triple Bottom Line (TBL) framework. The research evaluates European oil and gas firms' investment potential through an assessment of their financial performance together with their E/S. The research investigates how specific indicators in the sector reveal transition-related risks and opportunities which standard financial assessments fail to detect.

The research implements a combination of quantitative and qualitative methods. The research combines financial ratio assessments with standardized evaluations of non-financial disclosure data. The research uses NVivo-coded stakeholder interviews to obtain qualitative data which strengthens the study's validity through triangulation methods. The research uses financial statements and sustainability reports and assurance disclosures from 11 multinational European oil and gas firms spanning from 2015 to 2022.

The research findings indicate that Shell and TotalEnergies and Equinor and Anglo American maintain their position as leaders because they link their financial stability to strong environmental and social programs. The research shows that certain businesses maintain solid financial performance yet fail to integrate sustainability practices properly while other organizations focus on sustainability but lack sufficient financial stability. The analysis shows that Fortune Global 500 rankings fail to predict IAM scores effectively because revenue size alone produces a correlation of approximately 0.5 (Spearman ρ). The leader–laggard structure maintains its stability when researchers perform sensitivity tests with different weighting methods.

The research proves that customised TBL models serve as dependable methods for evaluating investment potential in sectors with high capital requirements and transition risks. The combination of sustainability metrics with financial performance creates stronger business stability instead of causing any negative impact. The research supports TBL theory by confirming balanced weighting methods while providing investors and policymakers and managers with a practical framework to assess transition readiness and manage stranded assets and create sustainable investment plans.

Declaration of Original Authorship

I confirm that this is my own work and that the use of all material from other sources has been properly and fully acknowledged.

Ekaterina Yaremchuk

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List of Abbreviations

BSC – Balanced Scorecard

BP – British Petroleum

CCS – Carbon Capture and Storage

CDS – Credit Default Swap

CSR – Corporate Social Responsibility

ETS – Emissions Trading System

EU ETS – European Union Emissions Trading System

FG500 – Fortune Global 500

GHG – Greenhouse Gas

IAM – Investment Attractiveness Model

IR – Integrated Reporting

NVivo – Qualitative Data Analysis Software

O&G – Oil and Gas

ROA – Return on Assets

ROE – Return on Equity

SDGs – Sustainable Development Goals

SRI – Socially Responsible Investing

TBL – Triple Bottom Line

UK ETS – United Kingdom Emissions Trading Scheme

UNFCCC – United Nations Framework Convention on Climate Change

Definitions of Key Terms

TBL – A framework for measuring organisational performance across economic, social, and environmental dimensions, aiming to balance profit, people, and planet (Elkington, 1997).

Investment Attractiveness – The perceived ability of an asset, sector, or company to deliver financial returns while managing risks and aligning with broader social and environmental objectives (adapted from Koller et al., 2020).

Stakeholders – Individuals or groups that can affect or are affected by the achievement of an organisation's objectives (Freeman, 1984).

Corporate Social Responsibility (CSR) – A firm's responsibilities that go beyond profit-making to include policies, decisions, and actions desirable in terms of society's values and expectations (Carroll, 1991).

Environmental, Social, and Governance (ESG) – A set of criteria used by investors and stakeholders to evaluate a company's sustainability performance and ethical impact (Sustainable Accounting Standards Board, 2018).

Sustainability – Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987).

Balanced Scorecard (BSC) – A strategic management tool that translates an organisation's vision and strategy into a set of financial and non-financial performance measures (Kaplan & Norton, 1996).

Integrated Reporting (IR) – A reporting framework that combines financial and non-financial information to explain how an organisation creates value over time (International Integrated Reporting Council, 2013).

Emissions Trading System (ETS) – A market-based approach to controlling pollution by providing economic incentives for reducing emissions, pioneered by the EU ETS in 2005 (European Commission, 2005).

Chapter 1: Introduction

1.1 Research Background

The oil and gas (O&G) sector have historically boosted global economic expansion, energy supplies, economic expansion, technical development. The European sector is crucial to maintaining jobs and meeting the continent's energy needs. But because of its significant effects on the environment and society, the industry is likewise coming under more scrutiny (Atal, 2017). The O&G sector is at the centre of sustainability issues since the extraction, production, and consumption of fossil fuels are significant causes of greenhouse gas emissions, environmental deterioration, and climate change.

The rapid growth of the industry through pipeline building and fracking and oil drilling operations resulted in severe environmental damage extraction methods and rising global demand for fossil fuels (Avelar et al., 2024). European O&G industry experienced rapid growth throughout the 20th century because of industrial development and better that harmed ecosystems and polluted water sources while releasing substantial methane and carbon dioxide emissions (Cho et al, 2013). The lack of environmental accountability during past resource extraction activities led to widespread environmental damage because large-scale O&G projects frequently involved community relocation and unfair labour practices and ignored local community interests (Infante et al., 2019).

O&G firms are forced to innovate and lower their carbon footprints by laws like the Renewable Energy Directive and the EU ETS. The European energy-security challenges stemming from Russian pipeline gas dependence together with growing LNG spot market activity have influenced how firms approach their transition and what policies support the ETS framework. The EU gas market design produces brief periods of energy instability which investors need to factor into their pricing decisions (Pomfret, 2009).

The EU implemented the Renewable Energy Directive in 2009 which became RED II in 2018 to advance renewable energy adoption throughout the EU while the EU ETS created the world's first major carbon market when it started in 2005. The UK-based oil and gas firms BP and others follow domestic rules which include the Climate Change Act 2008 and the UK Emissions Trading Scheme (UK ETS) and Firms Act 2006 sustainability reporting requirements.

Regional variations in regulatory frameworks and sustainability priorities are reflected in these policies' variations across European markets. Institutional heterogeneity and transition pathways. The transition economies demonstrate through comparative evidence that countries with equivalent initial conditions will develop distinct paths when their market institutions and policy choices and checks-and-balances systems follow different trajectories.

Pomfret (2010) uses Central Asia as a natural experiment to demonstrate how governance structures and initial conditions determine market development speed and quality which affects long-term performance thus enabling ESG/TBL exposure assessment across different jurisdictions. For example, while Southern regions may concentrate on increasing energy efficiency and lowering emissions from existing infrastructure, Northern European nations may prioritise technical innovation and the integration of renewable energy sources (European Commission, 2024).

The public now expects businesses to demonstrate higher corporate accountability through their practices regarding labour standards and their interactions with communities and their governance systems. The growing social movements for environmental justice and corporate transparency require O&G firms to implement sustainable practices which exceed basic regulatory requirements (Kumari & Kamboj, 2023).

The Norwegian energy company Equinor leads the transition to renewable energy through its abandonment of traditional fossil fuel operations. The Dogger Bank Wind Farm in the UK represents Equinor's major offshore wind project which will become the world's largest offshore wind farm. The TBL framework supports Equinor's sustainable strategy because it enables portfolio diversification for financial stability and helps Europe reach renewable targets while decreasing carbon output and builds local partnerships for community development (Equinor, 2023). BP has established a 2050 net-zero emissions target through its new strategy.

BP dedicates major funds to clean energy technology development through hydrogen fuel manufacturing and carbon capture and storage (CCS) systems. BP works with Lightsource BP to build solar energy facilities throughout the world through their partnership. BP demonstrates its TBL framework compliance through its renewable energy market expansion and its leadership in carbon-neutral technology development and its commitment to sustainability reporting and community-based energy transition initiatives (BP, 2023). Shell has established two major sustainability targets which include decreasing its carbon intensity by 20% until 2030 and reaching net-zero offshore wind power generation as evidence of its transition to renewable energy systems.

Shell runs programs to support local emissions by 2050. The company invests in electric vehicle charging stations and biofuel development and communities who experience negative impacts from its operations which demonstrates its complete implementation of TBL principles through energy technology investments for O&G reduction and nature-based emission offsetting and labour practice and community relation improvements (Shell, 2023). The business world faces two main challenges which investors view as potential threats and promising business prospects.

Firms that ignore sustainability matters will experience negative reputation effects and face regulatory fines and funding restrictions yet Firms that handle these issues effectively will gain market leadership and sustainable growth (Choudhary & Kumari, 2023). The investment appeal of O&G firms now heavily depends on their ability to demonstrate sustainability practices. The O&G sector faces essential sustainability issues which need proper assessment. The labour standards and community relations in Eastern European O&G operations differ from Western European operations thus requiring specific social sustainability strategies (Verwaal, 2022).

The investment appeal of O&G firms depends heavily on sustainability because investors now base their investment choices on ESG criteria (Yang & Hamori, 2021). The performance effects of sustainability-oriented management depend on institutional quality according to recent studies which go beyond firm-level metrics. Audretsch et al. (2024) analysed 1,789 ecosystem actors from 17 Eastern and South-Eastern European cities to discover that better formal institutions enhance sustainability orientation's positive effects on entrepreneurial-ecosystem growth orientation and intensity. The interpretation of E and S indicators for investors requires knowledge about the governance quality of their jurisdiction because this matches our TBL-based assessment of O&G firms' transition readiness.

The TBL framework has emerged as a vital tool for assessing corporate sustainability and performance because it requires Firms to achieve environmental goals alongside social and economic targets. The TBL framework which John Elkington introduced in 1994 requires businesses to move past financial performance metrics by measuring their effects on society and the environment. The O&G industry requires this complete method because its business activities create major environmental and social effects.

The European O&G sector functions as the main power source which supports industrial activities and commercial operations and personal requirements. The industry faces intense monitoring because its operations generate major environmental effects which include greenhouse gas emissions and water consumption and ecological disruptions (Mahapatra et al.,

2023). The sector faces substantial social issues which affect worker treatment and neighborhood interactions and economic effects on regional areas. The sector maintains strong economic performance although its stability remains threatened by changing market conditions and international conflicts and the rising adoption of renewable energy systems (Ferrer et al., 2018). The global O&G industry now faces increased transformative challenges because of recent policy changes worldwide.

The European Green Deal establishes both strict climate goals and encourages sustainable industrial practices through green technology development. The UNFCCC (2023) reports that O&G firms must transform their business models because of the emission reduction and sustainable energy transition requirements established at COP26 and COP27.The TBL framework now serves as the primary method for evaluating European O&G firms' investment potential within their complex business environment. The investment community along with stakeholders now require better environmental and social transparency from firms because they view these practices as essential indicators for sustainable business operations and risk control (Yang & Hamori, 2021).

The changing market environment requires O&G firms to review their business strategies and operational methods and reporting systems for better alignment with modern stakeholder expectations. The growing body of research about ESG and sustainability in investments needs additional studies to understand how the TBL framework affects the investment appeal of O&G firms (Khamisuet al., 2024). The connection between TBL practices and investment choices in this sector needs thorough examination because it will help Firms handle sustainability challenges and seize related business opportunities. The TBL framework serves as a fundamental requirement for the O&G industry, yet its implementation faces significant obstacles.

The global economy relies heavily on the O&G sector for essential energy resources. However, the industry faces widespread criticism due to its environmental impact, including greenhouse gas emissions, ecological degradation, and resource depletion. (Verwaal, 2022). The extraction of resources in specific regions has made social factors including community relations and labour practices and human rights protection more visible to public scrutiny.

The core business metric for success in the industry focuses on economic performance through profitability and growth and shareholder value generation. European O&G firms experience significant changes in their investment appeal based on their ability to handle and maintain equilibrium between their TBL dimensions. The awareness about climate change and environmental damage and social fairness has led investors to treat sustainability and corporate responsibility as fundamental elements when making investment choices (Budak, 2020). Sustainable investing practices now incorporate sustainable methods and Environmental Social Economic criteria as essential evaluation tools for investment potential.

The research investigates how the TBL method affects the investment appeal of firms operating in the O&G sector. The research investigates how TBL practices together with reporting methods affect investor opinions and business value assessments for firms operating in this industry. The research investigates how O&G firms can use TBL principles to develop strategies that boost their market competitiveness while drawing in diverse investor groups. The research investigates how TBL framework adoption creates dual benefits for firms by fulfilling regulatory requirements and attracting investments while securing enduring business sustainability in the changing energy landscape.

The TBL framework provides a complete method to evaluate European O&G firms for investment potential through its combination of economic and environmental and social elements. The framework enables firms to measure their ability to generate shareholder value while simultaneously benefiting society and protecting the environment. The TBL framework

stands as a vital analytical tool for studying O&G sector sustainability issues because it directly addresses the current market requirements for accountability and stakeholder engagement.

1.2 Problem Statement and Justification

The European O&G industry operates under substantial economic obstacles alongside environmental and social problems. The global energy production sector which drives economic development now faces growing demands to adopt sustainable practices. The public sector together with investors and governments require businesses to demonstrate their environmental performance and social commitment and economic sustainability (Geldres-Weiss et al, 2021).

The industry maintains its economic value but its operations produce substantial operations. The investment community now focuses on ESG criteria because they seek businesses that fulfil sustainable development objectives greenhouse gas emissions and environmental damage and social imbalances in particular areas which challenge the sustainability of its business (Landi & Sciarelli, 2019).

The current financial performance and economic evaluation methods used for investment assessment do not effectively measure the complete range of sustainability-focused investment choices. The absence of sustainability integration in investment attractiveness assessment methods creates major problems for both O&G businesses and their investors. The global push for sustainability creates multiple negative effects on O&G firms when they ignore environmental social and governance criteria.

Firms that disregard sustainability face rising operational expenses because of enhanced environmental regulations and carbon pricing systems. The implementation of carbon taxes and emissions trading systems (ETS) creates additional financial expenses for Firms that do not actively control their carbon emissions. The transition of markets toward renewable energy creates a risk of asset value reduction for O&G firms. The transition toward renewable energy sources in the market creates a threat of asset devaluation for O&G firms.

The transition to renewable energy creates stranded assets from fossil fuel reserves and associated infrastructure which results in major financial losses for investors. A 2022 study by Ferrer et al. (2018) demonstrates that non-compliant O&G firms will experience market value reductions exceeding 20% during the upcoming ten years because of tightening sustainability regulations.

The market value of firms decreases because they need to spend money on operation upgrades to meet new standards and face decreasing failure to do so will harm their corporate reputation. Environmental accidents and social misconduct and community disputes in the fossil fuel market demand. The current business environment requires O&G firms to show sustainable practices because any industry result in negative media coverage which weakens investor trust and leads to market instability.

A company's reputation damage creates obstacles for vital business partnerships that drive innovation and expansion. Firms that fail to follow new sustainability standards face major financial risks through substantial legal penalties and enforcement costs. The European Commission's EU Green Deal enforcement system imposes financial penalties on firms which do not follow the regulations thus affecting their financial stability. The European

Commission imposes ETS emission limit penalties of €100 per ton of excess emissions which results in substantial financial penalties for large-scale operations (European Commission, 2024). The financial burden of regulatory penalties forces firms to redirect their resources from sustainable technology investments and practice development. The combination of non-compliance with ongoing legal battles and increased regulatory scrutiny creates additional financial and operational difficulties for firms. The O&G sector uses

financial metrics as its primary investment assessment tool yet disregards essential sustainability factors which determine E/S (Kaplan, 2018).

The current investment frameworks of the O&G sector fail to address the complete range of industry challenges because they focus only on financial performance while ignoring regulatory challenges and social and environmental responsibilities (Yang & Hamori, 2021). The absence of ESG criteria in investment frameworks produces multiple adverse effects which include regulatory penalties and asset value reduction and investor doubt that threatens the future sustainability of O&G businesses (European Commission, 2024; Verwaal, 2022).

Sustainability performance at firms creates internal effects which also influence market-based channels that determine financing terms and valuation assessments. Market-based channels function as vital systems which enable environmental and social (E/S) performance to affect corporate valuation and financing terms. The three main market-based indicators used to evaluate firms include their cost of equity and credit default swap (CDS) spreads and valuation multiples such as price-to-earnings (P/E) and enterprise value to EBITDA ratios.

Firms that achieve top E/S performance levels show lower risk premiums because their sustainability leadership helps decrease default risk and regulatory and reputational threats. The companies that lead in sustainability achieve better investor trust which results in lower equity costs and reduced CDS spread levels. Firms that implement better environmental and social practices achieve better cash flow stability because their operations become more efficient and they build stable relationships with stakeholders and maintain readiness for compliance which leads to sustained earnings growth.

The market values companies with strong sustainability practices more highly because investors believe these firms will maintain stable performance and experience less market volatility. The combination of E/S excellence affects how investors evaluate corporate valuation through its impact on risk exposure and potential long-term growth opportunities. Firms that develop authentic sustainability initiatives gain better strategic adaptability and transition flexibility which helps them protect their value base while creating new market opportunities when environmental and social risk assessments change. The mechanisms demonstrate how sustainability performance affects market valuation systems and capital expense requirements which makes it a key factor for investment appeal in European O&G firms.

The TBL framework solves these gaps through its structured method which evaluates economic performance alongside environmental and social outcomes simultaneously (Rodger et al., 2017). The TBL framework surpasses traditional financial metrics because it measures complete corporate impact assessment, which matches current investment priorities focused on sustainability (Landi & Sciarelli, 2019). TBL enables better investment choices through its combination of environmental and social responsibility metrics, which helps O&G firms achieve EU Green Deal targets and reduce their exposure to stranded assets (Beghetto et al., 2023).

The TBL framework enables investors to assess firms through specific metrics which help them make better investment choices. The TBL framework solves the essential requirement for multiple-dimensional assessment methods to determine investment potential in European O&G businesses. The TBL framework enables investors to make informed decisions because it combines economic performance with environmental and social aspects which match contemporary stakeholder expectations (Zhang et al., 2019).

The approach enables businesses to achieve sustainability targets while maintaining their market position through long-term competitiveness in an industry undergoing rapid transformation. The TBL framework must be integrated into investment analysis because it

represents both a functional requirement and a strategic requirement for sustainable growth in the O&G sector.

1.3 Aim and Objectives

The aim of this thesis is to investigates how European O&G firms' investment appeal is evaluated through TBL framework analysis and develop economic, environmental and social elements to understand sustainability effects on investor choices in the O&G industry.

1. The research develops a complete TBL framework which unites financial performance indicators with E/S metrics to help O&G firms implement TBL principles through practical strategies for enhanced investment attractiveness.
2. The research evaluates European O&G firms through financial performance indicators which include profitability metrics and revenue expansion and operational cost management. The research investigates how economic variables affect investment attractiveness through direct and indirect relationships to establish a detailed understanding of financial operations in this sector.
3. The research assesses O&G firms through E/S evaluation using specific metrics which include greenhouse gas emissions and water consumption and labour standards and community involvement. The research investigates how environmental regulations and climate targets and renewable energy adoption affect investment attractiveness through their combined effect on financial performance and sustainability initiatives.
4. The research investigates how different stakeholders view investment attractiveness through their perspectives as investors and regulators and local community members. The combination of stakeholder engagement with corporate responsibility and sustainability goal alignment creates a positive social and environmental impact on O&G firms which leads to increased investor trust and extended market appeal.

The research fulfils its objectives by conducting a thorough assessment of European O&G sector investment attractiveness while demonstrating sustainability's impact on corporate and investor decision-making processes. The research findings enable Firms to follow TBL principles while investors receive direction to make financial decisions that unite profitability with social and environmental responsibility.

1.4 Structure of the Thesis

This thesis progresses logically from establishing the research context to presenting a detailed analysis, applying the TBL framework, and offering actionable recommendations for the European O&G sector. The research objectives receive dedicated analysis through each chapter which unifies the study of TBL framework application for investment attractiveness assessment. The research follows this specific order:

Chapter 2: Literature Review The study bases its theoretical framework on TBL framework and investment attractiveness research which appears in this chapter. The research demonstrates how traditional financial metrics fail to meet current needs by showing how the TBL framework provides a solution for environmental and social and economic assessments in the O&G sector.

Chapter 3: Conceptual Framework The conceptual framework section connects theoretical knowledge to methodological strategies. The chapter explains investment attractiveness definitions while showing how TBL principles work in investment evaluation and discusses the difficulties of TBL implementation including non-financial measurement and three-pillar equilibrium.

Chapter 4: Methodology

The research design and methods for TBL framework-based investment attractiveness assessment appear in this chapter. The research combines quantitative financial data analysis with qualitative social and environmental indicator assessment to achieve complete evaluation. The research includes discussions about ethical aspects and methodological restrictions.

Chapter 5: Data Analysis

Thesis was analysed European O&G firms through this chapter. The research combines financial performance assessment with environmental and social metric evaluation to build complete investment profiles. The TBL framework proves its practical value through real-world analysis which shows how financial gains relate to sustainability performance.

Chapter 6: Application of the TBL Framework.

The practical application of the TBL framework is explored in this chapter, where it is used to assess investment attractiveness for selected European O&G firms. Case studies and comparative analysis with global benchmarks, such as the Fortune Global 500, illustrate the added value of TBL metrics in investment evaluations.

Chapter 7: Evaluation of TBL Framework. The research evaluates TBL framework performance through a comparison between its results and conventional performance indicators and international assessment systems. The framework demonstrates its strength through multiple dimensions but faces challenges because of limited data availability and subjective nature of non-financial performance

Chapter 8: Conclusion and Implications for Future Research

The last section of the book combines research results to demonstrate why sustainability needs to become part of investment evaluation methods for the O&G industry. The chapter delivers specific guidance to practitioners and investors while establishing directions for future research to enhance TBL framework implementation.

The research objectives receive support from each chapter through its combination of theoretical base with methodological strength and practical findings. The study follows a systematic structure which enables both theoretical development and practical implementation of sustainability integration in O&G investment attractiveness assessments.

1.5 Conclusion

The introduction demonstrates why TBL framework assessment stands as a crucial method for evaluating European O&G sector investment potential. The sector faces sustainability problems while investors seek evaluation systems which combine economic performance with environmental and social impact. The chapter establishes a new method of evaluation which matches contemporary investor requirements and sustainability targets through its analysis of traditional investment metrics.

The problem section demonstrates the immediate requirement for a new framework which matches current sustainability-focused market priorities of investors and stakeholders. The research objectives together with its main purpose define the investigation's path to understand how TBL framework data supports investment choices while building enduring value and strengthening corporate responsibility. The research demonstrates how the TBL framework enables investment attractiveness assessments to transform through its combination of theoretical knowledge and practical implementation and data-based evidence.

The research demonstrates the importance of corporate strategy alignment with sustainability targets through actionable findings that benefit academic studies and industrial operations. The thesis moves to Chapter 2 for a detailed examination of TBL framework principles and O&G sustainability and investment choice-making processes which will support the upcoming empirical research and practical applications.

Chapter 2: Literature Review on Triple Bottom Line (TBL) and Investment Attractiveness

2.1 Introduction

Business evaluation methods have undergone significant changes because of rising worldwide sustainability focus which affects industries that generate substantial environmental and social effects including O&G (Zhang et al., 2019). The rising stakeholder expectations for accountability have made traditional investment assessment methods inadequate for the current business environment. The O&G industry needs evaluation systems that move past financial metrics because it faces increasing environmental and social responsibility demands (Laing et al., 2019).

The business sustainability frameworks CSR and ESG criteria fail to deliver the complete assessment needed for financial performance and long-term value generation. The BSC and IR systems deliver Organisational performance data but they concentrate on internal management and reporting instead of creating a suitable investment evaluation tool.

The TBL framework stands out because it combines economic and environmental and social elements into one framework which matches the expanding focus on sustainable development and CSR. The O&G sector benefits from TBL because its complete methodology enables effective management of diverse sustainability issues and opportunities.

This chapter highlights the gap between existing evaluation frameworks and the need for an integrated approach to investment attractiveness in the O&G sector. It critically examines five key frameworks: TBL, CSR, BSC, ESG, and IR, to determine their applicability and relevance to the assessment of investment attractiveness. The chapter demonstrates through framework comparison that TBL provides a complete evaluation system which fulfils stakeholder requirements and supports worldwide sustainability targets.

The chapter unites existing theories with their connections to TBL to create a solid conceptual framework that includes multiple dimensions. The research demonstrates how TBL stands apart from other frameworks because it provides a complete assessment system that meets stakeholder needs and global sustainability targets. The research achieves its thesis goals while addressing essential knowledge gaps in current literature by creating a novel method to evaluate European O&G firms.

Through our literature review, the research were able to delve into pertinent research and pinpoint its constraints. The review maintains strict inclusion and exclusion criteria to select research studies which directly support the research goals. The review unifies existing knowledge about this subject area to direct upcoming investigations and establish industry standards. The research perform database searches through Scopus and Web of Science which are established academic resources.

The literature collection and analysis and synthesis process required six distinct stages. The systematic literature review includes articles from 2013 to present to include modern research findings. English-language articles are the primary focus. The research conduct research in the fields of Business, Management and Accounting, as well as Business Economics. Our research primarily targets magazines rated at 2 and 3 stars, as publications with a 4-star rating were not found using the selected keywords in our search criteria. Exclusion Criteria: Non-academic sources, duplicates, and studies not directly related to the TBL framework and investment attractiveness is excluded.

In the first phase, the research defined the review's purpose, scope, and objectives. Drawing inspiration from the foundational theories of resilience literature, the research crafted our search terms. These terms assisted in understanding the TBL theory as applied to firms. To provide a comprehensive and cohesive search, the research utilized all relevant synonyms of keywords found in preceding academic research (Yuen et al., 2023; Senyo, 2023; Verwaal,

2022; Siebeneicher, 2022; Mastrocinque, 2022). Our keyword focuses encompassed combinations such as " TBL", "sustainable development", and "performances". To widen our search spectrum, terms like "stakeholders" were incorporated to identify additional papers pertinent to the investment. Subsequently, in the next phase, the research formulated our search queries and established criteria for inclusion, further reinforcing the integrity of our literature review sample.

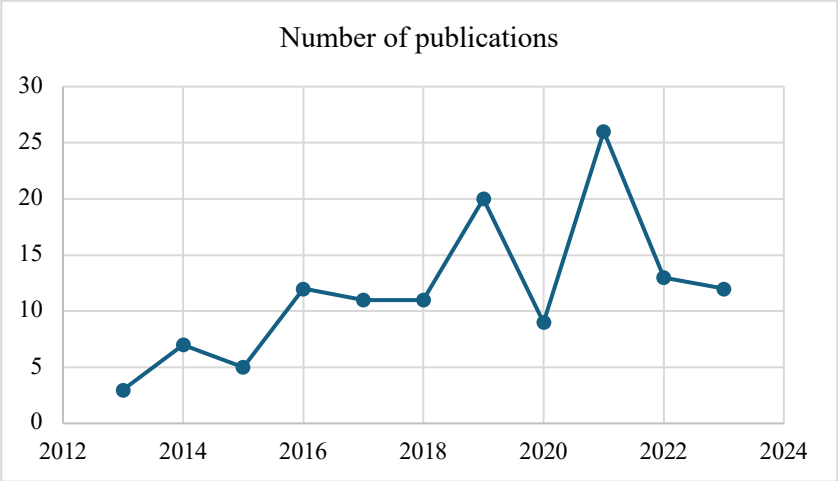


Fig. 1. The Expansion of Publications Centred on TBL Framework. Source: Author.

I set forth primary and supplementary criteria for our research inclusion. During the third to fifth phases, the research employed these criteria, focusing on publication timeframe, document type, and language. The review focused on the timeframe from 2013 to 2023, marking the onset and significant expansion of publications centred on the TBL framework shown in Figure 1. Our scope covered articles, early-access releases, data sets, and studies in English, resulting in 6,030 articles from both the Scopus and Web of Science databases. Our search was inclusive of various research methodologies, namely qualitative, quantitative, and mixed-method approaches.

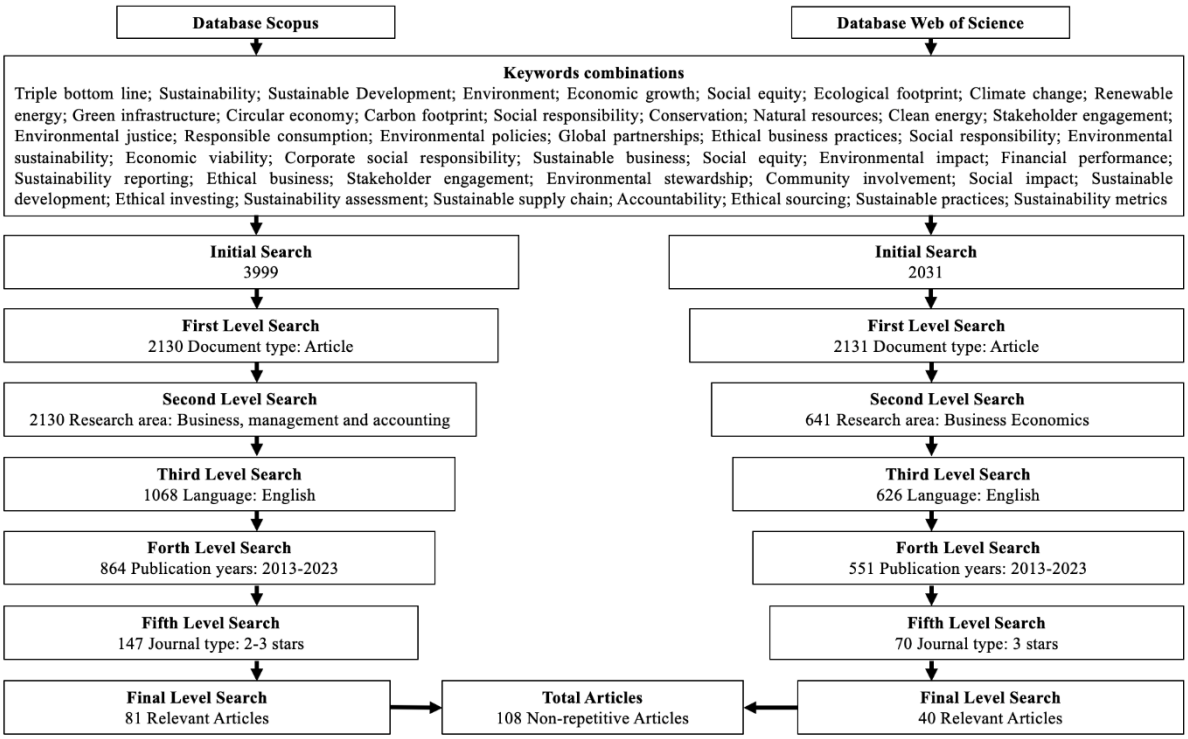


Fig. 2. Scopus and Web of Science Research Design. Source: Author.

In the final phase (figure 2), the research incorporated supplementary inclusion criteria, focusing on the paper's keywords and the standing of the journals in which they were published. The keywords from our initial search served as a guide, ensuring that selected papers for our final compilation aligned with notable studies (Albert, 2022; Ranjbari, 2021; Silvius, 2017).

Fig. 3. The Number of Publications that Mention the TBL. Source: Author.

To illustrate the effectiveness of the TBL approach, this chapter presents a contemporary analysis of its application within academic literature (Isil, 2017). To gauge the ubiquity of the TBL framework, the research conducted systematic literature reviews. Adopting Fink's (2014) sampling methodology, the research began by framing research questions aimed at discerning the frequency and perspectives related to the TBL framework in current sustainability studies. As depicted in Figure 3, there's a consistent yearly rise in TBL mentions in our reviews of 2-3-star journals. This criterion was applied across both Scopus and Web of Science, utilizing the distinct search functionalities offered by these databases. Both platforms provided six search levels, leading us to an initial tally of 6,030 papers. By the conclusion of our search, 108 papers remained in our collection.

The selected articles offer data which includes publication information and essential results and research methods and all relevant details about TBL framework implementation. The TBL theory indicators which measure social and environmental and financial business performance serve multiple essential operational and strategic needs. Firms use these indicators to measure their performance across TBL pillars through specific metrics which enable complete and effective goal development and communication.

2.2 TBL Performance and Relevance to Oil & Gas

TBL framework is a valuable framework for assessing and calculating investment attractiveness. It allows stakeholders to consider a broader range of factors beyond just financial returns. The concept of TBL refers to a framework that considers three dimensions of sustainability: economic, environmental, and social (Verwaal, 2022). The TBL approach emphasizes the importance of balancing financial profitability with environmental responsibility and social impact (Svensson, 2018; Kulkarni, 2000).

The TBL framework serves as a complex method which has become widely recognised for its impact on sustainability and CSR according to Isil (2017). The framework serves as an essential tool for assessing investment attractiveness in industries that present intricate economic and social and environmental challenges. The assessment of investment attractiveness requires evaluation of multiple factors which include financial performance and growth prospects and risk assessment and market standing and corporate governance and environmental, social governance and industrial market analysis (Elkington, 1998).

The combination of these factors determines how investors choose their investment destinations for maximum financial gain and value-based investments. The TBL approach has received broad acceptance through both practical implementation and academic research (Svensson, 2018; Gill, Dickinson & Scharl, 2008). The TBL framework serves as a tool for corporate sustainability performance evaluation and improvement (Sánchez-Chaparro, 2022) and for making decisions about product development and reverse logistics optimisation (Budak, 2020) and sustainable innovation (Longoni, 2016).

BP works to decrease its operational greenhouse gas emissions while maintaining a regular assessment of its targets based on current standards (BP, 2023). The company's forward-thinking strategy shows environmental stewardship and increases disclosure levels which strengthens investor confidence. The TBL concept stands as a fundamental principle which directs Firms to use TBL key performance indicators (KPIs) for sustainability reporting and manufacturing system integration (Milne & Gray, 2013).

The TBL concept receives improvement through its emphasis on how economic sustainability focuses on financial returns for stakeholders, while environmental sustainability protects ecosystems and social sustainability handles community engagement through social capital management (Junior et al., 2018). A company achieves true sustainability by successfully managing all three elements of the TBL framework.

The TBL framework requires investors to conduct detailed assessments about how their investments support sustainability across economic and environmental and social dimensions. Sustainability exists when Firms fulfil their current needs while protecting resources for future generations (Luthra, 2019). The process of investment decision-making requires Firms to evaluate financial performance alongside environmental responsibility and social impact.

The TBL framework enables Firms to study how individual sustainability pillars affect investment attractiveness when combined. The TBL framework delivers exceptional value to the O&G sector because it effectively measures the combined effects of economic performance and environmental stewardship, and social responsibility (Laing et al., 2019). The implementation of energy efficiency measures and renewable energy investments leads to cost reduction and profitability growth, and environmental sustainability achievement.

Firms that implement emission reduction strategies and environmental protection measures develop better ties with their local communities and regulatory bodies. The management of resource rents through national institutions determines how ESG risks materialize in the oil and gas sector. The combination of unstable revenue streams and poor rent management and insufficient institutional oversight lead to sustainable development failure even when the sector experiences growth according to research on resource-abundant transitioning economies.

The research by Pomfret (2012) examines six countries to demonstrate that resource curse outcomes become better when institutions manage rents through clear fiscal systems and sovereign funds but worsen when rent-seeking activities prevail. The institutional framework provides additional understanding about why businesses with similar characteristics experience different ESG risks based on location and why investors need to evaluate governance standards together with E/S metrics.

Research from European entrepreneurial innovation ecosystems indicates that sustainability-oriented management performance depends on institutional quality while showing decreasing marginal returns; better institutions enhance the positive effects on ecosystem quality. The assessment of innovation capacity and transition readiness by investors requires evaluation of E and S metrics in combination with institutional quality of the jurisdiction (Audretsch et al., 2023)

Firms that practice fair labour standards and support community development activities create stable operational conditions which lead to better workforce performance and financial stability (Zhang et al., 2019). The integrated approach enables O&G firms to receive evaluations based on their financial performance and their ability to operate sustainably and responsibly.

The combination of these factors determines how investors select their investment destinations in pursuit of both maximum financial gain and alignment with broader sustainability values. Traditional financial metrics remain central, yet increasing emphasis is being placed on approaches that integrate social and environmental dimensions into investment decisions. One such framework that directly aligns financial goals with sustainability considerations is the TBL approach, which has gained broad acceptance in both academic and professional contexts. By incorporating financial, social, and environmental dimensions, TBL provides a comprehensive method for evaluating investment attractiveness that moves beyond conventional profit-driven indicators.

The relevance of the TBL framework can be illustrated through its application in corporate practice. BP's sustainability strategy, for example, demonstrates how a multinational oil and gas company operationalises TBL principles. The company has committed to decreasing its operational greenhouse gas emissions and enhancing energy efficiency, thereby aligning its financial objectives with environmental responsibility. This integration underscores

how TBL can be used not only as a conceptual model but also as a practical tool for shaping corporate strategy and assessing long-term investment attractiveness.

2.3 Theoretical Foundations and Analytical Frameworks for Investment Attractiveness

The evaluation of investment attractiveness has relied on economic frameworks which Analyse profitability and market efficiency and risk management. The traditional financial performance metrics which include profit margins and revenue growth and return on investment no longer provide sufficient evaluation for businesses. The current methods fail to measure the complete social and environmental effects which businesses create. Multiple theories now exist to evaluate businesses through a complete method which combines economic performance with social and environmental effects of their operations.

According to Bocken and Geradts (2020), these evaluation methods serve as essential tools for assessing how sustainable firms develop. These systems operate within the framework of social structures and environmental frameworks and economic frameworks. Their business operations create extensive effects which go past their financial records. The pursuit of immediate financial gains through destructive environmental methods and social injustice and unethical conduct now faces criticism because it threatens long-term business value generation (Hermundsdottir & Aspelund 2021).

The need for expanded business evaluation methods has led to the development of multiple theoretical frameworks and models which support the integration of economic and social and environmental factors for performance assessment and investment attractiveness evaluation (Andrés et al., 2019). The TBL framework represents a major development which provides investors with a complete understanding of investment potential through sustainable business practices. The TBL theory supports Firms to evaluate their success through financial performance and their social and environmental effects (Gpu, 2017).

The approach rejects profit-only evaluation by promoting a balanced assessment of profit alongside people and planet (Gleißner et al., 2022). Businesses that adopt the TBL framework must achieve economic sustainability while maintaining social fairness and environmental protection. The complete assessment method helps businesses build better stakeholder relationships and corporate reputation while making them ready for future market success because sustainability has become a leading factor in business competitiveness.

Business practices receive evaluation through the growing popularity of CSR as a concept (Wong et al, 2023). Firms use CSR to perform voluntary actions which help them handle their economic and social and environmental effects in a responsible manner. The approach requires businesses to demonstrate ethical conduct while maintaining open operations and taking responsibility for their actions (Evans, 2024). Firms that practice CSR develop better reputations and build stronger stakeholder connections and gain more customer loyalty.

Investors seek out businesses with strong CSR initiatives because they believe these firms operate with better management and reduced exposure to legal and reputational threats (Turcotte & Lachance, 2023). The BSC serves as an essential framework which extends business evaluation methods past financial performance indicators. Kaplan and Norton created the BSC in 1996 as a performance assessment tool which combines financial data with customer insights and internal operational excellence and learning development metrics.

The BSC enables Firms to pursue immediate financial gains while simultaneously building essential elements for enduring success through customer satisfaction and operational excellence and employee development (Kaplan & Norton, 1996). The BSC offers sustainability measurement capabilities which make it an essential tool for Firms dedicated to sustainable

development. The TBL framework together with ESG criteria serve as essential evaluation tools for assessing business sustainability and ethical business practices (Khamisuet al., 2024).

The ESG framework enables firms to evaluate their environmental stewardship and social engagement and their governance practices through a systematic framework (Yan et al., 2024). The increasing number of investors uses ESG criteria to guide their investment choices because they understand that sustainable firms handle risks better and find new business opportunities in today's fast-changing environment (Shah et al., 2021). The rising interest in sustainable investments demonstrates how society now places more value on responsible business practices that generate long-term results rather than quick financial returns.

IR has become a popular method which enables Firms to deliver comprehensive and transparent performance reports. The reporting framework of Integrated Reporting merges financial data with non-financial information to create a unified document which shows how businesses generate value throughout time (Tejedo-Valencia et al., 2024). The method demonstrates how different types of capital such as financial and manufactured and intellectual and human and social and natural capital work together to achieve sustainable business success (Songini et al., 2023).

Firms that implement Integrated Reporting can improve their ability to present their long-term plans and sustainability initiatives to stakeholders which results in better investment opportunities and stronger accountability (Grassmann et al., 2019). The frameworks demonstrate a wide-ranging business evaluation system that shows how sustainable development has become essential for enduring business success.

The combination of economic and social and environmental elements in assessments enables businesses and investors to handle their challenges and opportunities better which results in sustainable and resilient outcomes. The following section examines essential investment attractiveness investment theories and frameworks which use TBL to transform conventional performance metrics.

2.3.1 Triple Bottom Line (TBL)

The TBL framework extends business evaluation beyond financial success by adding social and environmental performance metrics to the traditional profit assessment. John Elkington introduced the TBL framework in 1994 to help Firms measure their performance through financial results and their social and environmental contributions. The TBL framework consists of three main components which are People and Planet and Profit. The Three Pillars of TBL

1. The People element of the TBL framework examines the social effects that result from business operations. A business Organisation affects its workforce and their families and suppliers and the local community through its operations according to Verwaal (2022). Firms that focus on social responsibility work to establish fair labour practices and support diversity and inclusion and maintain safe workplaces and deliver benefits to their operational communities. Social responsibility encompasses philanthropy and community involvement and programs that work to reduce social disparities (Friedrich, 2021). The TBL framework helps businesses generate beneficial social results because Firms succeed when they support the welfare of their social network.

2. The TBL framework includes the Planet element which focuses on environmental sustainability. The environmental effects of business operations form the core of this pillar which examines resource usage and waste management and pollution and biodiversity protection. The TBL framework motivates businesses to establish sustainable practices which include lowering carbon emissions and using renewable power and water conservation and sustainable material procurement (Bataglin, 2020). Business activities must be evaluated for

their lasting effects on the planet and natural resources must be protected for future generations according to environmental responsibility standards (Budak, 2020). The TBL framework demonstrates that environmental health supports the enduring success of businesses together with the overall health of society.

3. The "Profit" element of TBL deals with the standard financial results that firms generate. The TBL framework defines profit as a component of economic sustainability which extends beyond traditional financial performance (Kazancoglu, 2019). Businesses need to create enduring financial success through sustainable methods instead of pursuing quick profits that damage social and environmental values. The TBL framework supports Firms to achieve economic prosperity through responsible actions toward people and environmental protection (Haffar, 2015).

Firms that focus on economic sustainability achieve better long-term success because they develop economic stability and maintain strong relationships with their stakeholders (Sanchez-Chaparro, 2022). The TBL framework has transformed how Firms and businesses handle sustainability initiatives. The TBL framework presents a complete success model which shows that profit does not represent the only measurement of business performance (Svensson, 2018).

The TBL framework shows that businesses should actively create positive social and environmental effects while achieving their financial targets. The implementation of TBL practices has resulted in multiple sustainability initiatives which include CSR programs and environmental management systems and social impact assessments (Svensson, 2017). The implementation of these initiatives enables businesses to detect and resolve the extensive effects of their operations which results in sustainable and ethical business operations (Kucukvar, 2014).

The TBL framework has transformed how investors and consumers and other stakeholders assess corporate performance. The evaluation process of firms now extends past financial reports because stakeholders want to see their social and environmental performance (Longoni, 2016). The changing investment landscape has resulted in the expansion of socially responsible investing (SRI) and the implementation of ESG criteria in investment choices (Junior et al., 2018).

The TBL framework brings a major advancement to business success assessment methods. The TBL framework helps Firms achieve sustainable operations through its combination of social responsibility and environmental stewardship and economic performance. The TBL framework shows that Firms must achieve success through their positive impact on people and the planet while maintaining profit as a vital element. The TBL framework serves as a crucial tool for businesses to handle global issues like climate change and resource depletion and social inequality while achieving sustainable growth in an evolving world.

2.3.2 Corporate Social Responsibility (CSR)

Businesses use CSR as a management approach to integrate social and environmental and ethical elements into their operational activities and stakeholder relationships (Dashwood, 2012). Firms perform CSR activities beyond legal compliance by taking voluntary actions to handle the complete social and environmental effects of their business operations (Matten and Moon, 2008). Businesses through CSR demonstrate their dedication to create positive social value while achieving financial success because firms must serve all stakeholders including shareholders and employees and customers and communities and the environment (Fatima and Elbanna, 2022).

The concept of CSR has undergone significant changes throughout its development. During the initial period of industrialization businesses concentrated on profit maximisation without worrying about their social or environmental effects (Long, 2022). The growing awareness of business-related social and environmental effects such as environmental destruction and labour mistreatment and economic disparities led to rising expectations for CSR (Abuya & Odongo, 2020; Atal, 2017).

The mid-20th century marked the beginning of CSR as a formal business concept because Firms started to handle social and environmental effects of their operations. The 1970s and 1980s brought about a rise in CSR activities because businesses encountered rising public and governmental and NGO oversight of their social effects. The development of CSR frameworks and guidelines during this period established themselves as essential operational standards for present-day business practices (Agudelo et al, 2019).

The CSR framework includes multiple initiatives which fall into four main sections. Environmental responsibility stands as a fundamental CSR element because it examines how business operations create environmental effects (Tiamgne et al., 2022). The implementation of sustainable waste management and resource control and pollution reduction and biodiversity protection represents the core elements of environmental responsibility (Fenner et al, 2020). Firms use green technologies and implement energy-efficient systems and support reforestation and water conservation projects to decrease their environmental impact (Khan, 2023).

A company's social responsibility emerges from its effects on the people and communities where it operates. A company demonstrates social responsibility through its commitment to fair labour practices and diversity promotion and community development and philanthropic activities (Shahid, 2023). Firms that focus on social responsibility dedicate resources to employee health and education and healthcare programs and community development projects to enhance community living standards (Chavez, 2022).

Social responsibility includes three main areas which are product safety and consumer rights and ethical marketing practices. A company demonstrates ethical responsibility through its dedication to operate with fairness and transparency while avoiding all forms of corruption (Tate, 2016). The company maintains ethical standards throughout all operations and upholds human rights while making sure business activities match moral and ethical standards. Firms with high ethical standards create codes of conduct and anti-corruption policies and systems to report and handle unethical conduct.

A company must achieve profitability through economic responsibility while creating sustainable and ethical economic growth (Kumara, 2018). The company needs to create profits for shareholders and simultaneously create economic growth that includes all stakeholders in its operations affect. Firms that focus on CSR create employment opportunities and provide fair compensation to workers and support local businesses and build community infrastructure that serves the entire community.

The adoption of CSR practices brings advantages to both business Firms and the wider community. The implementation of CSR programs helps businesses build better reputations while gaining customer trust and maintaining employee dedication (Wong et al, 2023). Firms which show dedication to social and environmental responsibility gain better customer loyalty and retention because ethical-minded consumers choose to support them. The implementation of CSR initiatives results in operational cost savings from energy efficiency and waste reduction which generates higher business profitability (Turcotte & Lachance, 2023).

CSR initiatives help society solve essential social problems and environmental challenges including poverty and inequality and climate change (Shahid, 2023). Through CSR initiatives businesses can create beneficial social changes while enhancing community health and supporting environmentally friendly growth. Modern business operations include CSR as

an essential element because society demands firms to create positive social and environmental impacts.

Businesses that implement CSR practices can reach economic success while maintaining their responsibility to protect the environment and support their communities. The growing importance of CSR remains essential for business development because it helps firms create value for all stakeholders beyond shareholder interests while addressing global issues like climate change and social inequality.

2.3.3 The Balanced Scorecard (BSC)

BSC represents a strategic management framework which Robert Kaplan and David Norton created in 1996 to help Firms track their performance through multiple dimensions. The traditional performance measurement systems used financial metrics as their main focus but these metrics failed to show the complete picture of Organisational health and future prospects. The BSC solves this problem through its expanded measurement framework which enables businesses to evaluate performance from multiple angles (Chehimia & Narob, 2024).

The BSC framework consists of four essential perspectives which include Financial and Customer and Internal Business Processes and Learning and Growth. The different perspectives of the Balanced Scorecard framework enable Firms to evaluate performance through multiple viewpoints which guarantees all essential business areas receive proper assessment (Galbreath, 2009). The financial perspective of the Balanced Scorecard system uses essential financial metrics to evaluate Organisational profitability and financial stability (Mio et al. 2022).

The financial perspective includes performance indicators that measure ROI and revenue growth and profit margins and cash flow. The BSC requires Firms to use financial indicators as essential performance metrics yet warns against making them the only measurement criteria (Bianchini et al., 2022). Firms need to examine these indicators together with the remaining three perspectives to achieve a complete understanding of their performance. The customer perspective of the BSC system evaluates how well an Organisation fulfils the requirements and satisfaction levels of its customer base (Kaplan & Norton, 2001).

The customer perspective includes performance indicators that measure satisfaction levels and customer retention and acquisition rates and market position. Firms that focus on customer-related objectives gain better understanding of their customer value delivery which leads to financial success. The BSC enables Firms to select their main customer groups and develop targeted strategies which create superior customer experiences and sustainable business relationships (Chehimia & Narob, 2024).

The customer perspective examines the internal operational systems which support business operations to fulfil financial targets and customer requirements. The assessment of critical business processes such as production and delivery and innovation and quality control forms part of this perspective (Voelpel et al. 2006). Firms that enhance their operational performance through process optimisation achieve better product quality and lower costs and reduced expenses. The BSC system enables Firms to determine their most vital internal processes for reaching strategic targets while offering methods for ongoing improvement (Crutzen et al., 2016).

The learning and growth perspective of the Balanced Scorecard system focuses on Organisational capabilities to innovate and improve and expand their operations. The Organisation's intangible assets, including employee skills and corporate culture and information systems, fall under this perspective (George et al., 2016). The learning and growth perspective requires Firms to develop their workforce through training and learning programs and to maintain systems that support market adaptation (Kaplan, 2002). The BSC enables Firms

to convert strategic targets into quantifiable targets across four perspectives, which makes it possible for all employees to see their role in achieving company-wide success (Ponte et al., 2017).

The BSC creates Organisational alignment which eliminates departmental barriers to create a unified method for reaching strategic targets. The BSC operates as a performance assessment tool which extends past conventional financial performance metrics (Bianchini et al., 2022). The system uses non-financial indicators to deliver a complete performance assessment which reveals important aspects that financial metrics alone would overlook (Mio et al., 2022). The complete assessment method enables Firms to detect Organisational risks and opportunities, which results in improved decision-making and enduring business success.

The BSC serves as an effective strategic management instrument which helps Firms measure their performance (Chehimia & Narob, 2024). The Balanced Scorecard delivers a complete Organisational performance assessment through its four perspectives, which include financial results and customer satisfaction and internal business operations, and learning development. The BSC enables Firms to link their operational activities with strategic objectives, which results in unified Organisational performance toward lasting success. The Balanced Scorecard continues to serve businesses as a valuable framework for achieving sustainable growth while maintaining market leadership in today's complex and competitive business world.

2.3.4 Environmental, Social, and Governance (ESG)

Business operations and investment decisions now heavily rely on ESG because sustainability concerns and corporate accountability have gained prominence (Shah et al., 2021). The ESG criteria system enables a complete assessment of corporate operations through methods that extend past financial performance indicators (Clark & Viehs, 2014). The ESG framework enables stakeholders to evaluate corporate performance through its environmental impact and social responsibility and governance practices (Khamisuet al., 2024).

The complete evaluation method enables Firms to determine their sustainability and ethical business practices for long-term success. The environmental section of ESG evaluates how Firms handle their natural environment. The environmental criteria of ESG include all aspects of energy consumption and waste disposal and pollution prevention and natural resource protection and animal treatment practices (Zhang, 2024). The environmental criteria of ESG include climate change mitigation strategies which focus on decreasing carbon footprints and improving energy performance (Yan et al., 2024).

Firms with effective environmental practices demonstrate better readiness for upcoming challenges because they prevent regulatory penalties and environmental risks and access green market opportunities (Chen et al., 2011; Wang et al., 2020). The evaluation of environmental performance by investors has become more prevalent because firms that disregard their environmental impact face substantial risks including legal consequences and damage to their reputation, and physical harm from climate change (Brooks & Oikonomou, 2018).

The social component of ESG evaluates how a company interacts with its stakeholders who include employees and customers and suppliers and the communities where it operates (Zahid et al., 2023). The assessment of a company's social performance requires evaluation of its labour practices and human rights record and its approach to diversity and inclusion and consumer protection standards. The social criteria of a company assess its community development activities and its social scores in social criteria demonstrate excellent employee treatment and strong community ties and fair business conduct (Khamis effects on education and health and equality (Lee et al., 2016).

Firms that perform well in social criteria tend to maintain satisfied employees and loyal staff while building strong customer bonds and developing a positive brand image. Firms with strong social performance indicators tend to generate more stable investment returns because they minimise the risk of social disturbances and employee walkouts (Zahid et al., 2023). A company's internal systems and controls and decision-making procedures and risk management protocols fall under the category of governance (Li et al., 2022).

The company's leadership structure and board composition and executive compensation and shareholder rights and transparency and legal compliance make up the governance framework. The system of governance includes procedures for dealing with bribery and corruption and managing conflicts of interest (Khan et al., 2016). Firms need robust governance systems to build investor trust and achieve ethical management that serves all stakeholders in the long run (Gerged, 2021).

Firms with weak governance systems face financial risks because they become vulnerable to scandals and legal issues and lose stakeholder trust. The increasing requirement for ESG transparency from regulatory bodies worldwide forces firms to adopt these factors in their operational frameworks (Aich et al., 2021). The rising public understanding of environmental and social matters has led to increased corporate responsibility for both financial results and societal and planetary effects (Liou et al., 2023; Parameswar et al., 2023).

The evaluation of corporate impact requires ESG as a fundamental framework which assesses complete Organisational effects. The evaluation of environmental and social and governance factors enables businesses and investors to make better decisions which support sustainability and ethical conduct and enduring business success (Landi & Sciarelli, 2019). The world faces three major challenges of climate change and social inequality and corporate governance failures which ESG continues to play a vital role in defining the future of business operations and investment activities.

2.3.5 Integrated Reporting (IR)

The IR framework integrates financial data with non-financial information to create a unified reporting system which serves as a complete performance and strategy and governance and value creation overview (Tejedo-Romero et al., 2023). The system provides complete Organisational performance and strategic governance and value creation data across multiple time periods (Tejedo-Valencia et al., 2024). The reporting system extends financial reporting by adding ESG elements to show how different resources and relationships work together for business success (Adams & Simnett, 2011).

The concept of IR developed as a solution to address the limitation of financial reports which focus on short-term financial data because they fail to show the complete range of Organisational activities and effects (Abeysekera, 2013). Businesses face growing demands from stakeholders who want complete transparency and accountability about their social and environmental effects (Lozano, 2013). The International Integrated Reporting Council (IIRC) founded in 2010 worked to create a worldwide standard for integrated reporting. The IIRC established its mission to establish a reporting system which demonstrates how Firms use their strategy and governance to achieve performance goals that generate value across different time periods (Frias-Aceituno et al., 2014).

The main principles of IR differ from traditional reporting methods because they focus on value creation through financial and social and environmental and intellectual means (De Villiers et al., 2014). The IR framework shows how value transforms throughout time by providing Firms with a dynamic performance assessment (Higgins et al., 2014). The IR framework recognises six capital types which Firms both utilize and modify through their

operations: financial capital and manufactured intellectual capital and human capital and social and relationship capital and natural capital (Steyn, 2014).

The capitals function as a system because IR requires Firms to show their capital usage and effects throughout their business activities. The IR framework presents information in a unified structure, which differs from traditional reports that often become lengthy and disconnected. The reports use a unified storytelling approach to link Organisational strategy with governance structure and risk management and opportunity identification and performance results, which demonstrate their value-creating impact (Adams, 2015). The reporting framework of IR emphasises the critical role that stakeholders play in business operations. Firms should use stakeholder engagement to learn about their needs and concerns which they should then incorporate into their reporting activities (Tejedo-Valencia et al., 2024).

The stakeholder-focused method in IR enables reports to focus on of IR examines both historical performance and projected Organisational development (Flower, 2015). The company the essential matters which affect stakeholders who interact with or show interest in Organisational activities. The forward-looking nature outlines its strategic goals and describes its plans to reach them while showing how these plans will affect its ability to generate long-term value. Firms that implement IR systems gain multiple advantages which benefit their stakeholders and their operations. The complete and integrated presentation of Organisational activities and impacts through IR creates transparency, which strengthens stakeholder trust (Perego et al., 2016).

The integrated reporting framework enables management to make better decisions through its comprehensive view of Organisational resources and risks and risk assessment and opportunity identification. Strategic decisions become more effective when Firms use IR because it provides complete visibility of their resources and risks and opportunities (Songini et al., 2023). The investor market now seeks businesses that show dedication to sustainability and responsible business operations (Dimes & De Villiers, 2024). IR helps firms gain investor interest through its ability to present their long-term plans and their capacity to deliver value through means beyond financial performance.

The integration of sustainability into core business operations through IR ensures environmental and social factors receive equal importance to financial considerations (Grassmann et al., 2019). The increasing need for transparent and complete disclosure from investors and regulatory bodies, and consumers has led to the development of IR as a new corporate reporting standard (Tejedo-Romero et al., 2023). The combination of financial and non-financial data in IR enables Firms to show their value creation methods in today's complex global business environment.

The approach requires businesses to move past their current financial performance metrics because it helps them understand how their operations effect society and the environment. The worldwide adoption of this approach will make IR a fundamental driver for sustainable business practices that benefit society. Theoretical models for investment attractiveness have undergone substantial development because sustainability has become a vital factor in business decision-making processes. The current investment attractiveness evaluation methods based on traditional theories lack the ability to measure the environmental and social effects, which now determine modern investment decisions.

The frameworks TBL, ESG, BSC, CSR and IR fill performance gaps by focusing on multiple dimensions of performance measurement. The TBL framework stands out as a complete evaluation system, which makes it essential for assessing investment attractiveness in the O&G industry because of its severe sustainability issues and demanding stakeholder requirements. The research implements TBL principles to develop new methods for evaluating investment attractiveness in a sustainable economic framework.

The table presents the individual benefits and constraints of TBL and ESG and BSC and CSR, and IR frameworks. The following analysis evaluates these frameworks through their core focus areas and operational boundaries and their ability to measure investment attractiveness and sustainability in O&G and other industries. Table 1 shows Comparative advantages and critiques of TBL vs. ESG, BSC, CSR and IR:

Table 1
Comparative advantages and critiques of TBL vs. ESG, BSC, CSR and IR

Aspect	TBL	ESG	BSC	CSR	IR
Focus	Economic, environmental, and social aspects	Environmental, social, and governance dimensions	Financial, customer, internal processes, learning and growth	Social and ethical responsibilities	Financial and non-financial information
Scope	Integrating social, environmental, and economical factors holistically	Methodical assessment of ESG factors for investments	Performance evaluation that goes beyond financial metrics	Emphasises social and ethical aspects above all else.	Determined to produce a coherent, long-term value report
Limitations	The three dimensions are challenging to measure and balance at the same time.	Less emphasis on integration and more on reporting and compliance	Concerns from external stakeholders or sustainability are not specifically addressed in the design.	May be optional and devoid of a formal assessment	More of a reporting tool than an assessment framework
Applicability in O&G Sector	Extremely relevant since social, environmental, and economic factors are interrelated.	Pertinent to evaluating adherence to regulations and compliance	Partially suitable; lacks an emphasis on external sustainability but is helpful for internal alignment	Beneficial for ethical behaviour and community involvement	Beneficial for conveying long-term plans and value generation

The TBL framework stands as the most complete method to assess investment attractiveness, especially for the O&G industry. The framework stands out from other assessment methods because it unites financial performance with social fairness and environmental protection. The success of TBL depends on resolving difficulties which stem from measuring and establishing common standards. The ESG framework provides strong structured metrics and compliance, but it may create sustainability dimensions that operate independently from each other. BSC and CSR provide value in internal alignment and reputation-building, respectively, but lack the breadth and rigor of TBL. IR offers transparency but remains limited to reporting.

The TBL framework and ESG concepts share a common goal to incorporate sustainability assessment into business evaluation, yet they function at distinct analytical stages. The TBL framework establishes the theoretical framework for evaluating firms value creation through its three dimensions which connect business operations to environmental and social systems. (Elkington, 1997; Slaper and Hall, 2011).

The ESG framework uses specific measurement criteria to transform TBL's theoretical foundations into operational assessment tools. ESG metrics enable organizations to measure

their sustainability performance through standardized disclosure systems and rating frameworks and quantifiable data (Eccles et al., 2014; Friede, Busch and Bassen, 2015). The TBL framework establishes boundaries for sustainability assessment, yet ESG frameworks establish specific measurement tools and evidence-based assessment methods for capital market applications. The financial layer serves as the valuation system which converts sustainability performance data into market-based results.

The quality of environmental and social factors affects companies' capital expenses and their creditworthiness and market value assessments because investors use sustainability data to adjust their pricing models (Krüger, 2015; Zerbib, 2019; Albuquerque et al., 2019). Financial markets use these transmission channels to transform non-financial performance data into economic signals which direct investment decisions.

The analytical structure consists of TBL as the philosophical framework and ESG as the operational framework and finance as the mechanism for sustainability outcome pricing and market valuation transmission. The distinction between these concepts enables researchers to understand overlapping ideas in existing literature while creating a systematic connection between sustainability frameworks and financial assessment methods for European O&G firms.

2.4 Comparative Review: TBL vs. Traditional Investment Metrics

The evaluation of investment attractiveness used to depend on financial indicators. The essential financial metrics continue to matter but they do not measure the complete social and environmental effects which businesses create in their operations (Ritz, 2023). The growing market focus on sustainability has made it necessary to adopt the TBL framework as a complete evaluation system (Camilleri et al., 2023). The following section evaluates TBL against standard investment metrics to show how TBL provides superior assessment of investment attractiveness compared to traditional methods. Table 2 shows comparative insights: TBL vs. traditional metrics:

Table 2
Comparative Insights: TBL vs. Traditional Metrics

Aspect	Traditional Metrics	TBL Framework	Analysis
Focus	Financial performance and shareholder return	Multidimensional: financial, environmental, social	While TBL captures holistic value creation, traditional measurements place more emphasis on profit.
Risk Coverage	Market volatility; Economic risks	Broader risks: social, regulatory, reputational	Non-monetary hazards like fines and harm to one's reputation are incorporated into TBL.
Sustainability Metrics	Limited or absent	Integrated into core assessment	Sustainability is largely absent in traditional metrics but central to TBL.
Adaptability to Trends	Static, focused on established financial practices	Dynamic, aligns with evolving sustainability trends	Traditional metrics lag behind trends; TBL evolves with sustainability demands.

Decision-Making Criteria	Profit-driven, ROI and NPV	Balances profit, environmenta, and social equity	TBL makes sure that decisions take the long-term effects on society and the environment into consideration.
Integration with Global Goals	Integration with global sustainability goals is either minimal or nonexistent.	Strong adherence to the UN SDGs and the Paris Agreement	TBL synchronises corporate activities with frameworks for global sustainability.
Impact Measurement	Centred on financial metrics such as revenue and profit margins	Incorporates financial, environmental, and social indicators	TBL promotes accountability by assessing broader effects that go beyond financial results.
Attractiveness for investors	Appealing to conventional investors seeking quick profits	Draws in investors who are concerned about ecological and social issues.	TBL is in line with the goals of long-term, ESG-conscious investors.

The current measurement systems fail to detect potential risks which stem from environmental destruction and social disturbances and poor governance practices (Ritz, 2023). The financial success of an O&G company does not guarantee sustainability because its carbon-based operations and negative community relations create substantial long-term threats. The focus of financial indicators on short-term gains leads Firms to make choices which compromise their sustainability for the future. Short-term financial gains from cost reduction efforts that disregard environmental rules and employee well-being will harm both corporate reputation and business stability.

The current measurement systems do not provide methods to assess how firms support environmental and social targets including emission reduction and resource optimisation, and fair employment practices. The current market requires businesses to demonstrate sustainability performance through environmental and social metrics because stakeholders want proof of Paris Agreement compliance (Brecha et al., 2021; Salimi & Vrauwdeunt, 2025). ROI and NPV traditional metrics fail to assess investment value in the current sustainability-oriented business environment.

The current investor decision-making process relies on factors that traditional metrics fail to measure because they do not assess environmental and social and governance risks. The TBL framework provides essential metrics which help Firms track long-term risks and opportunities because stakeholders require firms to demonstrate sustainability goal alignment and accountability. Firms that move their focus from financial returns to sustainability performance across multiple dimensions will achieve better market trend alignment and risk reduction and environmental stability in an unpredictable business landscape.

2.4.1 Common Goals and Foundations

The connection between CSR and the TBL theory stems from their mutual focus on expanding business success metrics past financial performance. The two frameworks share a common goal to move business success evaluation past profit maximisation by supporting a complete framework that combines social and environmental factors should accompany economic performance. The two frameworks work together to support sustainable business operations which benefit all stakeholders, including shareholders and employees and customers and communities and the environment.

The fundamental principle of CSR and TBL theory states that businesses exist within a social and environmental framework which affects their operations (Gleißner et al., 2022). The TBL theory which John Elkington developed in 1994 requires businesses to evaluate their performance through three dimensions which include people (social) and planet (environmental) and profit (economic). The framework indicates that businesses need to create beneficial social and environmental results while achieving financial success. The TBL framework helps Firms develop sustainable thinking by promoting long-term success instead of pursuing quick financial benefits (Budak, 2020).

The CSR framework supports this approach by motivating businesses to perform voluntary activities which create positive effects for society and the environment (Long, 2022). The CSR framework includes multiple activities which focus on ethical workplace practices and environmental conservation and community support and corporate philanthropy (Agudelo et al, 2019). The TBL framework shares similarities with CSR because it acknowledges businesses must demonstrate responsibility through stakeholder relations and environmental protection for enduring success.

The BSC and TBL theory represent two prominent business management frameworks which provide separate yet compatible methods to measure Organisational performance and sustainability (Kazancoglu, 2019; Mio et al., 2022). The two frameworks share a common principle which requires Firms to expand their evaluation methods to include multiple performance indicators that represent their complete business impact (Crutzen et al., 2016; Svensson, 2018).

The BSC and TBL theory share a common objective to develop sustainable business management through their distinct conceptual origins. The fundamental principle of both BSC and TBL frameworks demonstrates that financial performance alone does not provide sufficient information to understand Organisational capabilities and performance levels. The TBL theory enables Firms to evaluate their social and environmental effects together with financial results which results in sustainable business practices (Sanchez-Chaparro, 2022). The BSC framework consists of four essential perspectives which include Financial and Customer and Internal Business Processes and Learning and Growth (Kaplan & Norton, 2001).

The four perspectives of the BSC framework enable Firms to monitor their complete health status and strategic alignment through non-financial performance assessment. The connection between ESG criteria and TBL theory stems from their mutual dedication to extend business success evaluation methods past conventional financial performance metrics. The two frameworks support sustainability by requiring firms to assess corporate social and environmental effects which aligns with sustainable development principles (Kucukvar, 2014; Shah et al., 2021). The two frameworks operate independently yet support each other to create a complete system for business management and investment practices.

The core principle of ESG and TBL requires businesses to receive evaluation based on their economic results and their social and environmental effects (Yan et al., 2024). The TBL theory which John Elkington introduced in 1994 transformed how businesses measure their success. The approach promotes Firms to balance their financial targets with social and environmental duties for sustainable business operations. The ESG criteria system enables Firms to get a complete assessment of their performance through environmental stewardship and social responsibility and governance practices (Wang et al., 2020).

The evaluation of ESG criteria helps investors determine which investments will perform well in an era focused on sustainability and ethical conduct. Investors who use ESG criteria to evaluate firms can identify Firms that will thrive in a market where sustainability and ethical practices matter most.The connection between IR and TBL theory exists because both frameworks work to develop complete business performance evaluation methods. The two frameworks share a common goal to evaluate Organisational value creation through

financial results and social and environmental performance metrics (Abeysekera, 2013; Longoni, 2016).

The two frameworks operate independently yet share identical goals and principles which makes them suitable for use together in sustainable business operations. The TBL theory supports firms to measure their performance through three pillars which lead to sustainable outcomes (Svensson, 2017). The approach requires businesses to move beyond financial metrics because they must achieve social fairness and environmental stewardship and economic sustainability.

The International IR Framework enables Firms to present their value creation methods through a structured system that spans various performance dimensions (Tejedo-Valencia et al., 2024). The IIRC developed the International IR Framework, which helps Firms assess their long-term success through evaluation of financial capital resources, including financial and manufactured and intellectual and human and social relationships and natural capital.

By integrating these capitals into a single report, IR aligns closely with the TBL's focus on economic, social, and environmental factors, offering a practical tool for implementing the principles of the TBL.

2.4.2 Complementary Frameworks

The TBL principles find their practical application in CSR through its implementation of specific business strategies. The TBL framework gives Firms a conceptual model to assess their business activities (Junior et al., 2018) yet CSR delivers concrete methods for firms to meet their social responsibilities (Matten and Moon, 2008). CSR initiatives under the social TBL category (people) work to establish fair labour practices and promote diversity and inclusion and support employee welfare and community growth.

Firms that practice CSR activities work to create beneficial social results through their support of educational programs and healthcare services and social equality initiatives which directly support the "people" element of TBL. CSR initiatives that focus on environmental sustainability help businesses reduce their environmental impact which corresponds to the "planet" pillar of TBL. Firms that practice CSR work to achieve financial success through sustainable methods which include lowering carbon emissions and waste reduction and water conservation and biodiversity protection. The three TBL pillars work together through CSR because it helps Firms link their financial achievements to social and environmental benefits (Abuya and Odongo, 2020).

The BSC and TBL work together through their complementary functions to support sustainable business practices according to Chehimia & Narob (2024) and Sanchez-Chaparro (2022). The BSC enables Firms to implement the broad principles of TBL through a structured framework for strategic and operational implementation (Kaplan & Norton, 2001). The BSC enables Firms to transform TBL's broad sustainability targets into specific measurable performance indicators and objectives. The "Profit" pillar of TBL matches the Financial Perspective of the BSC because it ensures economic sustainability remains the top priority while Firms monitor additional performance indicators. The Customer Perspective of the BSC aligns with the "People" pillar of TBL through its focus on stakeholder engagement and social responsibility and customer satisfaction (Verwaal, 2022).

The TBL provides Firms with a conceptual structure which outlines the essential characteristics of sustainable business operations. The framework presents a wide perspective on corporate value creation which extends beyond shareholder benefits to include positive impacts on employees and communities and environmental sustainability. The TBL framework enables Firms to merge social and environmental elements into their strategic planning and business model development and decision-making processes (Longoni, 2016).

ESG provides Firms with detailed performance measurement standards which help them implement the TBL principles. The TBL concepts become quantifiable through ESG criteria which Firms can monitor and evaluate (Chen et al., 2011). The environmental section of ESG uses carbon emission data and energy performance metrics and waste management indicators to measure the "planet" element of TBL. The social section of ESG tracks labour practices and human rights and community effects, which align with the "people" segment of TBL.

The governance elements in ESG support responsible and ethical management through board structure and executive pay, and transparency standards which align with the "profit" pillar (Li et al., 2022). The TBL theory and IR framework work together to establish new methods for evaluating business performance which transcend traditional isolated assessment systems (Tejedo-Romero et al., 2023). The TBL framework functions as a foundational principle which promotes businesses to maintain equilibrium between their economic performance and their social and environmental duties.

The framework shows that Firms should evaluate their value creation through financial metrics and their social and environmental effects (Longoni, 2016). The IR framework enables Firms to report their activities' effects on the six capitals through a specific method which aligns with the principle of integrated reporting (Songini et al., 2023). The method aligns with TBL principles because financial and manufactured capital represent the "profit" pillar, while human and social capital represent the "people" pillar and natural capital represents the "planet" pillar. Firms can show their ability to handle operational trade-offs and synergies between different performance areas through integrated capital reporting, which demonstrates the connected nature of economic and social and environmental results.

2.4.3 Critical Evaluation of Frameworks

The TBL framework faces criticism because it lacks standardized measurement systems. The TBL framework lacks standardization in its reporting structure because it does not follow the same guidelines as IFRS or GAAP financial reporting standards. The absence of standardization creates problems when Firms use different sustainability measurement approaches because it makes performance evaluation between firms and industries difficult (Yuen et al, 2023).

The European O&G sector faces major obstacles because of the inconsistent application of sustainability standards. The different ways firms interpret and execute TBL dimensions produces inconsistent results in their economic and E/S measurements (Mastrocinque et al, 2022). Different firms within the industry select various environmental performance indicators for their sustainability reporting focuses on such as greenhouse gas emissions or water usage or biodiversity effects. The absence of standardized reporting methods makes it difficult to evaluate performance correctly and prevents investors from using dependable comparable data for their investment choices.

The TBL framework's flexibility enables customization but creates conditions for firms to pick favorable metrics which weakens the framework's credibility. Firms face a high risk of presenting misleading sustainability reports when they choose to highlight specific aspects that boost their reputation while ignoring other important sustainability metrics. The practice of presenting misleading environmental information through CSR initiatives within TBL frameworks has become known as greenwashing.

The practice of greenwashing occurs when Firms create deceptive environmental information to create a false impression of their environmental responsibility (Berg et al., 2022; Bernini et al, 2024). The O&G industry faces a high risk of greenwashing because its environmental effects are naturally significant. Firms use high-profile CSR initiatives to fund

environmental conservation projects and promote small sustainability achievements while maintaining their core operations that produce minimal environmental impact (Turcotte & Lachance, 2023).

The superficial sustainability approach creates false impressions about company sustainability commitment to stakeholders who include investors. The TBL framework faces a major implementation challenge because it lacks effective methods to verify sustainability reports and maintain transparency in reporting. The lack of strict verification systems allows CSR initiatives to become marketing tools instead of actual sustainability initiatives (Junior et al., 2018).

The TBL framework loses credibility and stakeholder trust when firms use it for deceptive purposes which weakens its ability to boost investment appeal. The TBL framework together with similar sustainability frameworks need to address particular requirements of the O&G industry because this sector depends heavily on fossil fuel extraction. The O&G sector encounters distinct sustainability problems because its operations produce large amounts of greenhouse gases while causing environmental destruction and creating substantial social effects on nearby communities (Laing, 2019).

The relationship between operational efficiency and sustainability in the sector becomes complex because improvements in one area can create negative impacts on other aspects. The TBL framework requires sector-specific modifications to effectively handle the complex relationships between different sustainability elements (Verwaal, 2022). The O&G industry achieves operational efficiency through technological advancements which simultaneously decrease environmental impact and enhance resource management. The framework requires modification to identify the distinct sustainability metrics which apply to fossil fuel extraction and processing operations.

The TBL framework becomes ineffective for precise O&G sustainability performance evaluation when it lacks industry-specific modifications. The shift toward renewable energy systems brings new complexities to the evaluation process. The global sustainability agenda forces O&G firms to expand their energy mix by developing cleaner technologies for their business operations (Bonfanti et al, 2021).

The TBL framework needs to develop new assessment criteria which track strategic business changes toward sustainability to maintain its effectiveness for evaluating firms that transform their operations. The TBL framework provides useful assessment capabilities for company sustainability and investment potential but its non-standardised approach and vulnerability to greenwashing and limited ability to handle sector-specific details create major obstacles. The research develops a customised TBL framework for European O&G businesses which standardises evaluation methods to measure economic performance and environmental and social impact effectively. The research improves TBL framework usability and enables better investment choices for the essential and transforming industry sector.

2.4.4 Conclusion

This chapter is intended to provide the core conceptual explanation of TBL, as being the main theory of interest for this research. Firstly, the chapter presents a review of the theories, which an integrate of economic, social, and environmental dimensions in business performance and investment attractiveness. Reviewing involves mainly a presentation of the development of the theories; their importance, their agreed-upon meanings, and their practice among the different fields.

The chapter demonstrates how TBL theory connects with business frameworks, including CSR and BSC and ESG criteria and IR because Firms now understand the necessity of complete business management and evaluation systems. The different frameworks work

together to create a complete sustainability framework which demonstrates how Firms must balance economic performance with social and environmental elements for enduring business achievement.

The TBL theory functions as the fundamental philosophical framework which promotes businesses to evaluate their complete range of effects. The theory establishes the fundamental principles which demonstrate that business achievement requires more than financial success because it must also benefit society and protect the environment. The principles of TBL find practical application through CSR and BSC and ESG and IR which help businesses create specific action plans and performance metrics to achieve sustainability goals.

The TBL framework matches with CSR because it delivers operational methods which help Firms integrate social and environmental elements into their business activities while maintaining ethical conduct. The BSC supports TBL by establishing a systematic method for Firms to execute and measure sustainability targets within Firms which ensures these targets become part of the company's strategic plan. The TBL framework receives its foundation from ESG criteria, which provides specific measurement tools for evaluating corporate performance in environmental and social and governance aspects thus becoming essential for investors and stakeholders.

IR unites these concepts through its requirement for complete reporting which demonstrates the diverse value creation methods in present-day business operations. These frameworks unite to create a sustainable global economy which directs businesses toward practices that generate financial success and social and environmental benefits. These concepts continue to influence business development because they help Firms handle contemporary challenges while serving the needs of all their stakeholders. Firms that integrate these frameworks will reach sustainable success by developing enduring value that benefits future generations.

Firms that achieve high TBL performance metrics gain better access to new market opportunities from sustainable product demand growth and regulatory stability. These firms gain a competitive edge which leads to sustained profitability and investor interest. The TBL framework requires stakeholder engagement because it enables businesses to keep their operating authorisation from society. Firms that maintain active stakeholder relationships with employees and customers and communities, and governments develop stronger bonds, which in turn strengthen their reputation and customer loyalty and result in superior financial outcomes.

Businesses that follow TBL principles today will find it easier to meet upcoming sustainable business regulations, which global authorities are starting to implement. The combination of legal compliance and forward-thinking corporate governance makes these firms more appealing to investors who value both aspects. 8. The TBL framework requires businesses to disclose their economic and social, and environmental effects through transparent reporting practices.

The practice of transparency in business operations helps investors trust firms because they want to see evidence of responsible business practices. Firms that show transparency about their TBL performance metrics gain investor trust because they appear more reliable. The TBL theory provides investors with a complete system to evaluate investment opportunities.

The TBL framework evaluates firms through economic performance and social impact and environmental sustainability to determine their ability to create enduring value. Investors who want to see both financial returns and social and environmental value from their investments should use this framework as their essential tool. The following chapter will establish the theoretical foundation for TBL investment attractiveness assessment after selecting this theory for defining investment attractiveness.

2.5 Gaps in Literature for TBL in Oil & Gas

The synthesis of existing literature represents a pivotal stage in the scholarly process, serving as the cornerstone for well-informed research endeavours. It encompasses a diverse array of methodologies, including framework-based reviews, theory-based reviews, theory development reviews, methodological reviews, and meta-analysis reviews shown in Figure 4.

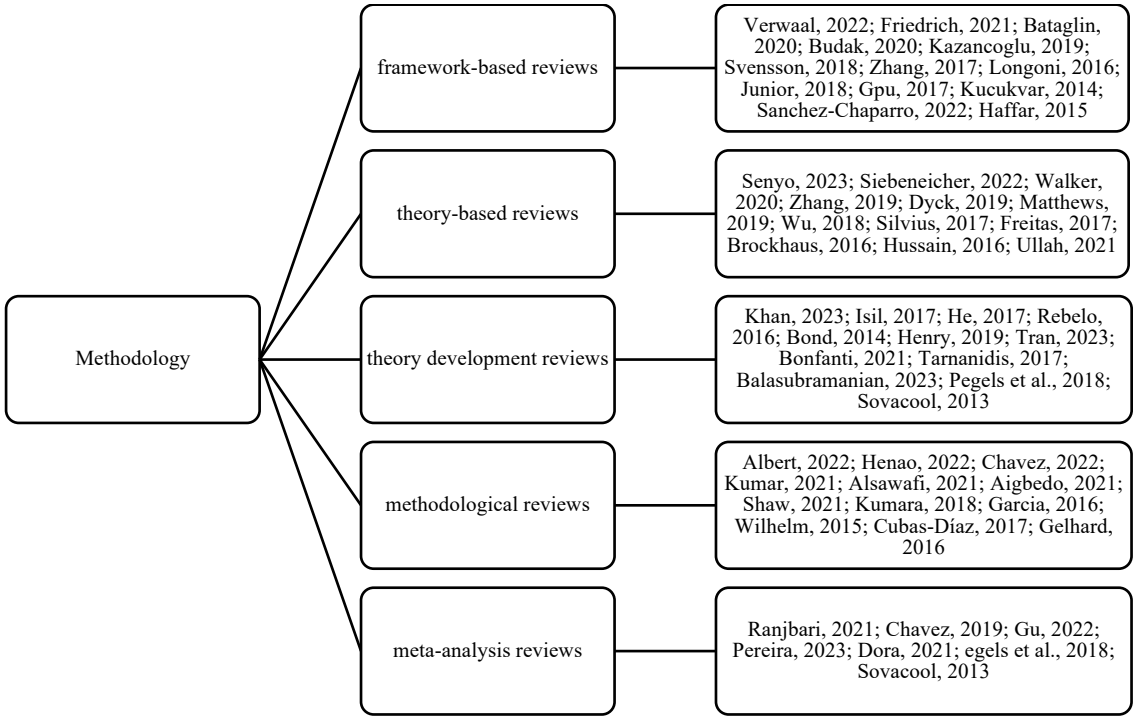


Fig. 4. Methodologies in the Systematic Literature Review of TBL. Source: Author.

The primary objective of this systematic literature review is to critically examine and synthesise existing research on the application of the TBL theory as a valuable framework for assessing and calculating investment attractiveness. The scope of this literature review encompasses a comprehensive analysis of scholarly articles that address the intersection of the TBL framework and investment attractiveness. Our study adopts a systematic literature review strategy, recognised for its rigorous, replicable, and rule-based method for identifying and synthesising relevant research (Albert, 2022; Ranjbari, 2021; Silvius, 2017).

The co-word connections in Figure 5 allow researchers to find and unite multiple keywords which appear together in one paper. The visualisation tool reveals how different

keywords link to each other through their connections within the research framework.

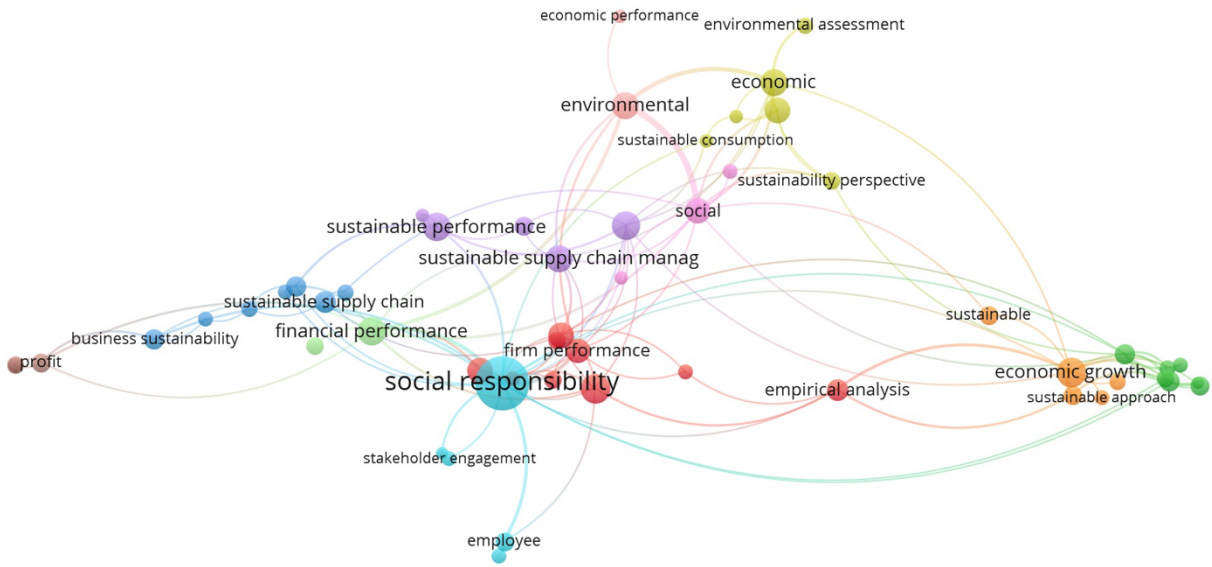


Fig. 5. The Keyword Network Visualisation of the TBL. Source: Author.

The TBL theory enables Firms to move past profit-only assessments because it includes essential social and environmental performance evaluation. The approach enables Firms to achieve positive global sustainability results while enhancing their market standing and securing their operations against upcoming worldwide challenges.

Upon systematic examination of the 108 selected papers, two primary methodological approaches emerge as dominant in the literature: case studies and quantitative models. These methodologies are utilized to explore the intersection of the TBL framework and investment attractiveness within the O&G sector, each offering distinct advantages and limitations which shows in the table 3.

Table 3
Dominant Methodological Approaches

	Case Studies	Quantitative Models
Prevalence and Application	The use of the TBL framework in actual O&G contexts is examined in a sizable amount of the studied literature using case study approaches. These case studies offer in-depth qualitative insights into how TBL principles are incorporated into corporate strategy and investment decision-making processes, frequently concentrating on particular businesses, projects, or regional initiatives within the European market.	In order to evaluate the relationship between TBL performance indicators and investment attractiveness metrics, researchers employ statistical analysis, econometric models, and other numerical techniques. Quantitative models are also frequently used in the literature. These models frequently include social and environmental parameters in addition to financial performance data to assess their combined influence on investment choices.
Advantages	Case studies provide a thorough examination of intricate phenomena, enabling scholars to document the intricate interactions of social, environmental, and economic factors in particular organisational settings.	Researchers can find and measure important correlations between variables because to the high degree of statistical rigour provided by quantitative models.

	This method makes it easier to comprehend sector-specific possibilities and difficulties in detail, emphasising the ways in which stakeholder expectations and regional regulatory frameworks affect TBL implementation. Case studies look at actual situations and offer practical advice and best practices that can guide both scholarly research and business operations.	Large-scale quantitative analysis results have wider applicability because they are easier to generalise across the O&G industry. The objectivity and dependability of results are improved by lowering the possibility of researcher bias through the use of numerical data and standardised measures.
Limitations	Because case studies are so in-depth, it is frequently difficult to extrapolate results to the whole O&G industry.	The sector-specific dynamics and contextual subtleties that affect how TBL concepts are applied in the O&G business may be ignored by quantitative models.

The reviewed literature depends mainly on case studies and quantitative models which produces specific effects on TBL framework assessment of European O&G sector investment attractiveness. The specific nature of Case Studies restricts their ability to generate findings that can be applied to the entire sector. Quantitative Models generate results that apply to multiple situations but they fail to consider essential environmental and social elements which affect sustainability performance and investment attractiveness.

The current research methods show either deep qualitative understanding or wide quantitative reach but not both so new approaches should unite these elements for extensive sector-wide insights. The use of Case Studies results in subjective findings that cannot be applied widely but Quantitative Models fail to recognise important contextual elements which creates potential oversimplifications. A mixed-methods research design enables researchers to combine detailed qualitative data with strong quantitative results which solves the current research limitations. This study combines case studies with quantitative models to establish a complete understanding of how TBL framework affects investment attractiveness in European O&G operations.

Research Gaps

The review identified common themes and gaps in the existing literature related to the TBL strategies' effects on the investment decisions of shareholders. Identifying research gaps in the context of the TBL, , is essential for advancing knowledge and practical applications of this holistic approach (Albert, 2022; Liute, 2022; Henao, 2022; Chavez, 2022; Alonso-Martinez, 2021; Kumar, 2021; Alsawafi, 2021; Aigbedo, 2021; Shaw, 2021; Tumelero, 2019; Kumara, 2018; He, 2017; Garcia, 2016; Wilhelm, 2015; Hussain, 2016; Cubas-Díaz, 2017; Gelhard, 2016). To identify research gaps in TBL, the research undertake a systematic process that involves a comprehensive literature review.

This section elucidates the novelty of this research by explicitly contrasting it with prior studies, particularly those by Pegels et al. (2018) and Sovacool (2013), and highlighting how the current study both builds upon and diverges from their work. Pegels et al. (2018) conducted an extensive analysis of sustainability practices in the global O&G industry, emphasising the integration of ESG factors into corporate strategies to enhance long-term viability.

Their research demonstrated that environmental protection and social accountability play a crucial role in managing sector risks and seizing business opportunities. The research by Pegels et al. (2018) and Sovacool (2013) has made substantial contributions to sustainability and energy security knowledge, but their research methods and boundaries differ from the present study which evaluates European O&G sector investment attractiveness through the TBL framework. The current research identifies a major knowledge gap because no study

exists which combines economic and social and environmental factors to evaluate European O&G company investment potential.

The current financial evaluation methods that use ROI and NPV do not measure essential sustainability effects which determine business sustainability and investor choices. The current assessment methods for European O&G firms face accuracy problems because they do not meet the requirements of strict regulations and changing stakeholder expectations. The research by Pegels et al. (2018) shows how ESG factors should be integrated into corporate strategies, yet it uses a worldwide perspective that does not examine European market-specific regulatory and economic and social elements.

The research by Sovacool (2013) delivers an extensive analysis of energy security yet it lacks an investigation into how O&G firms should be evaluated for investment potential through TBL sustainability assessment. The research develops an integrated TBL framework which combines financial performance indicators with E/S metrics to address the identified research gap. The framework assesses European O&G firms through a complete evaluation process which links their financial performance to their sustainability achievements.

Although Sovacool (2013) provides a comprehensive analysis of energy security, it does not address how O&G firms can be evaluated for investment potential using TBL sustainability criteria. To bride this gap, Sovacool develops an integrated TBL framework that combines financial performance indicators with environmental and social metrics. This framework enables a holistic assessment of European O&G firms by linking their financial outcomes to sustainability achievements. Furthermore, Sovacool (2013) explores the influence of European regulatory mechanisms, such as the EU ETS and the Renewable Energy Directive, on investment decisions within the regional market. It also investigates the role of various stakeholders, including investors, regulators, and local communities, in shaping the social dimensions of investment attractiveness. Ultimately, the research demonstrates how diverse sustainability practices impact investor interest and contribute to value-based investment strategies.

For the literature review on TBL performance, the research gaps can be categorized into theoretical and methodological gaps shows in the table 4:

Table 4
Summary Table of Literature Gaps

Category	Existing Research	Research Gaps
Theoretical	Focus on ESG factors within global frameworks and broad energy security dimensions	Lack of comprehensive, integrative TBL frameworks tailored to European O&G sector; overlooked dynamic interdependencies between TBL dimensions.
Methodological	Predominantly qualitative analyses; absence of sector-specific metrics; limited regional focus	Development of a TBL-based framework with standardized metrics for European O&G; integration of quantitative indicators alongside qualitative assessments.
Practical	Emphasis on sustainability practices and energy security without linking to investment attractiveness	Creation of actionable strategies for O&G firms to align with TBL principles; providing practical insights for investors using the TBL framework.
Sector-Specific	Limited focus on European regulatory and market environments; general sustainability practices	Tailored analysis considering EU regulations like ETS and Renewable Energy Directive; sector-specific sustainability challenges and opportunities.

The identified gap, this research establishes an integrative TBL-based framework that encompasses traditional financial metrics alongside E/S indicators. The framework provides a

complete method to evaluate European O&G firms based on their economic viability and sustainability performance. The research examines how different stakeholder groups including investors and regulators, and local communities affect the social aspects of investment attractiveness.

The research shows how different sustainability practices affect investor interest in firms. The research findings offer essential knowledge along with operational recommendations which help scholars and business Firms create sustainable investment plans. The existing body of research includes multiple studies about lean principles and their effects on Organisational performance (Alsawafi et al., 2021) and financial performance (Shaw et al., 2021) and social performance (Chavez, 2022; Alonso-Martinez et al., 2021; Kumar et al., 2021; Wilhelm, 2015) and environmental outcome (Aigbedo, 2021; Liute & De Giacomo et, 2012). Nonetheless, these studies focused on the area of the impact of lean manufacturing on all three dimensions of sustainability (Jum'a, 2022).

Despite the growing interest in TBL, its application to the O&G sector remains underexplored, particularly in terms of how it influences investment attractiveness. This study addresses this gap by providing empirical evidence of TBL's relevance in the sector.

The evaluation of sustainability frameworks shows that CSR and ESG and BSC and IR systems offer useful management tools and disclosure methods, yet they lack unity in their ability to unite financial data with non-financial performance information. The TBL framework provides a well-rounded structure which enables organizations to connect their social and environmental achievements with their enduring financial performance. The following chapter uses TBL principles to create an operational framework which establishes quantifiable metrics to assess investment potential through stakeholder and performance elements that affect the European oil and gas industry.

Chapter 3: Conceptual Framework for Investment Attractiveness Analysis (13949)

3.1 Introduction

The TBL framework needs practical implementation through the connection of sustainability pillars to quantitative firm-level indicators which show both financial and non-financial performance data. The chapter establishes the theoretical basis for the IAM through the connection of TBL framework pillars to stakeholder-based assessment methods including CSR and BSC. The framework transforms sustainability principles into quantifiable metrics which represent the complete range of Investment attractiveness factors in European oil and gas operations.

The reviews examine how pandemic affects sustainability through multiple dimensions (Ranjbari, 2021) and evaluate frugal innovation sustainability effects (Albert, 2022) and determine sustainability competitive advantage factors (Satar, 2023) and study innovation-circular economy connections (Suchek, 2021) and Analyse business strategies for reaching sustainable development goals (Mio, 2020). The literature reviews deliver essential knowledge which helps researchers understand modern sustainability problems and their solutions in current society.

The existing theoretical research in the field of TBL performance and investment attractiveness primarily examines the environmental, social, and economic dimensions of TBL in isolation (Ranjbari, 2021). A significant gap exists in the lack of comprehensive theoretical frameworks that holistically integrate these dimensions. Such integration is crucial to understanding the combined impact of these dimensions on investment attractiveness. Methodologically, most current research approaches assess the TBL dimensions separately (Garcia, 2016). This segmentation limits the ability to accurately gauge the collective influence of TBL performance on investment decisions (Kucukvar, 2014). The research gap becomes apparent when examining the development of quantitative indicators in studies focusing on TBL performance and its impact on investment attractiveness.

The literature about environmental and social factors in different industries is extensive but economic indicators remain understudied according to Satar (2023). The lack of focus on economic indicators matters because these indicators help complete the assessment of TBL performance. Research on specific sectors becomes necessary to understand how TBL efficiency operates differently in industries that create major environmental and social effects. The development of effective investment strategies depends on these studies because they help create balanced approaches that combine economic and environmental and social aspects of the TBL framework.

The research in this chapter helps researchers understand TBL frameworks and sustainable management practices which enable them to evaluate investments through their economic and environmental and social impacts. The environmental performance of firms operating in O&G and other high-impact sectors faces intense investor evaluation because of their substantial ecological effects. The research review investigates the intricate relationship between TBL performance and investment appeal in detail.

The research provides valuable knowledge which helps both academic studies and practical applications in developing sustainable development-aligned strategies and policies. The complete evaluation of TBL performance and investment attractiveness serves as a fundamental requirement for businesses to achieve their sustainability targets effectively. The research framework provides a solid method to evaluate O&G sector investment attractiveness which supports both financial targets and sustainability requirements. The following sections

present detailed information about the framework elements and their application in investment assessment and their effects on business and investment choices.

3.2 Defining Investment Attractiveness and TBL's Role

Investment attractiveness refers to a company, sector, or region's ability to attract and retain capital by demonstrating potential for financial returns, stability, and growth. Traditionally, investment attractiveness has been assessed through financial metrics. These metrics provide investors with insights into a company's economic performance and ability to generate short and long-term returns.

In the O&G sector, investment attractiveness has historically been influenced by factors such as resource availability, production efficiency, regulatory frameworks, and market demand for fossil fuels. While these factors remain relevant, investment decision-making has evolved significantly. In today's market, stakeholders, including investors, regulators, and communities, demand a more comprehensive evaluation of corporate performance that considers the environmental and social impacts of business operations. This underscores the need for a broader framework that extends beyond traditional financial indicators.

TotalEnergies achieved better investment appeal through its European Green Deal target-based sustainability initiatives as a major European O&G company. TotalEnergies demonstrated TBL principal implementation through its 2050 net-zero emissions target and major renewable energy investments in wind and solar power and local community development programs. TotalEnergies achieved three key outcomes through these sustainability initiatives which included ESG investor attraction and market leadership and regulatory compliance for the long term (TotalEnergies, 2023).

3.2.1 Stakeholders

The model implements Stakeholder Theory principles through CSR and BSC dimensions which convert stakeholder expectations into quantifiable social and governance performance metrics.

A company faces specific performance limitations when handling multiple stakeholders demands because it needs to understand complex factors which extend past profit optimisation (Matthews, 2019; Senyo, 2023). Firms face a special challenge when they need to produce measurable social results, such as emission reduction, in addition to their core business outputs (McWilliams, 2014). The management requires performance indicators which measure various outputs while optimising resource distribution. The growing focus on environmental and economic sustainability has led to social issues being neglected in assessments (Ahi & Searcy, 2015; Su, 2021; Wu, 2018).

A company's sustainability and operational health depend on achieving optimal results for all relevant stakeholders while maintaining effective cost management regardless of its Organisational purpose. Stakeholders need to assess the attractiveness of investments as their main priority when making investment choices. Stakeholders use these elements to establish the total attractiveness of investment prospects (Siebeneicher, 2022; Walker, 2020; Dyck, 2019). These metrics help Firms make sustainable choices by uniting environmental and social elements with financial aspects to support TBL-based investment decisions (Kucukvar, 2014; Crane et al., 2016).

The evaluation of TBL theory requires stakeholders to understand their specific needs and priorities (Anbarasan, 2018). The assessment process should prioritise the specific goals and values of each stakeholder group since they may value different TBL dimensions differently (Cubas-Díaz, 2017). Investment attractiveness needs a complete evaluation that

unites all three dimensions to achieve financial gains while upholding sustainability and social accountability (Infante, 2013). The TBL theory provides Firms with a systematic evaluation method which combines economic performance with environmental impact and social effects (Dora, 2021; Balasubramanian, 2023). Multiple stakeholder dimensions enable them to choose investments which support sustainability and responsibility.

3.2.2 Sustainability Implications

The application of the TBL theory to assess firms holds profound sustainability implications (Freitas, 2017). The industry's investment choices produce wide-ranging sustainability effects which impact economic stability and environmental health and social well-being according to Autry et al. (2013) and He (2017). The sector's future development depends on these implications which also determine how stakeholders should act and what responsibilities they must fulfill. Multiple detailed systems help Firms understand and measure sustainable building practices (Gpu, 2017). Among the TBL sustainability indicators, employment, income, tax and work-related injuries were considered social indicators (Kucukvar, 2014), while gross domestic product, gross operating surplus, and imports were categorized as key economic indicators (Wood & Garnett, 2010).

Based on the literature review provided, several sustainability implications have been identified: Manufacturing firms contribute to the achievement of Sustainable Development Goals by adopting sustainable practices in economic, environmental, and social dimensions (Bonfanti, 2021). Technologies in the renewable energy sector have both positive and negative environmental implications, but the overall positive impacts outweigh the negative ones (Khan, 2023).

Technologies have both positive and negative environmental and social implications, and their implementation should aim to preserve natural resources, minimise pollution, and improve worker health and safety (Balasubramanian, 2023). Lean manufacturing practices are positively associated with environmental and social practices, but their interaction with both can be detrimental to TBL's performance (Tran, 2023). Integrated management systems can contribute to sustainable development by managing multiple components of sustainability, optimizing resources, and improving internal and external image (Rebelo, 2016).

Conflict transformation methods can enhance sustainable peace in the mining industry and improve TBL outcomes by incorporating sustainable development practices and community engagement (Bond, 2014). Top management composition can impact TBL's performance in corporate sustainability, with different compositions leading to different levels of compliance, efficiency, and innovation (Henry, 2019). Whereas, other researchers conclude that the construct of economic values should address both social and environmental issues that simultaneously meet stakeholders' expectations (Rajasekaran 2013; Tarnanidis, 2017).

The assessment of investment attractiveness requires knowledge about these sustainability effects. The framework demonstrates how economic performance interacts with environmental and social elements to create investment opportunities that build sustainable equitable and resilient systems. The literature review examines how experts have studied sustainability effects through TBL framework assessments of investment attractiveness while showing the development of sustainability research.

3.2.3 Sustainable performance indicators: main themes

I examine the existing research to determine its core elements including themes and methods and theoretical frameworks and achieved results. A comparative analysis of TBL practices across different industries and countries and cultural settings helps identify

inconsistent findings and different approaches and results that do not match. These disparities can indicate a lack of standardization in practices or varying impacts and thus represent a gap in understanding.

The analysis involves a systematic distribution of the selected scholarly articles, categorizing them based on distinct themes identified through specific keywords and performance indicators within the TBL framework. This rigorous classification enabled an intricate understanding of the prevalent scholarly directions, the concentration of research efforts, and emerging trends or gaps in the existing literature related to TBL theory's applications and efficacy. The distribution of reviewed papers among themes with the keywords and TBL theory's performances is shown in Table 5:

Table 5

The Distribution of Reviewed Papers Among Journals with the Keywords and TBL Theory's Performances. Number, Journals, Number of Articles

	Author	Topic	Year	Key words	2 Journals
1	Albert, M.	Assessing the sustainability impacts of frugal innovation – A literature review	2022	Indicators	Journal Of Cleaner Production
2	Liute, A & De Giacomo, M.	The environmental performance of UK-based B Corp firms: An analysis based on the triple bottom line approach	2022	Environmental performance	Business Strategy and The Environment
3	Henao, R. & Sarache, W.	Sustainable performance in manufacturing operations: The cumulative approach vs. trade-offs approach	2022	Performance	International Journal of Production Economics
4	Chavez, R., Yu, W., Jajja, M., Song, Y. & Nakara, W.	The relationship between internal lean practices and sustainable performance: exploring the mediating role of social performance	2022	Sustainability and social performance	Production Planning and Control
5	Alonso-Martinez, D., De Marchi, V. & Di Maria, E.	The sustainability performances of sustainable business models	2021	Corporate social performance	Journal of Cleaner Production
6	Kumar, G., Meena, P. & Difrancesco, R.	How do collaborative culture and capability improve sustainability?	2021	Supply chain performance	Journal Of Cleaner Production
7	Alsawafi,A., Lemke, F. & Yang, Y.	The impacts of internal quality management relations on the triple bottom line: A dynamic capability perspective	2021	Sustainability performance	International Journal of Production Economics
8	Aigbedo, H.	An empirical analysis of the effect of financial performance on environmental performance of firms in global supply chains	2021	Environmental performance	Journal Of Cleaner Production
9	Shaw, S., Grant, D. & Mangan, J.	A supply chain practice-based view of enablers, inhibitors and benefits for environmental supply chain performance measurement	2021	Environmental supply chain performance	Production Planning and Control
10	Tumelero, C., Sbragia, S. & Evans, S.	Cooperation in R & D and eco-innovations: The role in firms' socioeconomic performance	2019	Socioeconomic performance	Journal of Cleaner Production
11	Kumara, G., Subramanianb, N. & Arputhamc, R.	Missing link between sustainability collaborative strategy and supply chain performance: Role of dynamic capability	2018	Supply chain performance	International Journal of Production Economics
12	He, Z., Chen, P., Lui, H. & Guo, Z.	Performance measurement system and strategies for developing low-carbon logistics: A case study in China	2017	Performance measurement system	Journal of Cleaner Production
13	Garcia, S., Cintra, Y., Torres, R. & Lima, F.	Corporate sustainability management: a proposed multi-criteria model to support balanced decision-making	2016	Sustainability performance measurement	Journal of Cleaner Production
14	Wilhelm, M., Hutchins, M., Mars, C. & Benoit-Norris, C.	An overview of social impacts and their corresponding improvement implications: a mobile phone case study	2015	Sustainability performance improvement	Journal of Cleaner Production
15	Hussain, N., Rigoni, U. & Orij, R.	Corporate Governance and Sustainability Performance: Analysis of Triple Bottom Line Performance	2016	Sustainability performance	Journal of Business Ethics
16	Cubas-Díaz, M. & Sedano, M.	Measures for Sustainable Investment Decisions and Business Strategy–A Triple Bottom Line Approach	2017	Sustainability performance measurement	Business Strategy and The Environment

17	Gelhard, C. & Delf, S.	The role of Organisational capabilities in achieving superior sustainability performance	2016	Sustainability performance	Journal of Business Research

Source: Author.

This visualisation offers insights into the concentration of research efforts and the academic emphasis on evaluating and understanding the practical efficacy of TBL in various contexts. Each paper was meticulously reviewed, and its primary thematic content was delineated by interpreting its context about the TBL's three pillars: social, environmental, and economic sustainability. The keywords served as focal points in this examination, guiding the thematic distribution by ensuring that each article was categorized based on its central premise, research objectives, and findings within the TBL paradigm.

Articles 1 and 3 in the performance group investigate how innovations designed to reduce costs and resources (frugal innovation) impact sustainability and compare two approaches - cumulative (integrating various sustainability aspects) vs. trade-offs (prioritizing some sustainability aspects over others) in manufacturing operations. Articles 6, 7, 9, and 11 in the supply chain performance group investigate the impact of a collaborative Organisational culture and capabilities on achieving sustainability goals, look at how internal quality management practices within firms affect their TBL performance, using a dynamic capability perspective, discusses factors that enable or inhibit effective environmental performance measurement in supply chains, and analyses how sustainability strategies in collaboration affect supply chain performance, focusing on the role of dynamic capability.

Articles 2 and 9 in the environmental performance group analyse the environmental aspect of TBL in UK firms certified as B Corporations, which are committed to high social and environmental performance and discuss factors that enable or inhibit effective environmental performance measurement in supply chains. Articles 4, 5 and 10 in the social performance group explore how lean management practices within Firms impact their overall sustainability, especially focusing on the mediating role of social performance, examine the effectiveness of different business models that are designed to be sustainable, and examine the role of cooperative research and development in driving eco-innovations and their impact on firms' socioeconomic performance.

Articles 12, 13 and 16 in the performance measurement group present a case study in China, focusing on the implementation of strategies and measurement systems for low-carbon logistics, proposes a multi-criteria model to support balanced decision-making in corporate sustainability management and discuss metrics and approaches for integrating sustainability into investment decisions and business strategies. Articles 14, 15 and 17 in the sustainability performance group focus on the social impacts of mobile phone production and suggest improvements, likely from a sustainability perspective, analyse the relationship between corporate governance structures and TBL performance, and investigate how various Organisational capabilities contribute to enhanced sustainability performance.

As illustrated in Figure 7, there was a discernible uptick in interest regarding TBL performances starting in 2015. The pandemic's worldwide effects in 2021 led to the highest number of published papers which demonstrated growing interest in complete sustainability measurement methods. The European O&G sector needs to integrate TBL into its investment analysis process because of its essential nature.

The O&G industry faces major environmental challenges because of its greenhouse gas emissions and social problems that include forced community relocation and violations of worker rights. Firms using TBL can boost their investment appeal through their ability to show sustainability progress through quantifiable emission reductions and renewable energy adoption and stakeholder engagement and market adaptation for low-carbon energy needs. The

current market demands a wider framework for investment attractiveness assessment because financial performance no longer fulfils the requirements of today's sustainability-focused business environment.

The TBL framework extends traditional analysis by adding E/S metrics, which helps Firms assess their complete value creation and sustainability strength. The European O&G sector can achieve sustainable profitability through TBL adoption, enabling Firms to meet stakeholder requirements and worldwide sustainability targets. The research introduces TBL as a new IAM which helps both theoretical development and practical business decisions in an industry undergoing rapid change.

3.3 The TBL Framework for Investment Analysis

The TBL framework enables Firms to evaluate their performance through multiple assessment criteria. The following section explains the TBL framework's complete application process for evaluating European O&G firms' investment potential. The framework combines financial performance indicators with sustainability metrics to evaluate Firms that maintain profitable operations while upholding their social and environmental duties.

The TBL evaluation process for this analysis requires researchers to select essential metrics for each category before studying their connections and then combining the results to create a complete assessment of investment potential. The research quality assessment of included studies through the research ensures that results maintain both reliability and validity. The analysis takes into account all research limitations and potential biases that exist in the studies. The TBL framework evaluates corporate performance by examining three separate elements, which include social performance and environmental impact and economic results (Friedrich, performance and sustainability aspects of firms. The TBL performance percentages are detailed in Table 6.

Table 6
TBL Performances

Performances	Number of publications	Percentage
Environmental	19	19.18%
Social	33	33.31%
Economic	20	20.18%
TBL	36	36.33%
Total	108	100.00%

Source: Author.

The information in Table 6 indicates that within the last ten years, academic literature has predominantly featured discussions on the TBL theory, which represents 36.33% of the focus. Despite the increasing importance of environmental sustainability, environmental indicators have garnered the least scholarly attention at 19.18%. The research has focused more on economic and social aspects with 20.18% and 33.31% of total attention.

The indicators' scores from Albert (2022) and Henao (2022) and Alsawafi (2021) and Tumelero (2019) and Kumara (2018) and He (2017) and Garcia (2016) will interest investors. A company that demonstrates balanced performance across TBL dimensions shows a complete

sustainability strategy which investors view as a sign of enduring business stability thus making it more attractive for investment. The Environmental Social and Economic investment sector has experienced rapid expansion during the past few years. The investment community shows increasing interest in businesses that maintain strong environmental practices.

The TBL framework provides useful benefits for investment analysis, yet several obstacles prevent its optimal use: The main obstacle to effective comparison stems from the absence of uniform reporting standards which differ between geographic areas and business sectors. The reporting practices of sustainability metrics differ between firms because some Firms provide complete reports, but others only share specific data points which makes cross-company assessments unreliable.

The TBL framework promotes the creation of standardized performance metrics to achieve performance evaluation transparency through comparable assessment results. The process of quantifying social and environmental indicators leads to subjective evaluation results because these metrics prove challenging to measure. Different Firms use different measurement systems to assess their community engagement and labour practices. The use of universally accepted benchmarks from the UN SDGs helps Firms reduce the impact of personal opinions during evaluation processes.

The analysis of E/S faces obstacles because of restricted access to dependable and uniform data sources. Small businesses face difficulties in sustainability reporting because they do not possess enough financial resources. The implementation of regulatory requirements alongside third-party verification systems will improve data reliability through enhanced transparency. The evaluation process becomes unbalanced when firms demonstrate superior economic results but weak environmental sustainability performance.

The TBL framework includes weighting systems which enable stakeholders to determine the relative importance of each performance dimension. The TBL analysis process demands substantial resources and specialized knowledge which makes it difficult for small businesses to implement this framework. The implementation of simplified assessment methods together with training programs will help Firms overcome their current obstacles. Standardized metrics combined with increased transparency through the TBL framework solve existing problems which result in dependable investment attractiveness evaluations. Firms which demonstrate balanced performance across all TBL dimensions prove their sustainability while building investor attraction through their long-term business stability.

Environmental Sustainability

The evaluation of corporate investment potential now heavily depends on environmental performance results from different business sectors. Environmental performance metrics serve as essential factors for investors who practice sustainable and responsible investment strategies (Cubas-Díaz, 2017). Firms that show dedication to environmental sustainability gain better standing with their consumers and business partners and stakeholders (Yuen, 2023). Firms that build positive reputations will attract loyal customers who might generate additional revenue. Firms that focus on environmental performance discover methods to enhance operational efficiency (Ozbekler, 2019).

Firms that minimise waste while maximizing resource efficiency can achieve substantial cost reductions. Firms that actively protect the environment will develop better relationships with their stakeholders who range from local communities to worldwide environmental Firms. Firms that build strong positive relationships with stakeholders gain multiple advantages which include easier project approvals and improved brand reputation. Firms that focus on environmental performance will succeed in adapting to upcoming market changes because they align with the global shift toward sustainability (Henao, 2022; Chavez,

2022; Alonso-Martinez, 2021; Kumar, 2021; Aigbedo, 2021; Kumara, 2018; He, 2017; Garcia, 2016).

Firms that lead environmental performance initiatives tend to become leaders in innovation (Brockhaus, 2016). The development of innovative products and services emerges from environmental performance focus which creates new market possibilities. Table 7 illustrates the environmental performances of firms.

Table 7
Environmental Performances (Indicators)

Article автор год убрать в статью	Environmental Performances	Year
Triple bottom line analysis of oil and gas industry with multicriteria decision making	Direct energy consumption discriminated by primary energy source	2023
	Total water withdrawal by source	
	Total direct emissions of greenhouse gases per weight	
	Total indirect emissions of greenhouse gases per weight	
	SOx, by type and weight	
	NOx, by type and weight	
	Total water discharge by quality and destination	
	Waste total weight	
	Total volume of significant spills	
	Investments and expenditures in environmental protection by type	
The environmental performance of UK-based B Corp firms: An analysis based on the triple bottom line approach	Air and climate	2022
	Water	
	Land and life	
Sustainable performance in manufacturing operations: The cumulative approach vs. trade-offs approach	Use of hazardous materials in production processes	2022
	Solid waste generation	
	Greenhouse gas emissions	
	Energy efficiency in production processes	
	Environmental regulation compliance	
The relationship between internal lean practices and sustainable performance: exploring the mediating role of social performance	Reduction of air emission	2022
	Reduction of wastewater	
	Reduction of solid wastes	
	Decrease of consumption for hazardous	
The sustainability performances of sustainable business models	Maximize material and energy efficiency	2021
	Close resource loops	
	Substitute with renewables and natural processes	
How do collaborative culture and capability improve sustainability?	Protect and restore the environment	2021
	Reduction energy consumption	
	Reduce water consumption/recycling and reuse of water	
	Reduce waste and emissions from our facilities	
	Reduce purchases of non-renewable materials	
A supply chain practice-based view of enablers, inhibitors, and benefits for environmental supply chain performance measurement	Energy consumption	2021
	Supply Chain	
Carbon market maturity analysis with an integrated multi-criteria decision-making method: A case study of EU and China	GHG emission	2019
	Covered GHG ratio	
	Covered GHG emission	
	Carbon market access threshold	
Missing link between sustainability collaborative strategy and supply chain performance: Role of dynamic capability	Eco-friendly product development	2018
	Material requirement planning combined with recycled materials	
	Purchasing with green supplier assessment	
	Reduce, reuse, and recycle	
	End-user's environment-oriented demands	

	Technology and machinery sharing	
	Inventory related information sharing	
	Waste reduction	
	Compliance with laws	
	Increased of recycling	
	Make recyclable parts	
	People through effective use of technology	
	Business environment affects supply and demand	
	Learning ability and innovation	
Corporate sustainability management: a proposed multi-criteria model to support balanced decision-making	Materials	2016
	Energy	
	Biodiversity	
	Emissions, Effluents, and Waste	
	Products and Services	
	Compliance	
Industry 4.0 enabling sustainable supply chain development in the renewable energy sector: A multi-criteria intelligent approach	RE target share gap	2022
	PV target share	
	GHG emission reduction	
	Recycling rate	
	Disposal green policies	
	Technology for disposal	

The costs of environmental accidents including oil spills and hazardous waste leaks become extremely high because they create legal problems and harm business reputation (Yee, 2021). Firms that focus on environmental performance will experience fewer incidents of this nature. Firms that evaluate their environmental effects develop long-term business strategies (Fenner, 2020).

Sustainable business models emerge from this approach which leads to enduring business operations and stable investor returns. A company's environmental performance now extends beyond basic regulatory compliance and CSR obligations. The environmental performance of a company determines its investor appeal and market standing while ensuring sustainable business operations in the long run. The connection between environmental protection and business achievement has become a fundamental factor which investors use to make their investment choices.

Social Sustainability

Corporate managers widely concur that social and environmental responsibility constitute two of the most pivotal non-financial strategic performance indicators (Plambeck & Taylor, 2015). Therefore, the TBL model incorporates financial performance, social responsibility, and environmental responsibility as benchmarks for assessing a firm's performance (Kucukvar et al., 2014). Sustainable entrepreneurship involves recognizing social or ecological problems, developing solutions that address the TBL, and creating or entering sustainable markets (Belz, 2017).

Sustainable supply chain management integrates social and environmental sustainability elements into supply chain management systems (Sarkis, 2015). The documents demonstrate that transparency along with education and market intelligence play essential roles in reaching sustainability targets (Glavas, 2014; Tate, 2016). The social pillar emphasizes the need for Firms to create positive social effects while maintaining ethical business practices (Wang, 2021).

The social sustainability framework includes three main components which focus on community involvement and employee and local population welfare and human rights and

workplace standards (Manupati, 2021; Carayannis, 2021). Social sustainability includes CSR programs and fair workplace practices and workplace safety measures and social responsibility impact evaluations. Table 8 illustrates the social performances of firms.

Table 8
Social Performances

Topic	Social Performances	Year
Sustainable performance in manufacturing operations: The cumulative approach vs. trade-offs approach	Wages and economic compensation	2022
	New direct and formal workplace creation	
	Employee turnover rate	
	Accident rate	
	Employee satisfaction and motivation	
The relationship between internal lean practices and sustainable performance: exploring the mediating role of social performance	Employees are satisfied with their job	2022
	The amount of stress at work	
	Health and safety incidents	
	Injuries and lost days related to injuries	
The sustainability performances of sustainable business models	Deliver functionality rather than ownership	2021
	Adopt a stewardship role	
Missing link between sustainability collaborative strategy and supply chain performance: Role of dynamic capability	Openness & communication	2018
	Knowledge and skill sharing	
	Mutual risks and rewards	
	Joint learning	
	Trust	
	Loyalty	
	Environment awareness with social responsibility	
	Community health and safety	
	Better working condition	
	Ability and willingness to help	
	Always giving true information	
Performance measurement system and strategies for developing low-carbon logistics: A case study in China	Employment and welfare	2017
	Fair trade and contribution to society	
	Policies and Organisation	
Corporate sustainability management: a proposed multi-criteria model to support balanced decision-making	Local communities	2016
	Corruption	
	Public Policy	
	Anti-competitive behavior	
	Compliance	
	Employment	
	Labour/Management relations	
	Occupational health and safety	
	Training and education	
	Diversity and equal opportunity	
	Investment and Procurement Practices	
	Non-discrimination	
	Freedom of association and collective bargaining	
	Child labour	
	Forced and compulsory labour	
	Security practices	
	Indigenous rights	
	Customer health and safety	
	Product responsibility performance indicators	
	Product and service labelling	
	Marketing communications	

	Customer privacy	
An overview of social impacts and their corresponding improvement implications: a mobile phone case study	Labour rights and decent work	2015
	Health & safety	
	Human rights	
	Community	
Triple bottom line analysis of oil and gas industry with multicriteria decision making	Workforce by employment type, employment contract and region	2023
	Rates of work-related deaths	
	Rates of work-related occupational illnesses by region	
Environmental improvement initiatives in the coal mining industry: maximisation of the triple bottom line	Community contributions	2019
Carbon market maturity analysis with an integrated multi-criteria decision-making method: A case study of EU and China	Government policies	2019
	Monitoring, Reporting, Verification	
	Influence on corporate carbon strategies	
Industry 4.0 enabling sustainable supply chain development in the renewable energy sector: A multi-criteria intelligent approach	Employment and job opportunities	2022
	Wage level	
	Gender employment gap	
	Stakeholders influence	
	Social acceptability	
	Population growth rate	

The way firms perform socially determines how attractive their investments appear to potential investors. Firms that show dedication to social responsibility and ethical conduct now receive more investment interest from stakeholders (Chavez, 2022; Alonso-Martinez, 2021; Kumar, 2021; Wilhelm, 2015). The welfare of employees and positive community involvement and ethical supply chain relationships make firms more appealing to investors and stakeholders.

The rising social awareness about responsible business practices has created a market demand for sustainable operations because these practices generate enduring business success and sustainable expansion. The TBL framework serves as a complete method for studying European O&G sector investment attractiveness in this research. The framework unites economic performance with environmental impact and social responsibility to measure investment value while meeting current market requirements for sustainable practices.

The analysis assesses corporate performance while showing stakeholders how to build lasting value and minimise risks and improve their relationships with stakeholders. The TBL framework provides complete understanding to investors and firms and policymakers who need to handle sustainability challenges in the O&G industry.

Economic Sustainability

The economic pillar of the TBL framework centres on financial viability and profitability. It emphasises the need for investments to generate economic returns, foster growth, and ensure long-term financial stability (Gelhard, 2016). Economic sustainability considerations may include assessments of profit growth, revenue generation, cost market share, and market share growth. Quantifying and assessing the TBL can be a complex task that often requires collaboration among various departments within an organisation, as well as the use of appropriate metrics and data sources (Jum'a, 2022). It's a valuable tool for firms looking to assess their impact on the environment, society, and their financial bottom line, ultimately striving for sustainable and responsible business practices. Table 9 illustrates the economic performances of firms.

Table 9
Economic Performances

Topic	Authors	Economic Performances	Year
Sustainable performance in manufacturing operations: The cumulative approach vs. trade-offs approach	Henao, R. & Sarache, W.	Cost Quality	2022
		Lot size flexibility	
		Production lead-time	
		Cycle time	
		Work in process inventory	
The relationship between internal lean practices and sustainable performance: exploring the mediating role of social performance	Chavez, R., Yu, W., Jajja, M., Song, Y. & Nakara, W.	Production cost	2022
		Labour productivity	
		High product performance	
		Ease (cost and time) to service product	
The sustainability performances of sustainable business models	Alonso-Martinez, D., De Marchi, V. & Di Maria, E.	Repurpose for society/environment	2021
		Develop sustainable scale-up solutions	
		Inclusive value creation	
How do collaborative culture and capability improve sustainability?	Kumar, G., Meena, P. & Difrancesco, R.	Profit growth	2021
		Market share	
		Market share growth	
		Return on investment	
		Return on assets (ROA)	
An empirical analysis of the effect of financial performance on environmental performance of firms in global supply chains	Aigbedo, H.	ROE	2021
		ROA	
		Net Profit Rate	
		Profit per worker	
Missing link between sustainability collaborative strategy and supply chain performance: Role of dynamic capability	Kumara, G., Subramanianb, N. & Arputhamc, R.	Shorter lead time	2018
		Improved quality	
		Higher profit	
Sustainability as a new school of thought in project management	Silvius, G.	Land use	2017
		Investments	
		Labour productivity	
		Damage rate	
		Products and Services	
Corporate sustainability management: a proposed multi-criteria model to support balanced decision-making	Garcia, S., Cintra, Y., Torres, R. & Lima, F.	Economic Performance	2016
		Market Presence	
		Indirect Economic Impacts	
Triple bottom line analysis of oil and gas industry with multicriteria decision making	Infante, C., Mendonça, F., Purcidonio, P. & Vallie, R.	Total production	2023
		Development and impact of investments	
Environmental improvement initiatives in the coal mining industry: maximisation of the triple bottom line	Laing, T., Upadhyay, A., Mohan, S. & Subramanian, N.	Revenue	2019
		Pre-tax profits	
		Revenue per GHG	
Carbon market maturity analysis with an integrated multi-criteria decision-making method: A case study of EU and China	Zhang, F., Fang, H. & Song, W.	Covered industry amount	2019
		Covered emissions entities	
		Institution investor participation	
		Transaction mode amount	
		Trading goods type amount	
		Allowance trading volume	
		Non-trading days	

		Average price	
		Trading volume of CER or CCER	
		Transaction concentration	
		Turnover	
		Compliance rate	
Industry 4.0 enabling sustainable supply chain development in the renewable energy sector: A multi-criteria intelligent approach	Mastrocinque, E., Ramírez, F., Honrubia-Escribano, A. & Pham, D.	Carbon financial products amount	2022
		Feed-in-tariff	
		R&D government support	
		Energy sales	
		Sourcing costs	
		Upfront costs	
		O&M costs	
		Cost of capital	
		Country risk premium	
		Long-term gov. bond yield 10-year	

The attractiveness of a company for investment depends heavily on its economic performance results. The financial performance of a company becomes the main investment factor when it demonstrates stable profitability and revenue expansion and solid financial ratio performance (Garcia, 2016; He, 2017; Kumara, 2018). Firms with solid economic performance receive better investment ratings because they present lower risk levels and higher shareholder value (Tumelero, 2019). The combination of effective management and strategic market navigation through challenges becomes evident when a company demonstrates strong economic performance (Laing, 2019).

The competitive business environment requires investors to Analyse financial stability indicators including ROA and ROE and net profit rate and profit per worker to evaluate investment potential (Aigbedo, 2021; Chavez, 2022; Alonso-Martinez, 2021; Liute, 2022). Firms that demonstrate economic stability create better conditions for innovation and expansion and employee welfare programs which attract additional investors. The globalized economy requires businesses to focus on maintaining economic stability because it directly affects worldwide investment choices.

Stakeholders	TBL Dimensions	Contextual Factors

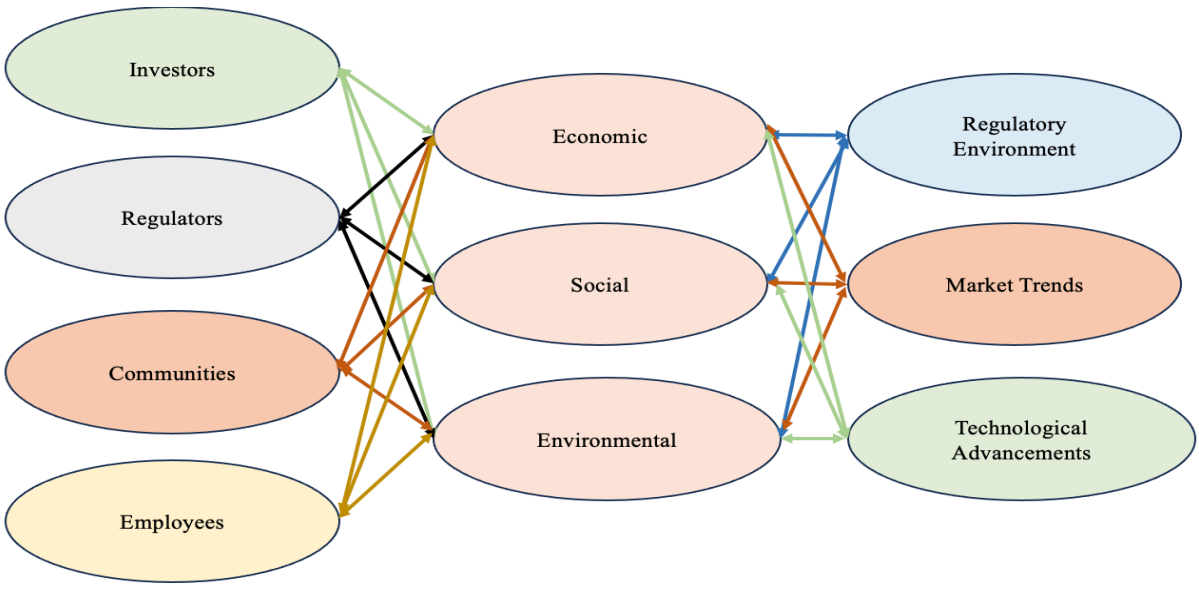


Fig. 6. Connections between TBL Dimensions, Stakeholders and Contextual Factors: Author

The central elements of the figure 6 consist of the three TBL dimensions which include Economic and Environmental and Social. The Venn diagram design shows how these dimensions connect through their overlapping circular structure. The circles contain relevant indicators and examples for each dimension while shared areas between them represent combined approaches and mutual advantages. The TBL dimensions receive influence from stakeholders who exist outside the central area of the diagram (e.g. investors and regulators and communities and employees).

The TBL components show feedback connections which demonstrate how environmental efficiency savings generate economic growth through emergent behaviors. The system operates within a dynamic environment shaped by Contextual Factors which include regulatory frameworks and market patterns and technological progress. The connections between nodes show how different elements interact with each other to produce new behaviors that enhance investment appeal. The TBL framework presents a complex system where economic and environmental and social elements interact through feedback loops and emergent behaviors to determine investment attractiveness for European O&G firms.

The complete assessment of European O&G firms' sustainability and long-term business potential requires knowledge of their interactive systems. The TBL framework enables European O&G firms to achieve investment attractiveness through its feedback loops and emergent behaviors. The components work together to create ongoing development and innovative solutions and Organisational strength and strategic partnerships which help businesses maintain profitability while meeting sustainability goals for diverse investor groups. The successful implementation of these interactions by O&G firms leads to better long-term business stability and draws responsible investors who seek sustainable energy solutions in the modern market.

3.4 Challenges and Critiques of Applying TBL

The TBL framework receives broad acceptance for its complete corporate performance evaluation system which combines economic and environmental and social elements yet faces difficulties when used for investment purposes. The TBL framework faces multiple challenges when used for investment assessment in high-impact sectors such as O&G because of sustainability practice complexities and limited data availability and operational challenges.

The following section examines TBL implementation challenges for investment attractiveness assessment together with specific areas where the framework needs improvement or modification. The TBL framework received a detailed evaluation through my research which examined all aspects of Environmental and Social and Economic dimensions. Our systematic literature review approach allowed us to examine numerous academic studies about sustainability which demonstrated how the three pillars create a complex network that supports sustainable business operations.

The analysis helps researchers determine which research topics have received extensive study while revealing gaps in current investigations. The TBL pillars exist in a connected system which forms the fundamental structure of sustainable business operations. Our research indicates that firms need to achieve equilibrium between economic performance and social accountability and environmental protection to become investment-attractive and sustainable.

Research indicates that natural resource rents affect entrepreneurial activity differently across countries based on institutional quality in resource-dependent settings. The quality of formal institutions determines how natural resource rents transform into productive business ventures because high-quality institutions direct rents toward entrepreneurship, but poor institutions lead to rent-seeking activities that harm sustainable development. The interpretation of E and S indicators in TBL requires governance quality assessment because institutional differences between jurisdictions can produce biased cross-jurisdictional comparisons (Medase et al., 2023).

Researchers currently study TBL indicators across each pillar to establish their practical value through empirical research. The researchers work to enhance the framework's accuracy while creating sustainable business guidelines for Firms. Figure 7 provides a graphical representation of the number of academic articles focusing on the performance aspects of the TBL theory and the number of papers with the TBL theory's performances.

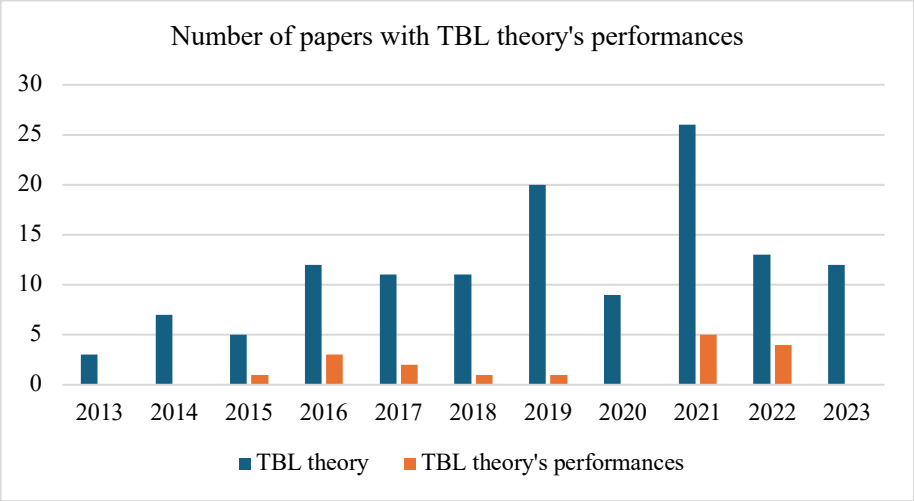


Fig. 7. Number of Papers with TBL Theory and TBL Theory's Performances. Source: Author

In summary, the TBL framework's applicability is only expected to increase as the world gets more interconnected and complicated. By continuously improving and broadening the TBL indicators, researchers are at the forefront of this movement, making sure that they continue to be relevant and useful in the dynamic business environment of today. The TBL has gained attention as a result of the growing significance of sustainability in the business world and the increasing pressure from stakeholders for businesses to operate responsibly.

This study emphasises how crucial it is that each pillar have precise, widely accepted definitions. The usefulness and legitimacy of the TBL framework may be jeopardised if there is no consensus on what Environmental, Social, and Economic performance is. Businesses and investors need to take a more comprehensive, multifaceted approach to evaluating value as the issues of global sustainability grow more entangled with business. Figure 8 illustrates the annual count of TBL indicators addressed by researchers.

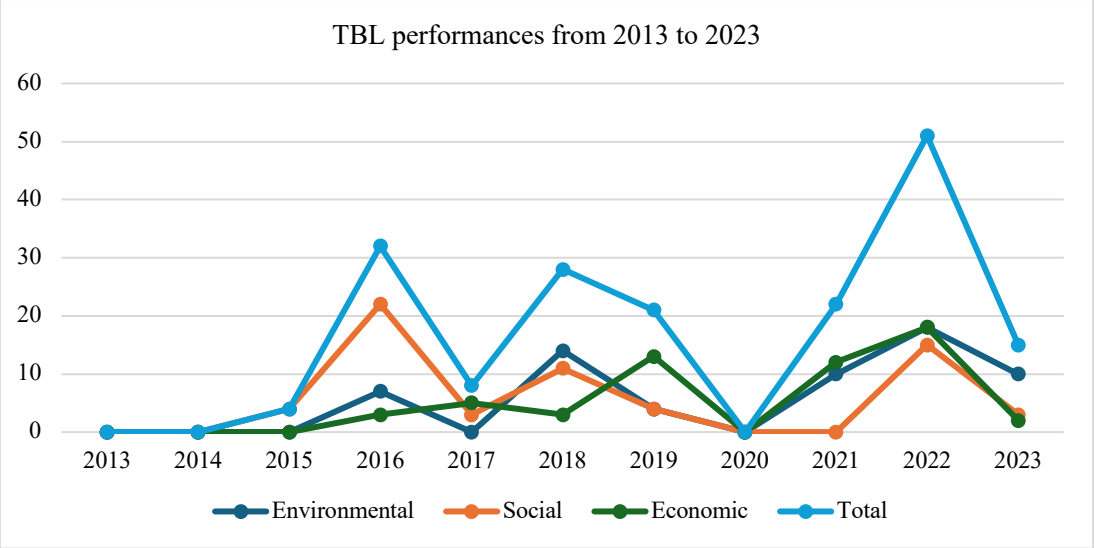


Fig. 8. TBL performances from 2013 to 2023. Source: Author

From the chart, it's clear that all three indicators are addressed with comparable emphasis. In 2015, the social dimension was first presented, and by 2016, academics were talking about all three aspects. Indicators pertaining to fair wealth distribution, long-term financial stability, and value creation for all stakeholders are becoming more popular in the economic sphere, even though profitability is still important.

From an investment attractiveness perspective, the assessment of the TBL refines the understanding of Environmental, Social, and Economic dimensions of sustainability. Table 10 shows TBL indicators, including energy sector indicators: Environmental - 63 Indicators (20 energy sector), Social - 62 Indicators (13 energy sector) and Economic - 56 Indicators (9 energy sector).

Table 10
TBL Performances for O&G Firms

Topic	Environmental Performances	Year
Triple bottom line analysis of oil and gas industry with multicriteria decision making	Direct energy consumption discriminated by primary energy source	2023
	Total water withdrawal by source	
	Total direct emissions of greenhouse gases per weight	
	Total indirect emissions of greenhouse gases per weight	
	SOx, by type and weight	
	NOx, by type and weight	
	Total water discharge by quality and destination	
	Waste total weight	
	Total volume of significant spills	
	Total investments and expenditures in environmental protection by type	
Carbon market maturity analysis with an integrated multi-criteria decision-making method: A case study of EU and China	GHG emission	2019
	Covered GHG ratio	
	Covered GHG emission	
	Carbon market access threshold	
Industry 4.0 enabling sustainable supply chain development in the renewable energy sector: A multi-criteria intelligent approach	RE target share gap	2022
	PV target share	
	GHG emission reduction	
	Recycling rate	

	Disposal green policies	
	Technology for disposal	
Topic	Social Performances	Year
Triple bottom line analysis of oil and gas industry with multicriteria decision making	Total workforce by employment type, employment contract and region	2023
	Rates of work-related deaths	
	Rates of work-related occupational illnesses by region	
Environmental improvement initiatives in the coal mining industry: maximisation of the triple bottom line	Community contributions	2019
Carbon market maturity analysis with an integrated multi-criteria decision-making method: A case study of EU and China	Government policies	2019
	Monitoring, Reporting, Verification	
	Influence on corporate carbon strategies	
Industry 4.0 enabling sustainable supply chain development in the renewable energy sector: A multi-criteria intelligent approach	Employment and job opportunities	2022
	Wage level	
	Gender employment gap	
	Stakeholders influence	
	Social acceptability	
	Population growth rate	
Topic	Economic Performances	Year
Triple bottom line analysis of oil and gas industry with multicriteria decision making	Total production	2023
	Development and impact of investments	
Environmental improvement initiatives in the coal mining industry: maximisation of the triple bottom line	Revenue	2019
	Pre-tax profits	
	Revenue per GHG	
Carbon market maturity analysis with an integrated multi-criteria decision making method: A case study of EU and China	Covered industry amount	2019
	Covered emissions entities	
	Institution investor participation	
	Transaction mode amount	
	Trading goods type amount	
	Allowance trading volume	
	Non-trading days	
	Average price	
	Trading volume of CER or CCER	
	Transaction concentration	
	Turnover	
	Compliance rate	
	Carbon financial products amount	
Industry 4.0 enabling sustainable supply chain development in the renewable energy sector: A multi-criteria intelligent approach	Feed-in-tariff	2022
	R&D government support	
	Energy sales	
	Sourcing costs	
	Upfront costs	
	O&M costs	
	Cost of capital	
	Country risk premium	
	Long-term gov. bond yield 10-year	

The TBL indicators include energy sector dimensions which demonstrate the essential position of the sector for assessing economic sustainability and E/S. The integrated approach demonstrates the critical position of the energy sector in sustainable development and decision-making processes because it requires complete assessments for long-term growth and responsible development (Tarnanidis et al., 2017). The research study demonstrates how the TBL framework determines contemporary investment planning approaches.

The research provides a complete understanding of sustainability determinants to help businesses and investors create a sustainable future that unites financial success with environmental protection of the environment and social progress. The paper examines the possible drawbacks of using TBL for investment attractiveness assessment while pointing out its weak points and necessary modifications:

1. Measurement Challenges: Quantifying Non-Financial Metrics The main weakness of TBL stems from its inability to establish standardized measurement systems for non-financial indicators which include environmental effects and social results (Ozbekler & Ozturkoglu, 2019). The measurement of E/S indicators faces challenges because they do not have standardized definitions which makes it difficult to perform cross-company assessments. The reporting of carbon emissions depends on the selected scope and methodology yet social impact assessments remain based on subjective and qualitative data. The lack of standard reporting methods between firms and regions makes it difficult to obtain dependable TBL assessment data. The limited resources of small O&G firms prevent them from producing complete and unbiased sustainability reports. The process of converting environmental and social results into financial values continues to be a major obstacle.

2. Trade-offs between Dimensions. The TBL framework depends on firms achieving equilibrium between their economic performance and their social and environmental results. The three performance dimensions of TBL frequently produce conflicting results when Firms operate in resource-intensive sectors including O&G (Haffar & Searcy, 2015). The implementation of renewable energy systems and emission reduction technologies requires substantial initial investments which reduce short-term financial gains thus creating conflicts between economic and environmental performance goals. Environmental initiatives that restrict resource extraction in specific areas might lead to negative impacts on local communities who rely on these activities for work and economic stability and firms tend to focus on one dimension at the expense of others because of stakeholder influence and regulatory needs which disrupts TBL performance balance.

3. Subjectivity in Assessing Social and Environmental Performance. The social and environmental aspects of TBL face criticism because they contain subjective elements which create challenges for developing standardized performance benchmarks (Aigbedo, 2021). Social performance assessment includes multiple complex qualitative elements which focus on community relations and employee welfare and human rights compliance (Alonso-Martinez, 2021).

4. Limited Industry-Specific Adaptation. The application of TBL faces criticism because it lacks tailored solutions for industry-specific problems which are particularly evident in the O&G sector due to its complex sustainability requirements. The O&G sector faces challenges in environmental progress because its fundamental dependence on fossil fuels requires major business model changes to achieve meaningful sustainability progress. The TBL framework fails to recognise the particular barriers and compromises that occur during business model transformations (Haffar & Searcy, 2015).

The O&G industry operates across multiple geographical areas which present different environmental conditions and social frameworks and regulatory systems. A standardized TBL framework might not effectively handle regional differences because it does not consider local community standards or national environmental regulations. The implementation of TBL requires methodological improvements and proper execution to address its recognised weaknesses.

The development of standardized E/S metrics will enhance TBL assessment reliability and enable better comparison between Firms. The combination of TBL with financial assessment tools becomes more effective through improved compatibility. Stakeholder participation in TBL metric definition and priority setting helps minimise subjective

assessments while matching expectations from different groups. The TBL framework needs adaptation to handle O&G sector-specific issues including emission levels and regional differences to boost its effectiveness.

3.4.1 Sector-Specific Adaptation

The O&G sector operates under specific operational and strategic characteristics which affect business results and investment appeal. The sector features three main characteristics which include extended project durations and high capital requirements and substantial geopolitical uncertainties (Zhang, 2019). The TBL framework needs specific adjustments for the O&G sector to deliver accurate investment attractiveness assessments because of its unique operational characteristics.

The typical O&G project duration reaches multiple years because it includes exploration and development stages followed by production and decommissioning phases which can last for decades. The long duration of projects requires Firms to maintain continuous funding while handling risks and creating extended strategic plans (Infante et al., 2013). The TBL framework evaluates long project durations through its focus on enduring economic results and responsible environmental practices and social accountability. The selected TBL metrics span the complete project duration to demonstrate sustainability and project viability. The evaluation of ROI and NPV and IRR uses a time frame that extends beyond short-term periods.

The ability to generate financial stability and achieve profitability during long periods is vital for maintaining active projects (Gelhard & Delf, 2016). The evaluation of environmental impact through lifecycle assessments (LCAs) includes total GHG emissions and resource consumption and ecological damage throughout the project duration. The implementation of long-term environmental planning helps Firms follow new regulations and prevents major environmental accidents.

The assessment of long-term social effects includes evaluations of community growth and job security and health and safety protocols. The success of CSR initiatives and community engagement programs depends on their ability to create and maintain positive stakeholder relationships from project start to finish (Clark & Viehs, 2014). The initial phase of O&G projects demands major financial resources for exploration activities and drilling operations and infrastructure construction and technology deployment.

The high capital requirements of O&G projects need Firms to handle their funds efficiently while managing risks and maintaining financial stability (Albert, 2022). The TBL framework supports high capital-intensive operations through financial performance evaluation alongside sustainability indicators that help maximize capital utilization while upholding environmental and social requirements. The assessment of financial health and investment management capabilities depends on two essential capital efficiency metrics: Capital Expenditure (CapEx) efficiency and Debt-to-Equity ratios. The evaluation of sustainable technologies including carbon capture and storage (CCS) and energy-efficient systems focuses on their financial viability and enduring environmental advantages.

The framework evaluates capital investments based on their social sustainability value through workforce development and community advantages and labour standard compliance (He et al., 2017). BP dedicates substantial funding to CCS technology development for lowering its environmental impact. BP conducts thorough financial analysis of CCS projects through ROI and NPV calculations to verify their long-term financial value despite their expensive initial costs. The environmental metrics measure how well CCS technology performs in emission reduction and its ability to fulfil BP's sustainability objectives.

BP conducts social impact assessments of CCS projects to determine their effects on engineering and technical employment and their support for environmental conservation programs in local communities. The O&G industry faces substantial geopolitical risks because of political turbulence and regulatory shifts and trade barriers and international disputes. The viability of projects and operational continuity and investment returns face substantial threats from these risks. The TBL framework handles geopolitical risks by implementing risk management approaches throughout its dimensions while promoting Organisational flexibility and stability (Xu et al., 2019).

To illustrate, the adaptation of TBL in the O&G sector can employ explicit sector-relevant indicators. For example, environmental performance can be tracked using methane intensity (kg CH_4 per boe produced) and flaring incidence (volume of gas flared per unit of production), both of which directly capture lifecycle emissions risks. On the financial side, decommissioning obligations can be assessed through a decommissioning liabilities coverage ratio, which evaluates whether firms maintain adequate provisions to meet future asset retirement obligations. These tailored metrics ensure that the TBL framework reflects the distinctive operational and sustainability challenges of O&G operations.

The assessment includes two risk-related metrics which measure geopolitical exposure through country risk premiums and portfolio diversification into stable geographical areas. Firms need to follow international environmental standards and show flexibility when dealing with changing regulations that exist across different geopolitical areas (Anbarasan & Sushil, 2018). The framework determines how Firms can uphold their environmental responsibilities when facing changes in geopolitical conditions. The framework determines how well the company handles stakeholder relationships across different geopolitical areas to preserve social stability and prevent conflicts.

Shell maintains operations throughout areas which experience different levels of political stability and regulatory systems. Shell evaluates how geopolitical risks affect its investments through scenario planning and contingency strategies to protect its financial outcomes. Even when operating in regions with lax legislative frameworks, Shell maintains its global sustainability goals by adhering to international standards for environmental practices. In order to minimise social disputes and preserve operational stability during periods of geopolitical uncertainty, Shell cultivates strong partnerships with local governments and people.

3.4.2 Dynamic Interactions

The financial stability and strategic decision-making processes of O&G firms experience direct effects from oil price volatility. The TBL framework (Wang et al., 2019) identifies economic performance as a vital element because supply-demand imbalances and geopolitical events and macroeconomic factors create price volatility. The TBL framework promotes firms to create multiple revenue streams through renewable energy investments and service development which helps them reduce their exposure to oil price volatility.

The framework helps businesses maintain profitability through cost optimisation and operational efficiency and capital intensity management when oil prices decrease. The evaluation of economic performance through oil price simulations enables businesses to assess their market-related threats and business prospects across various market scenarios (Kucukvar et al., 2014). Firms use cost-cutting initiatives during periods of low oil prices to build financial strength which enables them to fund sustainable development projects and technological advancements. The investments made through these initiatives strengthen market standing and increase investor trust which generates a positive feedback loop (Cubas-Díaz & Sedano, 2017).

Firms use market volatility to select projects with lower production costs and develop flexible pricing methods. The combination of economic and environmental performance leads to these business behaviors. The 2020 oil price collapse led BP to speed up its investments in renewable energy projects and low-carbon technology development. BP achieved better financial stability and ESG investor interest through its economic strategy integration with environmental targets which proved the TBL framework's ability to handle volatile market situations.

The TBL framework provides Firms with a useful framework to evaluate investment potential but its use in investment settings requires specific handling of obstacles. The implementation of TBL principles requires specific adjustments because of measurement obstacles and conflicting priorities between different performance indicators. The framework continues to serve as a strong instrument for sustainability-focused investment decision-making despite its weaknesses because it can be customized for the O&G industry.

The research investigates ways to enhance TBL evaluation methods for investment attractiveness while developing practical solutions for O&G firms and investors. The implementation of renewable energy technologies through investments leads to lower carbon emissions and reduced operational expenses which results in better financial performance. The financial gains from environmental innovations stem from improved operational performance which results from social and economic improvements.

The financial performance of a company improves when it invests in community development because this leads to better operational efficiency and profitability. The strong bonds between the company and its community enable joint environmental projects that boost brand image and help the company follow environmental regulations. The TBL framework achieves equilibrium between different priorities through its unified structure of three dimensions. The implementation of environmental initiatives at first requires financial investments but firms can obtain regulatory benefits and public backing to achieve social and economic advantages.

The TBL framework produces new behaviours because its three core elements and outside factors create continuous interactions (Matthews et al., 2019). The strategic advantage of O&G firms stems from their ability to predict environmental changes through these behaviours which help them stay ahead of market developments. The O&G industry now dedicates funds to renewable energy projects because these investments serve both environmental and economic goals.

The combination of market requirements and public sentiment and regulatory requirements lead to new behaviours that support sustainable development goals. As a leader in the shift to renewable energy, TotalEnergies leverages its market expertise to grow its solar and wind energy businesses. Businesses that implement integrated sustainability are better able to withstand changes in the market and in regulations.

Firms that use the TBL framework gain better ability to detect external disruptions which enables them to minimise operational expenses and investment risks (Kucukvar et al., 2014). The diversified energy assets of Equinor including offshore wind farms prove how new resilience behaviors help businesses maintain stability and achieve long-term growth. The achievement of TBL targets depends on stakeholder partnerships between Firms and their governments and NGOs and technology firms. The alliances produce mutual value while minimizing potential risks.

BP works with Lightsource BP to demonstrate how firms can use alliances to meet sustainability targets and enter new markets through emergent behavior. Firms that perform scenario analysis across economic and environmental and social factors develop preparedness for upcoming market transformations and regulatory shifts and societal developments.

The measurement tools for each TBL segment need periodic updates to track new market developments such as carbon market growth and rising social priorities about diversity and inclusion. The framework maintains its relevance through stakeholder diversity because it adapts to external demands and constraints. The TBL framework provides a comprehensive evaluation system for economic and E/S which makes it useful for various stakeholders within the O&G industry (Infante et al., 2013). The TBL framework enables investors and regulators and O&G executives to make sustainable decisions through its framework which helps them achieve their goals while maintaining profitability and environmental protection and social accountability (Table 11).

Table 11
TBL Framework Decision-Making for the Stakeholders

Stakeholders	Decision-making	Example
Investors	In order to assess the sustainability and long-term viability of their assets, investors look for trustworthy frameworks. The TBL framework gives them the means to evaluate performance, opportunities, and risks in a comprehensive manner.	The framework enables sustainable investment funds to follow ESG-focused investment mandates by selecting O&G firms which demonstrate leadership through renewable energy projects and innovative sustainability programs.
Regulators	The regulatory bodies monitor sustainability law compliance and simultaneously promote better social and environmental practices across all industries. The TBL framework enables Firms to evaluate legal compliance through systematic assessment and detect areas that need additional oversight.	The TBL data enables regulators to create reward systems that compensate O&G firms for their work on community development projects and their efforts to decrease their emission levels.
O&G Executives	O&G leaders need to achieve operational sustainability and profitability goals to meet stakeholder expectations. The TBL framework delivers essential data which helps Firms make better strategic and operational planning choices.	Executive teams can use TBL data to enhance manufacturing plant energy efficiency which results in cost savings and better environmental outcomes.
Cross-Stakeholder Collaboration	The TBL framework enables stakeholder collaboration through its standardized performance metrics and common language for assessment. The O&G business requires coordinated efforts to handle its intricate sustainability issues.	The development of sector-specific sustainability guidelines with TBL best practices under corporate executive guidance will help regulators create standards that all stakeholders can accept.

The TBL framework provides an effective method to implement sustainability practices in the O&G sector which helps stakeholders make decisions that support enduring environmental and social and economic targets. The TBL framework enables investors to make better decisions through performance evaluation and regulators to create effective policies while executives can develop sustainable growth strategies. The TBL framework enables cross-

stakeholder collaboration to address sustainability's interconnected elements which results in a resilient and competitive O&G sector that meets worldwide sustainability targets.

3.4.3 Critical Gaps and Future Extensions

While the TBL framework offers a comprehensive approach to evaluating investment attractiveness by integrating economic, environmental, and social dimensions, evolving sustainability priorities and technological advancements necessitate further refinement. Addressing these gaps will ensure that the framework remains relevant and robust in increasingly dynamic and complex industries. Table 12 shows critical gaps:

Table 12
Critical Gaps

		Current Limitation	Proposed Refinement
Integration of New Sustainability Dimensions	Biodiversity and Ecosystem Services	The environmental section of the framework emphasizes emissions and energy efficiency and resource utilization but fails to recognise biodiversity and ecosystem services as essential elements.	The report should include metrics which measure habitat restoration together with species conservation programs and biodiversity offsetting and ecosystem health evaluation methods. The mentioned metrics apply specifically to O&G and mining and agricultural sectors because these industries frequently disrupt environmentally critical regions.
	Water Security	Most TBL frameworks fail to include water management and usage as essential sustainability factors because they affect sectors with substantial water consumption.	The assessment should include measurements for water extraction rates and wastewater management practices and local water consumption standards.
	Circular Economy	The environmental dimension fails to measure the complete advantages of circular economy principles which include waste reduction and recycling and resource optimisation.	The assessment includes metrics to evaluate resource recovery performance and lifecycle assessment results and recycled material implementation rates.
Adaptation to Clean Energy Advancements	Emerging Technologies	The framework does not include specific evaluation criteria for tracking the implementation of new clean energy solutions like hydrogen fuel and CCS and advanced battery storage systems.	The development of technology-specific indicators should focus on measuring R&D spending and clean energy technology scalability and operational effects.

	Energy Transition Preparedness	The existing framework fails to provide sufficient measures for tracking the transition process from fossil fuels to renewable energy systems.	The assessment system should include future-oriented metrics which evaluate renewable energy resource variety and transition funding and sustainability target achievement.
Addressing Evolving Stakeholder Expectations	Indigenous and Local Communities	The current social metrics fail to recognise the unique requirements and rights of indigenous and local communities who experience industrial impacts.	The assessment system should include performance indicators that measure fair resource distribution to match evolving global standards including biodiversity protection agreements and enhanced carbon emission targets.
	Dynamic Regulatory Landscapes	The use of static metrics creates a mismatch between established performance indicators and the evolving nature of regulatory frameworks and stakeholder requirements.	The report should use standardized and protect cultural heritage and successful community engagement practices.
Enhancing Data Standardization and Technological Integration	Data Inconsistency	The inconsistent methods firms use to report environmental and social data create challenges for comparing their performance across different Firms.	The system should use adaptable metrics which receive periodic updates reporting systems like GRI and CDP and firms must undergo third-party audits for verification purposes.
	Digital Transformation	The framework lacks the ability to use real-time data which AI and big data analytics provide.	The framework needs digital tools for real-time monitoring and predictive analytics and scenario modelling to improve the precision and reliability of sustainability assessments.

Extending and refining the TBL framework provides fertile ground for future research, especially as industries and markets evolve toward greater sustainability. Table 13 shows future extensions:

Table 13
Future Extensions

		Rationale	Research Focus
Incorporating Cross-Sectoral Applications	Supply Chain Sustainability	The total effect of supply chain operations on sustainability results demonstrates substantial influence throughout different business sectors.	The framework needs expansion to assess the complete sustainability of supply chains from resource extraction through to waste disposal operations.

	Renewable Energy Sector	The growing renewable energy sector requires assessment of its dual environmental and social consequences which include battery-related rare earth mining operations.	The framework must include performance metrics that measure renewable technology life cycles from production to disposal while also evaluating supply chain visibility.
Advancing Longitudinal and Comparative Studies	Longitudinal Analysis	The tracking of TBL performance development through time reveals extended effects of sustainability programs.	The research should track how Firms that sustain their TBL improvements affect their financial results and market value and stakeholder confidence levels.
	Cross-Industry Comparisons	Research studies enable Firms to discover optimal sustainability practices and identify unique obstacles which different sectors face when using the TBL framework.	The research evaluates TBL performance between agricultural and manufacturing and financial services sectors to discover applicable knowledge.
Enhancing Stakeholder-Centric Perspectives	Investor Decision-Making	Investors show rising interest in ESG criteria yet they need universal evaluation methods to assess sustainability performance between businesses.	The system will create an investor-focused TBL scoring framework which unifies financial metrics with non-financial indicators to support investment choices.
	Community Engagement	The social effects of corporate operations require thorough comprehension because they determine both stakeholder support and business operational achievement.	The TBL framework assesses community engagement methods and their ability to boost investment appeal.
Leveraging Technological Innovations	AI and Big Data	Sustainability assessments become more precise and detailed through the implementation of advanced analytical methods.	AI-based tools need evaluation for their ability to track TBL performance in real-time and create predictive models and perform scenario analysis.
	Blockchain for Transparency	The implementation of blockchain technology enables Firms to achieve better supply chain visibility and product origin tracking.	The TBL framework requires blockchain integration for better data reporting reliability and accountability through enhanced data verification processes.

The TBL framework needs specific solutions to handle its operational challenges which will maintain its effectiveness for modern sustainability needs and industrial complexities. The lack of standardization in environmental and social metric reporting between firms prevents stakeholders from making accurate cross-company comparisons. The framework supports firms to use standardized reporting methods which follow EU Green Deal and UN SDG requirements.

The implementation of standardized metrics creates reliable data that enables stakeholders to trust the information and build transparency. The verification process of reported data by third parties through open-access platforms for sustainability metrics will

boost both accountability and accessibility. The framework lacks sufficient metrics to measure essential sustainability aspects which include biodiversity protection and water resource management and circular economy practices.

The framework requires additional metrics which measure habitat restoration efforts and water efficiency and resource recovery performance to address current gaps. The framework becomes more complete when it includes lifecycle assessments and ecosystem health indicators because these measurements benefit high-impact sectors including O&G and mining and construction. The framework needs to evolve through updates that reflect clean energy progress and changing regulatory frameworks.

The TBL framework will achieve global climate goals through the addition of metrics for hydrogen fuel and CCS technology and predictive indicators for energy transition readiness. The framework needs adaptive metrics which should track changes in regulatory frameworks including new emission standards and biodiversity protection agreements. The combination of AI systems with big data platforms and blockchain technology enables sustainability assessments to achieve better precision and detailed measurement results.

The framework becomes more reliable through real-time monitoring systems and predictive analytics and blockchain-based traceability solutions. The TBL framework will continue to serve as a leading sustainability tool for investment decision-making through the implementation of these solutions across various fast-changing industries. The TBL framework maintains its effectiveness through updates which add biodiversity and circular economy elements and clean energy technology integration.

Research should concentrate on three main areas: expanding the framework to mining and construction sectors and developing cross-industry applications and using technology to enhance data precision and business decision quality. The TBL framework will achieve enhanced power for sustainability promotion through industry-wide implementation when it receives targeted improvements for better investment and operational strategy development.

3.5 Synthesis and Implications for Methodology

The TBL framework enables researchers to evaluate European O&G firms through its three core dimensions of economic performance and environmental sustainability and social responsibility. The following section combines all TBL framework elements from previous sections to explain their role in determining research methodology. The TBL framework enables researchers to conduct a complete analysis of investment choices because it combines multiple performance dimensions in a single framework.

The TBL framework requires a methodological system which measures both quantitative and qualitative performance indicators because it assesses. The research combines quantitative financial data with sustainability metrics and qualitative company report analysis and stakeholder evaluation to achieve complete investment attractiveness assessment. The chapter reviewed existing literature to determine how TBL indicators affect investment attractiveness. The TBL framework consisting of economic and environmental and social dimensions has become essential for analyzing investment decisions. The research examines social and environmental strategies' impact on investor appeal through a comprehensive evaluation of existing academic literature.

Research demonstrated the requirement for standardized TBL metrics but also revealed the difficulties of implementing these measures. The economic indicators now combine financial performance metrics with environmental and social responsibility elements according to Gu and Wang (2022). The implementation of sustainable practices by firms leads to enduring financial stability which investors find essential. The review demonstrates that environmental

indicators now serve as essential factors which influence how investors choose their investments.

The worldwide focus on climate change and ecological preservation has made firms accountable for their environmental actions (Yee et al., 2021). The sustainability and investment appeal of these firms depends heavily on their performance in carbon footprint management and water conservation and waste disposal practices. Social indicators which include community involvement and worker protection and corporate governance standards have proven essential for determining a company's market appeal (Tate & Bail, 2016). Firms which show dedication to social causes create better operational conditions while attracting investors who value ethical practices.

The review demonstrates that these indicators function as interconnected elements. The review Analysed how TBL's three dimensions interact with each other to affect sustainable investment decisions (Aigbedo, 2021). The research demonstrated that investment attractiveness exists as a complex system which depends heavily on Firms upholding multiple values and responsibilities. Research demonstrates how the TBL framework enables stakeholders to connect with corporations while solving sustainability complexities which leads to better responsible investment choices.

The current theoretical studies focus on individual TBL dimensions without developing complete frameworks that unite these elements. The separate evaluation of TBL dimensions in research studies prevents researchers from accurately measuring their combined effect on investment attractiveness. The research on specific sectors remains limited because it focuses mainly on industries that generate major environmental and social effects. Review examined TBL theory performance both in theoretical frameworks and practical applications. The studies' results and their practical effects helped me determine how the theory performs in real-world scenarios across different business sectors and environments.

The research methodology combined thematic keyword analysis with TBL theory performance assessment to deliver a complete overview of current studies. The research revealed which topics attract most academic interest and which need additional investigation to determine future sustainable development research directions. The literature review provides essential knowledge about the TBL framework and sustainable management research field.

The TBL framework serves as a fundamental tool for complete investment attractiveness evaluation because it assesses firms through economic performance and environmental impact and social responsibility. The review shows investors closely monitor environmental performance of firms which operate in industries that create major ecological damage such as O&G. The research provides essential knowledge which helps scholars and practitioners create sustainable development-oriented strategies and policies. The research provides a complete method to evaluate TBL performance and investment attractiveness which leads to better sustainable business practices.

The TBL framework enables Firms to merge financial performance indicators with sustainability metrics which results in complete investment attractiveness evaluation. The main data sources for this research include annual financial statements and sustainability reports and ESG disclosures and industry benchmarks and regulatory documents. The evaluation process combines financial performance data with environmental and social metrics to determine their connectedness.

The process of data integration demands Firms to build a single assessment system which merges financial records with sustainability indicators. A scoring system has been implemented to create a standardized method for TBL metric evaluation which enables Firms to compare their performance across different sectors and firms. The TBL framework enables complete investment attractiveness assessment of European O&G firms through a sample evaluation process which enables performance comparison.

The evaluation process assesses firms through their performance against typical industry benchmarks and their implementation of best TBL practices. A ranking system has been created to determine which firms excel in TBL performance while showing which ones trail behind so investors can make informed decisions. The research uses statistical benchmarking and thematic analysis of sustainability initiatives to perform quantitative and qualitative assessments. The evaluation system uses this method to determine how firms perform relative to their competitors in the market.

The TBL framework focuses on enduring value generation which demands the methodology to evaluate indicators and strategies that focus on upcoming periods. The evaluation framework includes future market developments and regulatory changes and renewable energy transitions to determine firms' readiness for enduring business success. The evaluation process examines corporate strategies for energy transition and emissions reduction and stakeholder engagement through qualitative assessment to determine their TBL principle compliance.

The research methodology uses scenario planning and content analysis of sustainability strategies to evaluate both present-day performance and future business prospects. The TBL framework supports various stakeholder groups including investors and regulators and employees and communities, so the methodology needs to handle their distinct interests. The research examines how stakeholders view E/S through their expectations. The research depends on transparent data collection methods which use ESG ratings from third-party providers and official regulatory documents to guarantee data accuracy.

The research design incorporates stakeholder-focused methods which guarantee that all relevant parties' priorities receive proper representation in the analysis. The research uses stakeholder interviews and community impact report analysis as qualitative methods to achieve this goal. The research methods in this study were shaped by TBL implementation difficulties which include data inconsistencies and subjective evaluations. Standardised metrics and scoring criteria help minimise the differences found in environmental and social data measurements.

The research uses financial reports together with ESG disclosures and industry benchmarks to create reliable findings. The study performs sensitivity analysis to understand how different TBL dimension priorities affect business outcomes through the evaluation of profitability versus emissions reduction trade-offs. The research design combines standardized methods with data verification techniques and sensitivity tests to develop an evaluation system that maintains both precision and flexibility. The combination of TBL elements leads to the development of a complete assessment system which evaluates investment potential in the O&G industry.

A weighted scoring system combines economic and E/S indicators to generate an investment attractiveness index. The TBL performance data is presented through dashboards and charts which help users understand the differences between various O&G firms. The scoring system and visualization tools make the framework easy to understand for investors and stakeholders who can use it to make decisions based on TBL principles.

The TBL framework unites with investment analysis to establish a methodological structure which merges financial data with sustainability indicators into one unified assessment system. The methodology evaluates investment attractiveness through a complete assessment of economic performance and environmental and social aspects in a complete and unified manner. The research methodology aligns with investor and stakeholder expectations by providing specific recommendations for European O&G firms to improve their TBL performance and market investment appeal. The study establishes a methodologically sound framework for TBL application in sustainability-focused investment analysis through its combination of rigorous methods and stakeholder-focused approach.

Chapter 4: Methodology

4.1 Research Design

The research design of this study uses pragmatism as its paradigm because it enables researchers to integrate qualitative and quantitative methods for studying investment evaluation from both theoretical and practical perspectives. The research method depends on empirical data interaction with practical settings to generate knowledge instead of using a single philosophical framework. The pragmatist approach enables the study to use its mixed-method design which combines financial data evaluation with qualitative sustainability assessments to understand the complete investment value potential in the O&G industry. The complete philosophical framework of this study appears in Appendix I.

This study adopts a quantitative-qualitative approach comprising four main stages. Details of the stages are presented in Figure 9. The research will follow a convergent design, specifically a QUANT-QUAL approach, where qualitative findings inform the subsequent quantitative phase (Creswell & Plano Clark, 2011). In a convergent design, quantitative and qualitative data are collected and analysed separately but integrated during interpretation to offer a comprehensive understanding of the research problem. As Tashakkori (2015) notes, convergent designs allow researchers to refine research questions dynamically and generate new insights through the integration of different data strands.

The research design of this study uses a Convergent Mixed Methods Design (QUANT-QUAL) to evaluate the investment appeal of European O&G firms from multiple angles. The research problem's complex nature with its three TBL pillars of economic performance and environmental sustainability and social responsibility requires this specific methodological approach. The research problem requires more than statistical models because quantitative methods alone fail to measure social and environmental sustainability factors which affect investment attractiveness.

The analysis of financial ratios and regression models shows economic performance but fails to explain the reasons behind stakeholder dialogue participation and sustainability disclosure practices of firms. The research design uses a Convergent Mixed Methods Design (QUANT-QUAL) to evaluate European O&G firms' investment appeal through a complete assessment. The research problem's complex nature with its three TBL pillars of economic performance and environmental sustainability and social responsibility requires this specific methodological approach.

The research requires more than statistical models to establish patterns because quantitative methods fail to measure the detailed social and environmental sustainability factors which affect investment attractiveness. The analysis of financial ratios and regression models shows economic performance but fails to explain the methods firms use to interact with stakeholders and present sustainability information in their disclosures. The analysis of sustainability reports and interviews through thematic interviews provides deep contextual understanding but fails to deliver the quantitative data needed for investor and policy maker decision support.

The absence of numerical performance indicators and measurable results makes it impossible to establish a solid foundation for investment choices. The convergent QUANT-QUAL design offers a solution that combines quantitative and qualitative research methods in a single study. The research design allows for:

1. The research collects and Analyses quantitative and qualitative data independently to maintain methodological integrity while preventing data contamination between the two approaches.

2. The interpretation stage combines different data sources through triangulation to enhance validity by uniting regression outputs with stakeholder insights.

3. The research variables receive dynamic improvement through interview-based insights which guide the development of the scoring model for the quantitative ranking process.

4. The TBL framework demands researchers to study economic performance alongside environmental and social aspects simultaneously. The convergent approach suits this research better than sequential or explanatory mixed methods because it enables the creation of an integrated IAM that combines financial data with stakeholder opinions.

The research design enables flexible data analysis which allows the study to track new themes and confirm results between different data types for a complete understanding. The research will conduct semi-structured interviews with annual and sustainability reporting officials from designated firms after finishing the first stage (Edmonds & Kennedy, 2017).

The interview data help to interpret and contextualise the quantitative findings, providing deeper insights and triangulation rather than serving as a basis for a subsequent quantitative phase. The interview results from stage three will guide the development of new indicators and variable refinement to create a structured scoring model. The fourth stage requires researchers to Analyse all available data sources which include sustainability reports and financial documents and interview responses. The fourth stage combines qualitative and quantitative data to produce complete findings about investment attractiveness. The ranking method will be used to link and interpret the combined data which will produce inferences based on a complete and methodologically correct process.

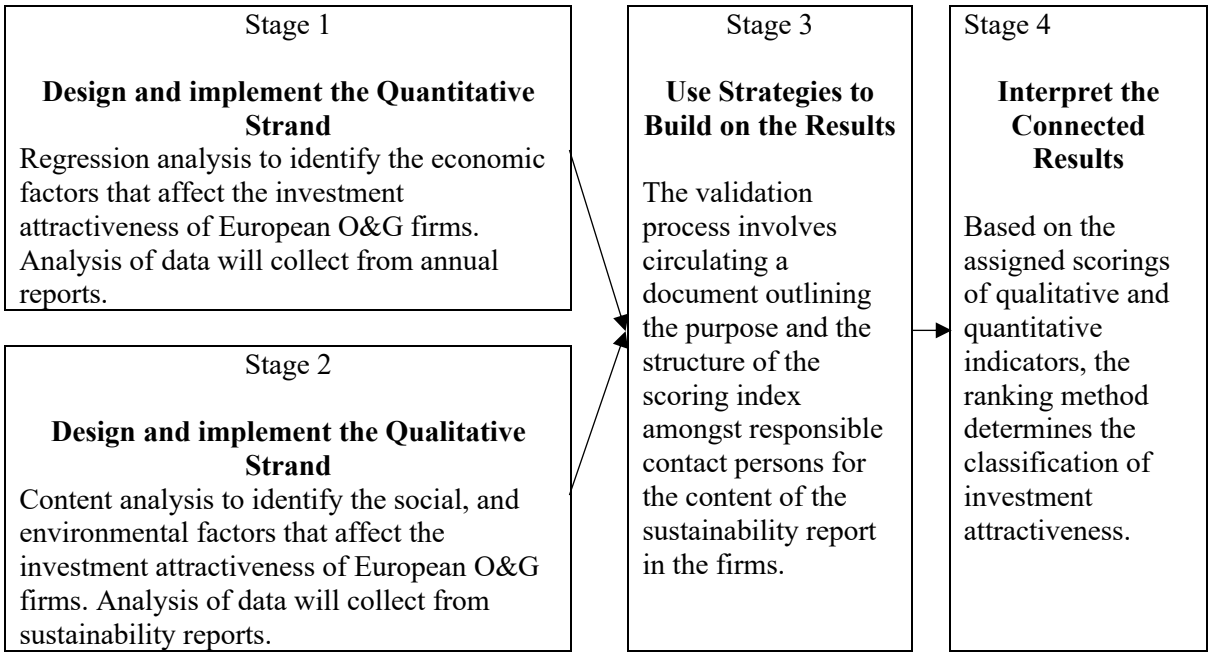


Fig. 9. Exploratory Convergent Method design Source: Creswell, 2018 was adopted by the author.

Stage One: Quantitative Study (Regression method) The research applies regression analysis to determine which economic elements from the TBL theory influence the investment appeal of European O&G businesses. The research obtained its data from eleven primary information sources. The research uses European businesses from UK, France, Finland, Italy, Norway, Spain and Germany based on Fortune Database data for its empirical research. The study period from 2015 to 2024 received annual reports from participating firms.

The European Union member states use International Financial Reporting Standards (IFRS) which the European Union has approved for preparing consolidated financial statements of listed firms operating within their territories. (UNCTAD, 2008) The International Federation of Accountants (IFAC) surveyed leading accountants who confirmed that universal international standards promote economic development (Atabey, 2014). The annual report serves as the main information source for Firms' relevant public stakeholders (Neu, 1998) because firms must issue this document as a statutory requirement (Gray, 1995). The annual reports serve as trustworthy information sources (Tilt, 1994) because each company issues one report annually (Unerman, 2000).

The research uses multiple reports from the same company to study development trends across time for individual firms and throughout the European energy sector. The researchers processed 6,237 calculated ratios for analysis. The research established numerical values for each financial ratio indicator and assigned corresponding codes to these values. Stage Two: Qualitative Study (Context method) The research uses content analysis to discover social and environmental elements from the TBL framework which impact European O&G firms' investment attractiveness.

The research draws its data from eleven primary sources. The Fortune Database serves as the basis to select European firms for empirical research purposes. The research included firms that published annual reports and maintained at least 110 sustainability reports throughout the 2015-2024 period. The research used 11 European businesses as its final sample. The researchers studied 3520 social and environmental elements from the data. A total of 110 European O&G company sustainability reports were selected for text-based analysis. The research data collection process uses firms as its main observation units.

The Sustainability Disclosure Database provides standalone web-based sustainability reports from all firms which researchers can access through its publicly accessible platform. The research uses stratified sampling were industry sectors function as separate strata. The research focuses on European O&G firms because these businesses share uniform understanding of policies and operational practices. The selected countries appear frequently in similar research studies (Soana, 2011) which enables researchers to perform comparative analysis with existing literature.

The research method faces criticism because it selects a non-representative population which limits the ability to generate findings applicable to a global context. The 11 firms represent a stratified sample that draws from the Sustainability Disclosure database's defined target population. The research population is well represented by the sample data which enables researchers to apply the study findings to other contexts. The research analyses multiple reports from one company during this research phase to track performance evolution at both the company level and the European energy sector level. The coding scheme receives my design before the research starts the coding process.

The content analysis process requires a coding scheme development framework according to Weber (1990) which helps researchers address ratter bias during this critical stage. Stage Three: Qualitative Study (Interview) A validation process will precede the application of the scoring index to evaluate sustainability reports from the selected sample. The scoring index document will be distributed to sustainability content handlers at each company for review of its purpose and structure and intended use.

The identification process for contact persons follows the requirements of Point 3.4 in the Global Reporting Initiative (GRI) framework (GRI, 2006) which mandates firms to reveal their contact details for report-related inquiries. The inclusion of contact information within the scoring system proves suitable because it makes reports more transparent and credible. The company demonstrates its commitment to stakeholder engagement through direct contact

which builds trust between stakeholders and enhances accountability. The validation process includes seven predetermined questions (Appendix II).

The scoring tool will undergo revisions based on all received feedback and comments to guarantee that the quality dimensions included are complete and reasonable and do not contain major omissions. Stage Four: Quantitative Study (Ranking method) The last step requires developing an IAM (IAM) for European O&G firms. The research will use a mixed-method approach to combine (a) sustainability report data from the first stage with (b) economic data extracted from annual reports. The TBL theory includes 3520 social and environmental factors and 6,237 economic factors and 9757 total factors which the research will analyse.

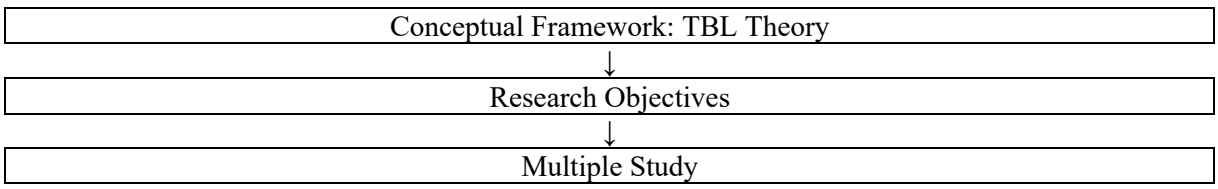
The IAM development process uses scoring results from qualitative and quantitative indicators to establish investment attractiveness rankings through the ranking method. The scoring index development for reporting quality assessment starts with identifying and specifying all quality principles which will be included in the index. The qualitative method requires me to study non-financial documents through context analysis and validation procedures which include sharing the scoring index document with responsible personnel who manage sustainability report content at their firms.

The quantitative method requires financial document analysis through regression analysis. The analysis of economic dimensions uses group ratios as my selection method. The researcher obtains sustainability and Annual reports through website downloads from individual company websites. The datasets received a ranking-based connection to link them together. The TBL framework directly shapes the research methodology to produce a comprehensive method for evaluating investment attractiveness.

The framework determines data collection approaches while specifying quantitative and qualitative assessment methods and provides an organized framework to understand results. The study maintains alignment between its research goals and TBL performance enhancement and investment attractiveness improvement for European O&G firms through its sustainability-driven investment decision-making framework. The research uses methodological precision and stakeholder-focused methodology to enhance TBL framework implementation in sustainability and investment evaluation.

The introductory section provides essential background information about the TBL framework and its relationship to O&G company investment attractiveness. The research investigates how environmental sustainability and social responsibility and economic performance affect investor interest in the O&G sector during this time of growing interconnection between these factors. The O&G industry serves as an optimal research subject because it generates substantial environmental effects and social and economic impacts. The research design allows for an in-depth analysis of current events within actual Organisational environments according to Yin (2018).

The study follows an exploratory design because it examines a new research area about stakeholder interpretations of sustainability while theoretical frameworks remain under development (Yin, 2018). The study uses descriptive methods to present detailed information about institutional sustainability discourse elements and their manifestation through stakeholder interpretations (Stake, 1995). Figure 10 shows conceptual diagram of research design:



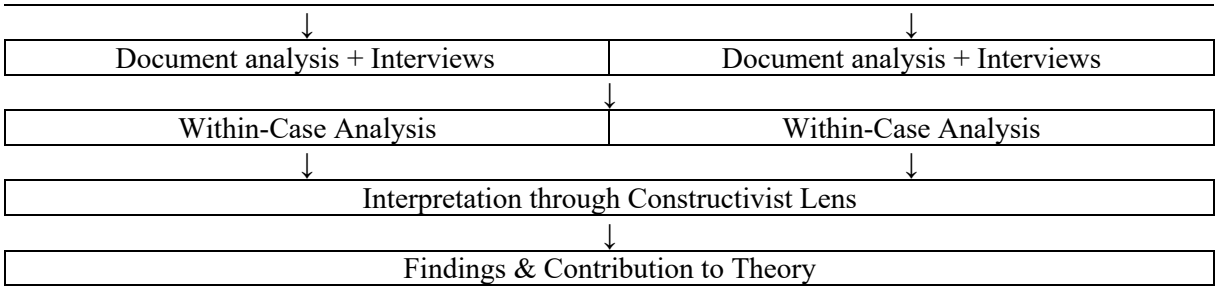


Fig. 10. Conceptual Diagram of Research Design

The research holds significant value because stakeholders now require firms to deliver more than financial performance. The growing interest in sustainable investing requires firms to demonstrate their TBL implementation methods for corporate strategy development and investment community disclosure. The research investigates how the O&G industry implements TBL principles to guide investment choices while operating in a sector that faces worldwide energy and environmental and economic challenges.

The research examines how major O&G firms implement TBL practices through their operational activities and disclosure practices and assesses these practices' effects on their financial performance and market value. The research examines sustainable investment patterns in the O&G industry through stakeholder and investor perspectives to understand market dynamics. The research will generate important findings for sustainable finance and corporate sustainability fields while providing actionable advice to O&G firms who want to boost their TBL performance and investment appeal.

The research expands TBL framework applications through a combination of financial data analysis and sustainability assessment methods to develop a complete evaluation system for European O&G sector investment potential. The current TBL research approach fails to fully capture sustainability investment complexities because it evaluates economic and environmental and social aspects separately.

The research method unites three analytical approaches which include regression analysis and content analysis and ranking methods to connect these research gaps. The research methodology uses a comprehensive evaluation system which matches stakeholder requirements and supports worldwide sustainability goals while maintaining TBL research excellence for practical sustainability investment assessment.

4.2 Unit of Analysis and Sample Selection

4.2.1 Overview of the European O&G Industry

The TBL concept serves as a fundamental framework for global business and investment evaluation because it assesses firms' complete performance and market appeal. The investment world now uses this concept to evaluate firms through E/S metrics which go beyond financial data. The TBL framework demonstrates the need for Firms to balance economic expansion with environmental protection and social fairness which represents sustainable development principles in business operations.

The investment sector now uses the TBL framework to evaluate potential investment prospects through its essential evaluation criteria. The combination of rising environmental and social issue awareness and changing regulations and consumer demand for sustainable practices drives this transition. Investors now pursue dual goals of risk reduction and regulatory compliance while seeking sustainable practices that create market advantages. The European O&G sector allocates its investments toward three main objectives: field extension projects

and challenging reserve exploration and renewable energy integration and digital technology adoption for operational enhancement and environmental benefits (Snieska, 2015).

The European O&G sector depends on technological progress which includes advanced seismic imaging and TBL framework for investment analysis requires firms to demonstrate their performance and strategy development across environmental sustainability and social responsibility and economic performance.

The complete evaluation method helps investors find businesses which maintain financial stability while being resistant enhanced oil recovery methods and digitalization to enhance production efficiency while decreasing operational expenses and environmental effects. The to environmental and social threats and able to handle regulatory shifts and seize sustainable market prospects. The TBL provides a complete method for evaluating investment potential as businesses and investments move toward sustainable development. Investors who include environmental and social factors in their analysis will make better decisions that support both long-term value growth and sustainability targets.

The following sections will explore the theoretical foundations of TBL and its role in investment choices and its projected impact on sustainable investment practices. The European O&G industry operates as a complex and dynamic sector which maintains essential functions for regional energy supply and economic growth and geopolitical stability. The European energy sector depends on O&G as a major power source because they supply fuel for transportation and heating as well as electricity generation and chemical industry raw materials. The ability of O&G firms to meet future energy market demands depends on proper investment levels so it becomes essential to study their sustainability reporting practices.

The research will determine if these reports create investment opportunities (Heim et al., 2022). The post-pandemic period brought additional difficulties to economies because certain regions experienced rising energy costs (Kalyuzhnova, 2020). The political instability created an extreme energy crisis which worsened the situation. The complete impact of these concurrent crises on green energy transition and climate change mitigation efforts remains unclear (Vieira, 2022). The European O&G sector faces ongoing financial difficulties which require advanced tools for bankruptcy prediction and financial stability evaluation.

This study aims to evaluate the influence of external factors on key well-known financial indicators that businesses employ to help with decision-making about the stability and expansion of their operations (Bunea et al, 2019), and to ascertain their predictive accuracy in forecasting bankruptcy within the sector. By employing a comprehensive linear regression model, the research scrutinises the relationship between financial ratios, such as liquidity, solvency, and profitability, and the probability of bankruptcy in the forecasted period. My analysis delineates how external factors disruptions have modulated these financial indicators and their implications for bankruptcy predictions.

The historical dialogue about corporate governance has maintained its independence from environmental and social concerns. The main focus of corporate governance has been to develop internal management systems which promote stakeholder accountability and Organisational transparency and fairness. The exclusive concentration on financial and operational elements within corporate governance systems has resulted in the industry ignoring its wider social and environmental effects. (Dinh et al, 2021).

The European O&G sector operates under multiple difficulties because its production fields have reached maturity while production levels decrease and operational expenses rise especially in North Sea operations. The European O&G industry operates under dual pressures to fulfil strict environmental rules while meeting the EU's goal to establish a carbon-neutral economy by 2050. European O&G firms encounter multiple business risks which boost their chances of financial breakdown and bankruptcy. The factors that affect these risks stem from both internal and external elements.

The field of bankruptcy prediction received its foundational research from Altman (1968). The researcher used 22 financial ratios to develop linear discriminant analysis which resulted in a bankruptcy prediction model that required five particular financial ratios. The research identified one major problem that affects bankruptcy prediction models. The intricate link between financial metrics and bankruptcy risk creates problems because essential indicators might get ignored or their value remains unoptimized (Tadaaki, 2018).

The evidence shows a strong and consistent link between financial indicators and bankruptcy, but these indicators demonstrate different predictive abilities based on industry type and economic conditions and time periods. The performance of financial indicators varies between different business contexts which results in different levels of model precision. The field requires ongoing research to develop models which adapt to business environment changes and enhance predictive accuracy.

The connection between financial indicators and bankruptcy serves as the foundation for multiple established bankruptcy prediction systems. The field of bankruptcy risk assessment continues to receive research attention because scientists seek better methods and additional data sources to boost their predictive accuracy in different business environments. The shift toward sustainable energy has triggered substantial funding for renewable power systems and energy optimisation projects and carbon capture storage (CCS) and hydrogen manufacturing technologies.

The European energy sector will continue to depend on O&G resources during the upcoming years because of security needs and economic requirements and environmental sustainability demands. The analysis of financial ratios serves as an appropriate tool to evaluate O&G firms because they need to develop long-term strategies (Carroll, 2021) and change their current operations (Aimei, 2022) to justify financial stability and growth opportunities (Myskova, 2017). Research has proven that financial indicator analysis functions as an effective method for investment management evaluation.

The analysis of financial ratios in the O&G industry will be applicable according to my previous research experience. The Fortune Database Global 500 from 2022 (CME, 2022) serves as my research basis because it includes European O&G firms that follow International Financial Reporting Standards. The research will determine if financial ratios can predict European energy sector enterprise profitability because of these conditions. The research used correlation regression analysis to forecast future financial results and correlation coefficient analysis to determine financial indicator relationships with bankruptcy tests.

The coefficient of determination shows the extent to which a statistical model successfully predicts its outcome. Financial ratios have been selected to understand their characteristics and achieve maximum utility according to Berry (1991). The evaluation of sustainability performance requires knowledge about O&G firms' current sustainability practices because their operations create substantial environmental and social and economic effects. The industry's path toward sustainability depends on stakeholder knowledge about sustainability practices because this information enables better decision-making and leads to responsible business operations.

The research bases its analysis on personal accounts from essential stakeholders who participated in crisis management at the institutional level. The research participants consist of health sector professionals and humanitarian workers and senior personnel from governmental Firms. The research uses individual accounts to understand institutional practices and decision-making processes and perception changes that occurred after the crisis. The research conducted interviews with 43 participants.

The research reached data saturation because no new themes appeared during the last stages of data collection. The researcher implemented a sampling strategy that included diverse participants to obtain multiple viewpoints from various Organisational positions and

institutional backgrounds. The researcher used purposive sampling to select participants who demonstrated crisis response expertise and direct involvement in the crisis management process.

The researcher used snowball sampling to locate actors who belonged to hidden or marginalised groups after the initial selection process. The research method follows established qualitative research guidelines from Palinkas et al. (2015) and Patton (2015) which support using purposive and snowball sampling to obtain detailed contextual information. The researcher recognised that post-crisis environments presented risks of sampling bias because of their sensitive nature.

The participants chose themselves based on their institutional ties and their willingness to share their Organisation's involvement in the crisis response. The researcher worked with multiple Firms to reduce selection bias by verifying information across different institutional sectors. The research encountered two main limitations because it faced barriers to reach specific stakeholders and because institutional narratives potentially influenced what participants shared.

The research study omitted private sector entities and community recipients from its participant pool. The research concentrated on institutional operations and policy-level reactions, so the researchers made a purposeful decision to leave out these groups. Future studies should include community members and external stakeholders to expand the current understanding of post-disaster reconstruction efforts. European O&G firms disclose essential information through their non-financial reports, but the absence of standardised metrics and frameworks hinders stakeholders from accurately assessing sustainability performance between different Firms.

The practice of environmental and social reporting by firms started with Petro Canada's 1991 independent report and has expanded significantly during the last forty-five years, according to Maharaj and Herremans (2008). The current state of corporate reporting requires more research about sustainability narratives and better integration of sustainability indicators. The existing body of literature about sustainability research it as a unified concept (Marshall et al., 2017). Multiple sustainability definitions in the literature base affect corporate decision-making and enterprise adoption of sustainable practices according to Landrum (2018).

The paper investigates how financial performance indicators relate to sustainability through an analysis of different Organisational metrics. The indicators function as essential tools to monitor and direct O&G firms toward sustainable development under the current global focus on comprehensive sustainability. The research investigates how Firms can use sustainability-focused indicator alignment to develop a positive feedback loop between investment appeal and environmentally friendly business expansion.

Therefore, dissecting sustainability into three distinct dimensions – environmental, social and economic (financial) - addresses a noticeable gap in the literature that has persistently sidelined the social and environmental dimensions of sustainability (Ashby et al., 2012), in stark contrast to the well-represented financial aspect. By introducing social and environmental indicators, the sustainability of the operation of a corporation generally could be better evaluated by stakeholders (Ozdemir et al., 2011), as they are interested in increased transparency on social and environmental aspects (Waddock, 2003), especially in times of crisis.

Content analysis has been frequently used as a tool for collecting empirical data in studies of non-financial documents (Milne & Adler, 1999). In this research, sustainability non-financial indicators are investigated in the context of European O&G firms for the period from 2014 to 2022. Thus, the study investigates the practice and general sustainability reporting quality of eleven O&G firms registered in seven European countries (Norway, France, Finland, Italy, Spain, Germany and the UK) in the O&G industry. These eleven O&G firms are part of

the Global Fortune 500 (G500) and all participate in the GRI: Shell, TotalEnergies, BP, Fortum, Enel, Equinor, Engie, Repsol, Iberdrola, Anglo American and EnBW.

4.2.2 Investment trends in European O&G

Investment trends in the European O&G sector reflect the broader global shifts towards sustainability, technological innovation, and energy transition. These trends are shaped by a complex interplay of factors, including regulatory pressures, market dynamics, environmental concerns, and the increasing emphasis on renewable energy sources. European O&G firms are increasingly investing in decarbonization efforts and sustainable practices in response to the European Union's ambitious climate goals, including the European Green Deal, which aims for a carbon-neutral continent by 2050 (Okeke, 2021).

Investments are being channelled into carbon capture and storage technologies, methane leak reduction, and energy efficiency improvements. Firms are also exploring the role of natural gas as a transition fuel, given its lower carbon footprint compared to coal and oil (Heim, 2022). There's a noticeable trend of European O&G firms diversifying their portfolios to include renewable energy sources. Major players are investing in wind, solar, and bioenergy projects, both to mitigate the long-term risks associated with fossil fuel dependency and to capitalize on the growing demand for clean energy. This strategic diversification is also driven by investor and stakeholder pressures to align with global sustainability targets.

Investment in digital technologies and innovation is a significant trend, aimed at enhancing efficiency, reducing operational costs, and improving safety in the O&G sector. Technologies such as artificial intelligence, machine learning, and the Internet of Things (IoT) are being deployed for predictive maintenance, optimized resource management, and enhanced decision-making processes.

These technological advancements are crucial for extending the life of existing assets and for discovering and developing new reserves more efficiently. Given the volatility in oil prices and the uncertain demand outlook, there's a growing emphasis on investing in assets that offer operational flexibility and resilience (Okeke, 2021). European O&G firms are prioritizing investments in projects with lower breakeven costs, shorter development timelines, and the ability to quickly adjust production levels in response to market conditions. This approach helps mitigate financial risks and enhances the adaptability of firms to changing energy landscapes.

Investments are increasingly being directed towards ensuring compliance with the stringent regulatory and environmental standards in Europe. This includes spending on environmental impact assessments, emission reduction technologies, and the development of strategies to manage and mitigate the ecological effects of extraction and production activities.

These compliance costs are becoming a significant part of investment budgets, reflecting the industry's commitment to meeting regulatory requirements and societal expectations. Collaborations and partnerships are becoming more common as European O&G firms seek to share the risks and costs associated with exploration, production, and the development of new technologies (Heim, 2022). Partnerships with renewable energy firms, technology firms, and research institutions are particularly notable, facilitating the sharing of expertise and resources in pursuit of innovative solutions and sustainable practices.

The European O&G sector is experiencing consolidation as firms seek to optimize their portfolios in light of the energy transition. This involves divesting non-core and less profitable assets to focus on key strategic projects and regions. Consolidation is also driven by the need to achieve economies of scale and enhance operational efficiencies in a competitive market environment.

The investment trends in the European O&G industry are indicative of a sector that is in transition, adapting to the demands of a low-carbon future while striving to remain competitive and profitable. As European O&G firms navigate these challenges, their investment decisions will continue to be influenced by the dual imperatives of sustainability and innovation, shaping the future of energy in the region.

4.3 Data Collection Methods

This research adopts a purposive sampling strategy to select O&G firms that meet specific criteria related to investment attractiveness and sustainability performance. This non-probability sampling approach is appropriate given the need to focus on firms that provide comprehensive and accessible data on both financial indicators and environmental, social, and governance (ESG) practices. By intentionally selecting firms that are actively engaged in sustainability reporting, the study ensures relevance to the research objectives and the application of the TBL framework.

The research extracted its data from eleven main sources. Eleven main sources were used in the research to collect the data. European firms chosen to represent the empirical domain of the research are determined based on the Fortune Database. This study employs a purposive sampling strategy, a non-probability method used to deliberately select cases that meet defined criteria central to the research objectives. This approach is appropriate for an exploratory, mixed-methods design where in-depth, information-rich cases are required to address the multifaceted concept of investment attractiveness.

a) Inclusion Criteria.

The firms included in the study were selected based on the following conditions:

- Listed in the 2022 Fortune Global 500 (CNN Business database);
- Classified under O&G or energy sector as per industry codes;
- Based in European countries (UK, France, Finland, Italy, Norway, Spain, and Germany);
- Annual financial reports have enacted the International Financial Reporting Standards (IFRS) that have been approved by the EU (UNCTAD, 2008; Atabey, 2014);
- Availability of annual financial reports for the years 2015–2022;
- Availability of at least one stand-alone sustainability report within the same period;
- Evidence of engagement in ESG reporting practices or presence in the Sustainability. Disclosure Database

b) Exclusion Criteria.

Firms were excluded if they:

- Operate outside the European region;
- Belong to non-energy industries;
- Did not publish sustainability disclosures or annual financial statements between 2015–2022;
- Annual financial reports have enacted the Generally Accepted Accounting Principles (GAAP) or other standards;
- Were acquired, merged, or no longer operational during the study period.

This yielded 11 O&G firms, which collectively represent a balanced spectrum in terms of revenue, profitability, asset size, and sustainability performance. This allows for a comparative, case-oriented assessment of both high-performing and underperforming firms in terms of ESG integration.

The comprehensive set of factors as part of the TBL theory analysis, including 3,520 social and environmental factors, alongside 6,237 economic factors, examine amounting to a total of 9,757 factors under consideration. A potential limitation of purposive sampling is

selection bias, particularly the tendency to over-sample firms with strong sustainability disclosures. To mitigate this, the study will include firms with a spectrum of sustainability performance levels, including those with limited or inconsistent ESG reporting.

Furthermore, findings will be cross validated using secondary data sources, such as third-party ESG ratings, industry benchmarks, and regulatory disclosures. This triangulation approach strengthens the reliability and validity of the results by incorporating multiple perspectives and reducing dependency on self-reported data. Table 14 shows the list of European firms including revenues, profit, and assets.

Table 14
O&G Firms - Position in 2022 Global Fortune 500

Rank	Company	Revenues ($M)	Profit ($M)	Assets ($M)	Country
1 (15)	Shell	272,657	20,101	404,379	UK
2 (27)	Total Energies	184,634	16,032	293,458	France
3 (35)	BP	164,195	7,565	287,272	UK
4 (56)	Fortum	132,894	874	170,165	Finland
5 (90)	Enel	104,052	3,771	235,291	Italy
6 (114)	Equinor	90,924	8,563	147,120	Norway
7 (130)	Engie	83,622	4,329	256,204	France
8 (251)	Repsol	52,335	2,955	63,961	Spain
9 (304)	Iberdrola	46,246	4,593	161,172	Spain
10 (331)	Anglo American	41,554	8,562	65,985	UK
11 (368)	EnBW	38,010	430	81,038	Germany

Source: the Author' calculation using the information gathered.

Data Collection Rationale

This study adopts a mixed methods approach to provide a comprehensive and balanced assessment of investment attractiveness in the European O&G sector, as framed by the TBL. This methodological design integrates both quantitative financial metrics and qualitative sustainability practices, enabling a multidimensional analysis that aligns with the evolving expectations of investors and stakeholders.

Adopting this mixed methods strategy, guided by a pragmatic research philosophy, ensures the study delivers valid, reliable, and actionable insights. It reflects the complexity of sustainable investment decisions, where both empirical evidence and stakeholder perceptions are critical in assessing long-term value and corporate resilience.

To ensure the accuracy, credibility, and robustness of the findings, this study employs a comprehensive data validation strategy through cross-referencing multiple data sources. Information will be drawn from three key streams: corporate reports, interviews with industry experts, and financial performance databases. Each of these sources contributes unique perspectives and strengthens the validity of the overall analysis by enabling triangulation.

In research, data can be broadly classified into primary and secondary sources, each serving distinct purposes and offering different types of insight. Primary data refers to information that is collected firsthand by the researcher specifically for the purposes of the current study. It is original and directly relevant to the research objectives. In this study, primary data includes the results of semi-structured interviews conducted with corporate sustainability officers and industry experts.

These interviews are designed to validate of financial and sustainability indicators and provide contextual insights into corporate reporting practices. Because it is collected directly

from knowledgeable participants, primary data tends to be current, specific, and highly relevant, although it may require more time and resources to obtain.

Secondary data, on the other hand, refers to information that has been previously collected and published by others. It is not originally generated by the researcher but is used to support or compare findings. In this study, secondary data includes annual reports, sustainability reports, and data from financial performance databases such as the Fortune Global 500.

These documents and databases provide historical, financial, and non-financial data that are critical for assessing the economic, environmental, and social dimensions of investment attractiveness. Secondary data is often more accessible and cost-effective, but it may be less tailored to the research questions and subject to limitations such as selective disclosure or outdated information.

The study will rely 70% on secondary data (company reports) and 30% on primary data (expert interviews). Using a combination of primary and secondary data allows for a more comprehensive analysis. While primary data adds depth and context, secondary data offers breadth and comparability. Together, they enhance the validity, reliability, and richness of the research findings.

The research combines primary and secondary materials through measurement triangulation to enhance construct validity and reduce potential bias. The research combines corporate disclosure data from sustainability reports and annual reports and integrated reports with third-party verified ESG ratings and regulatory filings and independent benchmarking databases. The dual-source approach protects against self-reported data flaws and corporate disclosure choices that might occur in sustainability reporting (Cho, 2012; Hahn, 2014).

The research used Refinitiv Eikon database indicators to confirm corporate-reported data and evaluate how different companies present their E/S information. The research used third-party data measurements instead of self-reported data when inconsistencies appeared because this approach maintained methodological precision and result comparability. The research combines corporate disclosure data with independent verification sources to enhance result reliability and achieve better cross-validation in line with sustainability measurement and mixed-method research standards (Brammer, 2008; Eccles, 2014).

For the qualitative phase (Stage 3), semi-structured interviews were conducted with 42 respondents. Most participants (40%) are from investment firms, followed by 26% from consulting firms, 24% from other sectors, and 10% from O&G firms. In terms of professional roles, 33% work in financial departments, 22% are directors or managers, 21% are heads of departments, and 24% fall into other categories. Regarding experience, nearly half of respondents (45%) have more than 10 years of experience, 40% have 6–10 years, 10% have 3–5 years, and only 5% have less than 3 years. This indicates a highly experienced and diverse sample.

The instrument used is a 7-question semi-structured interview guide, supported by a rationale for each question. It probes perceptions of the relevance and sufficiency of various metrics across the TBL dimensions. The interview guide was designed around the TBL framework and included seven core open-ended questions (see Appendix III). Questions were tailored to elicit insights into each TBL dimension:

- Economic dimension: “In your opinion, are the financial dimensions as defined all relevant for the evaluation of Investment Attractiveness??”

- Environmental dimension: “In your opinion, are the Environmental dimensions as defined all relevant for the evaluation of Investment Attractiveness?”

- Social dimension: “In your opinion, are the Social dimensions as defined all relevant for the evaluation of Investment Attractiveness?”

Each interview began with background questions on the participant's role and responsibilities and ended with reflective questions on perceived gaps in reporting practices.

4.3.1 Annual report of European O&G Firms

Annual reports of European O&G firms serve as comprehensive documents that detail the company's activities, financial performance, strategic direction, and outlook over the past fiscal year (Sharma & Henriques, 2005). Annual financial reports are crucial documents produced by publicly traded firms to inform shareholders, investors, and creditors about their financial performance and prospects.

These reports, generated at least annually, serve as a vital communication tool, bridging the gap between corporations and a wide array of internal and external stakeholders (Campbell, 2000). These reports are essential for stakeholders, including investors, analysts, employees, and regulatory bodies, providing a transparent overview of the company's health and strategic priorities. (Aktas et al., 2013).

The framework governing the presentation and content of financial reports is shaped by a comprehensive system of regulations. These regulations are established in response to the demands of various stakeholders, with accounting and securities market regulators playing a pivotal role in defining financial reporting standards (Tilt, 2001). The Financial Reporting Standards, along with Statements of Standard Accounting Practice, provide detailed guidelines on a broad spectrum of topics.

These range from asset valuation and lease accounting to the structure of cash flow statements and the treatment of VAT (Walker, 2005). Comprehensive financial statements, including the income statement, balance sheet, and cash flow statement. This section provides an in-depth analysis of the company's financial health, covering revenue, profit margins, expenses, investments, and financial ratios. Commentary might explain the financial results and factors affecting the company's financial performance.

Annual reports of European O&G firms include different sections: A brief history and an introduction to the company's core business areas, including exploration, production, refining, and distribution of O&G. An analysis of the global and European O&G market, including trends, challenges, and opportunities. A detailed review of the company's operational performance over the year.

This includes exploration and production activities, project developments, operational efficiencies, and technological advancements. Comprehensive financial statements, including the income statement, balance sheet, and cash flow statement. Commentary might explain the financial results and factors affecting the company's financial performance. An overview of the company's sustainability efforts, environmental impact, and social responsibility initiatives. Insights into the company's R&D activities, focusing on innovation in exploration and production technologies, digitalization, and the development of low-carbon energy solutions. An analysis of the key risks facing the company, including market volatility, regulatory changes, operational hazards, and environmental risks.

The company's strategic outlook, including future objectives, investment plans, and growth strategies. Such standards are instrumental in fostering consistency across reporting practices and delineate the baseline requirements for financial disclosures (Lev, 1988). Through these regulatory measures, annual financial reports serve their purpose effectively, offering a transparent and consistent view of a company's financial health to its stakeholders.

Annual reports of European O&G firms not only provide a retrospective view of the company's performance but also offer insights into how these firms are positioning themselves for future challenges and opportunities, especially in the context of the global energy transition and increasing environmental concerns.

Sustainability report of European O&G Firms

Previous research on corporate sustainability performance in manufacturing operations has made emphasis on financial performance as an indicator of investment attractiveness while neglecting the importance of social and environmental performance (Henao, 2022). In the past decades, responsible management research concluded that the focus on sustainability criterion that large-scale O&G corporations must ensure is the criterion that large-scale O&G corporations must ensure environmental and social sustainability. Sustainability indicators cover all aspects of an organisation's activities, as well as characterizing those intangible assets that are not reflected in financial statements.

Sustainability reporting has been examined in many academic studies and business reports (Albino, Balice, & Dangelico, 2009; Hussey, Kirsop, & Meissen, 2001; Jose & Lee, 2007; Jung, Kim, & Rhee, 2001; Morhardt, 2010). While most studies focus on firms' reporting practices in multiple sectors, many have included the O&G sector within their sample. There have also been a small number of studies which have focussed specifically on sustainability reporting by firms in the O&G sector (Dong & Burritt, 2010; Günther et al., 2007; Roberts Environmental Center, 2010).

O&G firms were among the first sectors to commence issuing standalone reports with one of the first environmental reports produced in 1991 by Shell Canada (Maharaj & Herremans, 2008). The O&G sector is one of the six sectors that led in 2017 and also led in 2020: technology, media & telecommunications; mining; O&G; chemicals; and forestry and paper. O&G firms with 69% per cent of N100 firms disclosing carbon targets. The O&G sector currently stands at-risk sector in which a majority of N100 firms report on the risks they face from biodiversity loss and, at 31%, it is a slim majority. (KPMG, 2020). Given those firms in the sector have been reporting on environmental issues for a relatively long period of time, are motivated to legitimise their firms, have a high reporting rate with relatively high quality and extensive reporting; sustainability reporting and GHG emissions reporting in the sector is expected to be one of the most advanced and evolved.

The first primary criterion that O&G corporations must satisfy is sustainability. A system to increase supply chain transparency for stakeholders, particularly local people, and investors, was attempted in the 1970s (Abd El-Rahman, 2019). According to Schneider and Schmidtpeter (2012), up to the 20th century's conclusion, the emphasis was on the enterprise's financial development and the protection of its owners and creditors.

Stakeholders are provided with social and environmental sustainability indicators in non-financial documents (Bebbington et al., 2008). Sustainability indicators are quantitative and/or qualitative measures that aim to interrelate and assess different areas of social, environmental and economic performance. Up until the mid-1990s, annual reports were the most popular place to find social and environmental data (Daub et al., 2007). To produce a distinct sustainability report, corporations must now take a regular approach to non-financial documents considering the growing social and environmental problems. The sustainability report is a document that disseminates environmental and social data to different stakeholders (Habek, 2013). Firms that disclose their sustainability performance attract specialised investors (Dhaliwal et al., 2011). As the additional information in non-financial documents allows investors to make more effective assessments, Stakeholders take into consideration non-financial reports when creating investment solutions (Carnevale & Mazucca, 2014).

The non-financial operations of a corporation are reported on in sustainability reporting. The sustainability report contains a lot more information than other forms of communication. Over the past ten years, corporate sustainability reporting has gained in popularity. Customers, suppliers, and shareholders are just a few of the many stakeholders that sustainability reports

aim to reach (Sodhi, 2018). In contrast to financial reporting, sustainability reporting focuses on an enterprise's plans as well as a report on historical data because an enterprise's stock market value is influenced by both present earnings and projections of future earnings.

This is partly a response to stakeholder requests for specific corporate performance elements when they make choices on behalf of the European O&G firms. Stakeholders' needs should be satisfied since they must be aware of sustainability problems and crucial to business strategy. Consequently, in addition to the economic metrics that require disclosure, the social and environmental facets of sustainability have become pivotal in assessing overall corporate performance (Khan, 2023). They have adopted sustainability reporting in its three aspects more than just "social and environmental" reports because of the increased interest in sustainability (Shamil et al., 2014). Stakeholders should be informed about corporate reporting obligations for O&G businesses in the form of sustainability-focused indicators measures. Indicators must be measurable, and helpful in making decisions (Junior et al. 2017).

Regardless matter how an Organisation's social and environmental performance affects its financial success, excellent non-financial documents should aim to offer precise and trustworthy information about that performance (Comyns et al., 2013). As non-financial documents is disseminated to both internal and external European O&G firms' customers, it assists all corporate stakeholders in making better decisions. Additionally, because they are a gauge of the calibre of corporate sustainability performance, reporting on these three sustainability dimensions influences the quality of non-financial documents (Nobanee & Ellili, 2016). The focus of this investigation is on this quality.

The specification of the principles that will be applied in the scoring index creation is necessary to ascertain the reporting quality. The O&G Industry Guidelines provide both basic reporting criteria for greenhouse gas emissions and requirements for sustainability reporting that are applicable to the industry. It should be noted that not all recommendations have the same reporting standards, therefore 31 overall quality aspects were defined, taking into account the standards included in each guideline. The result agrees with the methodology used by Günther et al. (2007), who also gave each indicator component a score of 0, 1, or 2. Subjectivity is one of the key problems with using content analysis, thus it must be minimised to ensure that information is gathered in a trustworthy and convergent method.

Financial Performance Indicators for European O&G Firms

Some ways of evaluating the financial situation are offered in the literature by Author from various countries. These methods vary in their analytical processes and the financial data they are based on. Several scientists and experts, including Horrigan, Tuffler, Altman, Kaplan, Lis, Springate, Ketz, and others, conducted research and developed methodologies for evaluating the financial health of economic entities. The estimated indicators were selected by the CFA programme (Financial Reporting and Analysis) (Kaplan, 2018).

The fundamental ideas of financial indicator analysis early appeared in the second part of the nineteenth century. During the 1920s, analysis underwent three significant developments (Horrigan, 1968). First, several ratios were created, then standards for an absolute ratio began to emerge, and finally, some analysts saw the importance of comparing the ratios of different firms (Whittington, 1980).

Researchers have used indicators as input to models for forecasting, while practitioners and accountants have employed financial ratios for that purpose. (Barnes, 1987). Finding estimates and forecasts for the company's future conditions and operations is the main purpose of the financial situation study (Bernstein, 1988). Previous research in this area on ratio models for manufacturing firms, while other academics have examined the longevity of these models

across a variety of manufacturing industries (Ezzamel, 1987). As a result, it is now possible to evaluate how comparable the ratio models are among various sorts of O&G enterprises.

At the beginning of the 20th century, financial ratios came into play primarily for credit scoring assessments (Beaver, 1966). Altman later confirmed the empirical strength of financial indicators through his work on bankruptcy prediction for American firms, a concept he introduced in the 1960s (Altman, 1968; Apan, 2018). Tailored for the European market, the Lis model emerged in 1972 to serve UK firms. This model, built upon the same financial ratios used in Altman's method, is considered an adaptation suitable for European contexts (Druzin, 2013).

In a parallel development, British researcher Taffler crafted a technique to forecast corporate insolvency based on financial performance, marking a significant advancement in predictive analytics (Agarwal, 2007). Springate, extending this line of inquiry in 1978, introduced a model predicated on Altman's work, utilizing stepwise discriminant analysis to estimate the probability of Organisational failure (Peter, 2011). Springate's approach initially employed 19 financial measures, subjected to rigorous multiple discriminant analysis, to predict potential financial distress (Agarwal, 2007; Almamy, 2016).

The application of these metrics enabled a comparative assessment of the financial robustness of O&G firms, a critical sector given its economic significance (Horrigan, 1968; Rodrigues, 2018). The enduring relevance of financial ratios as indicators of fiscal health is due to their derivation from financial statements, a testament to their analytical utility (Barnes, 1987; Halkos, 2012; Katsaprakakis, 2014).

No one set of ratios is universally accepted for financial analysis (Kaplan, 2018). The significance of cash flow ratios for forecasting financial instability has been emphasised by researchers. A study was done to see if cash flow ratios might be used to forecast financial problems in O&G businesses, according to Ward (1994). The CFA (Chartered Financial Analyst) curriculum, which is offered internationally to investment and financial professionals by the American-based CFA Institute (CFA, 2023), served as the basis for the financial ratios that the research used and the bankruptcy models that the research chose.

Literature has influenced research in many areas of finance, but especially studies that used financial indicators as input variables in forecasting models (Baíllo, 2009). A linear function of x, y(x), is connected to regression. The linear model has been studied by researchers Ramsay and Silverman (2005), Cardot and Sarda (2003), Horowitz Cai and Hall (2006). The resulting regression equation is applied in forecasting analysis and the correlation indicator shows the relationship between the financials indicators and bankruptcy. Financial indicators based on their statistical relationships are used to investigate the financial ratios used in forecasting models and determine the indicators (Rees, 1995).

The forecast is created by including numerically calculated parameter values for the factor values in the regression. The current approaches have several shortcomings, both in terms of the methodology used to analyse efficiency and in terms of the evaluation's goals, which typically consist primarily of processes rather than actual changes that have occurred in the firms. It is challenging to compute and generalise indicators because the approaches are centred on the examination of numerous dissimilar indicators. As a result, difficulties with techniques for evaluating the financial health of O&G sector enterprises need to be improved upon and developed.

4.3.2 Sustainability indicators

Environmental sustainability

Environmental sustainability, according to Shrivastava (1995), has the opportunity to reduce risks related to resource exhaustion, fluctuating energy prices, environmental contamination, and waste control. Environmental and supply chain operations have an impact on environmental challenges from control of waste and water pollution management to world climate change. Environmental sustainability is defined as supporting nature at an appropriate stage (Moldan et al., 2012). Attitude to the environment by the European O&G firms management is one of the key factors influencing their behaviour.

Environmental sustainability is the consumption of natural resources at a rapidity of lower native regeneration or no pollution at a rapidity beyond the ability of the ecosystem to consume and naturalize pollution (Dyllick & Hockerts, 2002). From a commercial standpoint, globalisation has led to a globalisation of the environmental burden. Adopting environmentally friendly practices is vital to preserving a competitive advantage. Environmental sustainability holds that businesses must adapt and restructure their activities to decrease their detrimental effects on the environment because their resources are finite (Shrivastava, 1995).

Resource preservation, waste contraction, and a decline in the use of dangerous materials are significant challenges that environmental sustainability addresses (Gimenez et al., 2012). Thus, it is evident that the importance the O&G industry places on environmental issues can have a significant impact on production and production research. According to Closs et al. (2011), corporate environmental sustainability is demonstrated by how well environmental practices are joined with the enterprise's everyday operations and strategic planning operations.

The Sustainability Report is a corporate paper containing data on the social, environmental, economic and management indicators of the European O&G firms. O&G firms' values show the link between responsibility to a sustainable worldwide economy and strategy. It is the connection between humans, the planet, and the profits of the company. According to Tate et al. (2013), environmental practices are a collection of actions taken by businesses to control and strengthen responsibilities.

These actions can be anything that helps to advance sustainability. Environmental sustainability challenges have drawn more focus as a result of these numerous social and economic influences. According to Klassen and McLaughlin (1996), environmental aspects cover all actions aimed to decrease the environmental impact of an O&G company's products.

These actions include everything from product creation to the final removal (Sroufe, 2003). European O&G firms must change their procedures in order to intensify environmental sustainability practices. The assessment of environmental responsibility is still an urgent problem, as already mentioned, not only for all stakeholders but also for energy firms. Therefore, it is necessary to support a precautionary approach to environmental issues, be sure to accept initiatives which growing responsibility for the condition of the environment, and support the growth of different technologies.

Social sustainability

Social sustainability refers to corporations' responsibility to society and includes issues relating to the approach to education, health care and social well-being as well as the reduction of poverty and sickness (Closs et al., 2011). It also had to do with the enterprise's human resources and covered business proceedings that were just and beneficial to those who were impacted by the business. The enterprise could be socially sustainable, it must offer equal chances, promote diversity, offer education opportunities to staff, and uphold great standards for regular health and safety (Slaper and Hall, 2015). The social aspect of sustainability is concerned with how O&G firms affect social systems like employment laws, human rights,

and their interactions with local communities. The indicators focus on fair employment practices respect for human rights, social responsibility, and product responsibility.

According to Pullman (2009), social sustainability attempts to increase the beneficial results of businesses' operations on both internal communities like employees and external communities like communities and society in the total. Social sustainability is the process of providing importance to society by expanding the human capital and future development of the social capital (Dyllick & Hockerts, 2002).

Social sustainability can be separated into courses: one refers to the enterprise itself and relates to the firm's workers, suppliers, and other subcontractors as well as pertinent labour practises (Sharma & Henriques, 2005). The capacity of O&G firms to act and be explainable for its social and environmental repercussions on the company is referred to as responsibility towards social justice concerns. Sustainability reporting is one means via which this accountability is expressed. Social sustainability involves the involvement of the enterprise in social processes, it contributes to the rise of the welfare of the community and the level of social security of its employees.

The internal factor is the Organisation's obligation to its staff, which involves practices relating to employee well-being and health. (Slaper & Hall, 2011). O&G firms' disclosures in their corporate communication channels make it clear who is responsible for these duties. A company will continue to exist if there are people on the globe and in the society to which it belongs.

The acknowledgement, valuation, and advancement of employees' abilities utilising suitable human resources practises for justice, wealth, and growth is another example of social sustainability within different firms (Pullman, 2009). The other aspect is the obligation that businesses have to the communities where they do business. Participating in community support activities includes planning charity events, giving aid to disadvantaged groups, and volunteering for community causes.

Goals of Sustainability Reporting

The success of an organisation is determined by a large group of stakeholders. The sustainability report must present a reasonable picture of the indicators of the company that prepared it about sustainability (e.g., Buchholz and Rosenthal, 2005). Sustainability reporting is a determinative method by which European O&G firms attempt to achieve these requirements. (Herzig & Schaltegger, 2006). It can be used to compare and evaluate sustainability performance against efficiency norms and willing initiatives, to show the influence of European O&G Organisation expectations on the company, and to compare the capacity of a European O&G Organisation. Moreover, it is becoming more accepted that corporate sustainability is more affected by sustainability reporting (Lozano & Huisingh, 2011).

Through sustainability reporting practises, stakeholders take part in accomplishing the overarching goal of sustainable development (Brusca et al, 2018). The data should be presented so that stakeholders may understand changes in the firms' efficiency and compare it to that of other firms. A comprehensive rule book that outlines the history of each criterion and how each criterion (0, 1, 2) should be reviewed and evolved was created in order to lessen subjectivity and guarantee consistent data collecting (Milne & Adler, 1999).

Stakeholders who have non-financial documents should be capable of comparing the data presented on the three aspects of the European O&G enterprises in previous periods. (Herzig & Schaltegger, 2017). In their dealings with suppliers, customers, dealers, government officials, and other stakeholders could be experiencing less conflict. Businesses might therefore strive to surpass competitors by establishing a competitive advantage. Finally, information

gathering and analysis for non-financial documents can support domestic information and inspection procedures. The scenario specific to the European O&G firms, market and industry conditions, stakeholder groupings, and management preferences all influence objectives and advantages and motivate directors to deal with non-financial documents.

Relationships between sustainability reports and annual reports

The corporate reporting strategy of firms depends heavily on the relationship between sustainability reports and annual reports according to Reinhardt et al. (2020). Sustainability reports and annual reports function as complementary documents because they present different insights about corporate performance. The three core elements of environmental integrity and social equity and economic prosperity exist in a connected system that supports each other (Purvis et al., 2019).

The main focus of annual reports centers on financial data but sustainability reports examine non-financial elements which include ESG aspects. The combination of these reports provides stakeholders with a complete understanding of a company's financial performance and sustainability status (Geldres-Weiss et al., 2021). The connection between sustainability reports and annual reports serves as a fundamental element for firms to develop their corporate reporting strategy. The two reports function as essential tools which help Firms connect with their stakeholders (Bocken et al., 2014).

Sustainability reports help Firms demonstrate their commitment to ESG activities and goals through transparent reporting (Stubbs & Cocklin, 2008). Firms use these reports to share their dedication to environmental sustainability and social responsibility and ethical governance practices (Lee & Rhee, 2007). Annual reports focus on financial disclosure and follow established accounting principles. The combination of these reports helps Firms demonstrate their commitment to corporate responsibility (Schaltegger et al., 2012).

The traditional bankruptcy models rely on financial ratios which come from annual reports of firms. Investors show growing interest in studying how non-financial indicators relate to bankruptcy risk. Non-financial indicators measure company performance through metrics which do not appear in financial statements but show results in environmental and social aspects (Liute, 2022). The combination of non-financial indicators with Altman's Z-Score financial analysis creates an expanded early warning system which helps identify potential bankruptcies in firms.

The UK-specific bankruptcy model developed by Lis used financial ratios to evaluate company solvency just like Altman's Z-Score (Druzin, 2013). The application of non-financial indicators to Taffler’s model (Agarwal, 2007) would involve using these indicators as additional data points to improve the model's predictive capabilities. The Springate model calculates corporate failure probabilities through financial ratios extracted from accounting statements (Peter, 2008). The connection between non-financial indicators and bankruptcy risk becomes most important in industries where environmental performance directly affects financial performance such as the O&G sector.

European O&G firms actively distribute information to various stakeholder groups which include investors and clients and suppliers.The actions and decisions undertaken by these various stakeholders have the potential to augment the financial accounting metrics, which are likewise disclosed in annual reports and income statements (Benner and Tushman 2002). Concentrating exclusively on financial metrics may lead stakeholders to overlook other critical performance indicators and the involvement of significant stakeholders who are essential supporters and beneficiaries of an Organisation's activities (McAdam & Lafferty 2004).

4.3.3 Analysis of non-financial documents

The research extracted its data from eleven main sources. European firms chosen to represent the empirical domain of the research are determined based on the Fortune Database. The firms included in the sample for this study are O&G firms included in the 2022 Fortune Global 500 (CNN). Firms were selected if an annual report and at least one of 99 sustainability reports are available from 2015 to 2023. The final sample consisted of 11 European firms. 3168 social, and environmental factors were analysed.

One of the choices which must be made when conducting a content analysis study is to decide which documents to analyse (Unerman, 2000). Environmental or social information can be disclosed in a variety of types of reports such as annual reports, company brochures or special interest reports (Zeghal & Ahmed, 1990) as well as via standalone sustainability reports. While all these sources of information should ideally be used to capture the organisation's social and environmental disclosure (Gray et al, 1995).

A sample of 99 stand-alone sustainability reports published by European O&G firms is selected and textually analysed. The unit of observation in the data collection process is the company. All firms' sustainability reports are standalone, web-based, and obtainable through the Sustainability Disclosure Database, which is a publicly available database. Our approach is stratified sampling with industry sectors as strata. Sampling focuses on European O&G firms because of their common understanding of policies and practices. Besides, these countries are commonly used in studies of this type (Soana, 2011) to allow us a comparison with the literature. Nevertheless, this research approach could be criticized on the grounds of our target population not being representative, and consequently, the results not being generalizable globally. Therefore, the 11 firms form a stratified sample of an identified (or defined target) population belonging to the Sustainability Disclosure database. Consequently, the sample can be said to be representative of the population, and thus the results of this study can be generalizable. the research is using multiple reports for the same company at this stage of research, the research examine improvement over the years for a particular company and then the European energy industry.

4.3.4 Analysis of Financial Documents

A sample of 99 stand-alone annual reports published by European O&G firms is selected and textually analysed. The annual report is widely recognised as a critical document for analysis in sustainability reporting research (Dong, 2010). As a regulatory requirement, businesses must produce annual reports regularly, making them a primary source of information (Gray, 1995; Neu, 1998). With their consistent availability — one per Organisation per year — annual reports are considered easily accessible and reliable sources (Unerman, 2000; Tilt, 1994). The adoption of the Internet by O&G firms has facilitated the global dissemination of information (Siala, 2014). However, the depth and quality of the information within annual and sustainability reports can vary significantly across firms, with some offering detailed disclosures and others providing more generalized business overviews (Gibson, 2013; Abdullah, 2017). The move towards online financial disclosure provides investors with virtually limitless access to supplementary data, enhancing financial transparency (Al-Htaybat, 2011; Jain, 2013). Such reports, including balance sheets, are foundational for evaluating financial health and guiding future decision-making (Nel, 2018). Financial indicators are commonly manipulated and categorized to provide more granular insight (Segura, 2018), with economic profitability being a key metric for assessing the effectiveness of a company's use of its financial assets (Mihola, 2016).

Overview of annual report Analysis in European O&G firms

Numerous scientifically established methodologies are available for evaluating a company's financial stability, each with its unique set of strengths and weaknesses. Pioneering work in this field has been contributed by scholars like Horrigan (1968), Lev (1974), Weston (1979), Foster (1986), and Mohammed (2012), who have each developed systematic approaches to financial analysis. Additionally, financial ratios, which form the crux of such analyses, are organized into various categories by Author such as White (2003), Soffe (2003), and Van Horne (2009). For this study, the selection of financial ratios was chosen by Kaplan's framework and four established bankruptcy prediction models. For this study, the selection of financial ratios was chosen by Kaplan's framework and four established bankruptcy prediction models (Kaplan, 2018). Table 15 shows the list of groups of financial ratios and bankruptcy models.

Table 15
Financial Ratios and Bankruptcy Tests

Liquidity ratios	*Solvency ratios*
1. Current ratio 2. Quick ratio 3. Cash ratio	1. Financial leverage 2. Debt-to-Equity ratio 3. Debt ratio
Profitability ratios	*Activity ratios*
1. Net profit margin 2. Return on assets 3. Return on equity 4. Gross profit margin 5. Pretax margin 6. Operating return on assets 7. Operating profit margin	1. Capital conversion period 2. Inventory conversion period 3. Receivables conversion period 4. Payables conversion period 5. Operating cycle 6. Operating return on assets
Bankruptcy tests	*Cash ratios*
1. Taffler's Model (UK) 2. Liss's Model (UK) 3. Altman's Model (USA) 4. Springate's Model (USA)	1. Cash to income 2. Cash return on equity ratio 3. Cash flow to revenue ratio 4. Cash return on assets ratio 5. Dividend payment ratio 6. Reinvestment ratio 7. Interest Coverage ratio 8. Debt coverage ratio

Source: the author uses the information gathered.

Liquidity ratios

Liquidity ratios are used to assess the O&G firms' capacity to meet their short-term obligations. (Kaplan, 2018). An asset is more liquid if you can access its full value with ease and faster. Table 16 shows a description of liquidity ratios.

Table 16
O&G Firms' Liquidity Ratios

Current ratio	$Current\ ratio = \frac{Current\ assets}{Current\ liabilities}$
Quick ratio	$Quick\ ratio = \frac{Current\ assets - Inventories}{Current\ liabilities}$
Cash ratio	$Cash\ ratio = \frac{Cash}{Current\ liabilities}$

Source: adapted from Ref. (Kaplan, 2018)

An indicator of an enterprise's capacity to fulfil short-term obligations is the current indicator (Fleming, 1986). A current ratio of one or above suggests that current assets should be sufficient to cover short-term obligations, whereas a current indicator of less than one may indicate that the company is experiencing liquidity problems (Mohammed, 2012; Courti, 1978; Cowe, 1982). The likelihood that the corporation will be able to fulfil its short-term obligations increases with the fast liquidity ratio (Platt, 1990). The main distinction between the current, quick, and cash ratios relates to the predicted liquidity of current assets, which are anticipated to be used to settle current liabilities.

Solvency ratios

Solvency indicators estimate a business's use of borrowed capital and assist in measuring its ability to satisfy long-term obligations (Ibendahl, 2016). Assessing the degree of independence from debt financing is the goal of the financial stability analysis of O&G enterprises. Table 17 O&G shows firms' solvency ratios:

Table 17
O&G Firms' Solvency Ratios

Debt-to-equity ratio	$Debt\ to\ equity\ ratio = \frac{Total\ liabilities}{Equity}$
Debt-to-capital ratio	$Debt\ to\ capital\ ratio = \frac{Total\ debts}{Total\ debt + Equity}$
Financial leverage	$Financial\ leverage = \frac{Average\ assets}{Average\ equity}$

Source: adapted from Ref. (Kaplan, 2018)

The debt-to-equity indicator is a gauge of how much fixed-cost borrowing the firms utilise. A ratio where capital is greater than debt, or at least equal to it, is ideal for external security (Sofyan, 2013). A higher or smaller reliance on debt as a source of funding is shown by increases and decreases in this ratio. The debt-to-capital ratio is yet another way of examining how debt is being used. The solvency ratio influences the company's financial performance (Satryo, 2016). A higher or smaller reliance on debt as a source of funding is shown by increases or decreases in this ratio. The financial leverage ratio is another metric that is employed as a gauge of a company's utilisation of debt financing (Kaplan, 2018).

Profitability ratios

The total performance of the O&G firms in relation to sales, assets, equity, and capital is gauged by profitability ratios (Akbar, 2020). In a general sense, the profitability of products implies that the production and sale of this product bring profit to the company. Table 18 shows profitability ratios:

Table 18
O&G Firms' Profitability Ratios

Net profit margin	$Net\ profit\ margin\ = \frac{Net\ income}{Revenue}$
Gross profit margin	$Gross\ profit\ margin = \frac{Total\ debt}{Total\ debt + Equity}$
Operating profit margin	$Operating\ profit\ margin = \frac{Operating\ income}{Revenue}$
Pretax margin	$Pretax\ margin = \frac{EBT}{Revenue}$
Return on assets	$Return\ on\ assets = \frac{Net\ income}{Total\ assets}$
Operating return on assets	$Operating\ return\ on\ assets = \frac{Operation\ income}{Average\ total\ assets}$
Return on equity	$Return\ on\ equity = \frac{Operation\ income}{Equity}$

Source: adapted from Ref. (Kaplan, 2018)

Net profit margin was shown by Rochim and Ghoniyah (Rochim, 2017) to significantly affect changes in earnings. Price increases or cost cuts both enhance gross profit. Gains on investments and other non-operating items are included in EBIT. The ability of the business to make significant profits is improved by a higher profitability ratio (Danish, 2020). An indicator of return on assets that accounts for taxes and interest is the operating return on assets.

Activity ratios

Activity ratios assess the effectiveness with which the company is utilising its assets (Kaplan, 2018). Relative indicators describe the degree of resource utilisation efficiency, which is assessed using turnover data. The corporation sells more products for the same amount of capital the faster the turn. The major result is an increase in sales and an acceleration of turnover without extra funding. Table 19 shows activity ratios.

Table 19
O&G Firms' Activity Ratios

Capital conversion period	$Capital\ conversion\ period = \frac{Equity * 365}{Revenue}$
Inventory conversion period	$Inventory\ conversion\ period = \frac{Inventory\ * 365}{Cost\ of\ sales}$
Receivables conversion period	$Receivables\ conversion\ period = \frac{Receivables\ * 365}{Revenue}$
Payables conversion period	$Payables\ conversion\ period = \frac{Payables\ * 365}{Revenue}$
Operating cycle	*Operating cycle = Inventory conversion period + Receivables conversion period*
Operating return on assets	*Cash conversion cycle = Operating cycle – Payables conversion period*

Source: adapted from Ref. (Kaplan, 2018)

Capital conversion period allows for assessing the intensity with which the entrepreneurial activity of the company is carried out. The inventory conversion period reveals the effectiveness and quality of inventory control and identifies any unused reserves that remain. The drop can be caused by the buildup of surplus inventory. The greater the ratio, i.e., the quicker consumers pay off debt, the better for the business. The receivables conversion period assesses the efficacy of working with customers about the recovery of accounts

receivable and represents the company's policy for credit sales. The days the company repaid payables each year are shown by the payable conversion period. The longer the cycles, the more money the company will need and the more expensive the financing will be. When analysing the dynamics of the operating cycle durability components and proceeding a cycle management strategy, it is important that it reflects the objective business processes, which may result in an expansion of the operating cycle.

Cash ratios

By contrasting the cash flows, necessary to analyse the balance sheet, the cash flow statement and the income statement. Performance ratios and coverage ratios are two subcategories of cash flow ratios (Kaplan, 2018). Table 20 shows performance ratios and coverage ratios.

Table 20
O&G Firms' Performance and Coverage Indicators

Performance ratios	
Cash to income	$Cash\ to\ income = \frac{CFO}{Operation\ income}$
Cash return on equity ratio	$Cash\ return\ on\ equity\ ratio = \frac{CFO}{Average\ equity}$
Cash flow to revenue ratio	$Cash\ flow\ to\ revenue\ ratio = \frac{CFO}{Net\ revenue}$
Cash return on assets ratio	$Cash\ return\ on\ assets\ ratio = \frac{CFO}{Average\ assets}$
Coverage ratios	
Dividend payment ratio	$Dividend\ payment\ ratio = \frac{CFO}{Dividends\ paid}$
Reinvestment ratio	$Reinvestment\ ratio = \frac{CFO}{Cash\ paid\ for\ long-term\ assets}$
Interest coverage ratio	$Interest\ Coverage\ ratio = \frac{CFO + interest\ paid + taxes\ paid}{Interest\ paid}$
Debt coverage ratio	$Debt\ coverage\ ratio = \frac{CFO}{Total\ debt}$

Source: adapted from Ref. (Kaplan, 2018)

Bankruptcy tests

Analysis of the company's bankruptcy assesses financing activities. There are numerous models for forecasting bankruptcy that can be used to estimate and pinpoint the enterprise's potential level of solvency. While no single bankruptcy model can be deemed flawless for the objectivity of the whole analysis taking into account some models, the major objective of

diagnosis is the condition of early making choices that will lessen the financial process's negative effects. Table 21 shows bankruptcy tests:

Table 21
O&G Firms' Bankruptcy Tests

Altman's Model	*Z = -0.3877 – 1.0736 X1+0.0579 X2* *X1 - current assets/current liabilities* *X2 - debt ratio*	*Z > 0.3 high* *Z -0.3 ÷ 0.3 possible* *Z < -0.3 low* *Z = 0 50%*
Taffler's Model	*Z = 0.53 X1 + 0.13 X2 + 0.18 X3 + 0.16 X4* *X1= profit before taxation / short-term liability* *X2 = working capital / liability* *X3 = short-term liability / assets* *X4 = revenue / assets*	*Z > 0.3 low* *iZ = 0.2 ÷ 0.3 possible* *Z < 0.2 high*
Liss's Model	*Z = 0.063 X1 + 0.092 X2 + 0.057X3 + 0.001 X4* *X1 = working capital / assets* *X2 = operation income / assets* *X3 = retained earnings / assets* *X4 = equity / debt capital*	*Z < 0.037 high* *Z ≥ 0.037 low*
Springate's Model	*Z = 1.03 X1 + 3.07 X2 + 0.66 X3 + 0.4 X4* *X1 = working capital / assets* *X2 = profit before tax / assets* *X3 = profit before tax / short-term liability* *X4 = sales / assets*	*Z < 0.862 high* *Z ≥ 0.862 low*

Source: adapted from Ref. (Apa, 2018; Druzi, 2013; Agarwa, 2007; Peter, 2011)

The solvency of the company, balance sheet liquidity, and balance cash flow are all examined in the analysis of the likelihood of bankruptcy. Summative assessment also offers information on the company's financial health and solvency, future projections, and the anticipated likelihood that it would file for bankruptcy.

Linear regression analysis

The associations between independent and dependent factors are investigated by the linear regression analysis programme (Geron, 2019). In order to predict the dependent variables from the independent variables, the algorithm then makes use of this knowledge. Financial indicators are the dependent variables, while the study periods are the independent factors. With this method, there is a relationship between the independent and dependent variables (x is the x1, x2, ...xn independent variables and y is the dependent variable). After that, a regression analysis is conducted on the complete dataset. Indicators of the regression's fit quality are obtained in order to evaluate its efficacy (Heijden, 2022). In determining to predict O&G firms' financial indicators, the following formula was used regression line:

$$y = bx + a \quad (1)$$

Where:
y - dependent variables are financial indicators,
x - independent variables are the study periods,
b - regression ratio.

Correlation indicator shows the relationship between the financials indicators and bankruptcy:

$$R = \frac{n\sum xy - \sum x \sum y}{\sqrt{(n\sum x^2 - (\sum x)^2)(n\sum y^2 - (\sum y)^2)}} \quad (2)$$

Where:
y - dependent variables are financial indicators,
x - independent variables are the study periods.

The coefficient of determination (R^2) shows how well a statistical model predicts its target outcome. A model achieves better prediction accuracy when its R^2 value approaches 1. The Variance Inflation Factor (VIF) serves as a statistical tool which helps researchers detect multicollinearity problems in regression models, according to O'Brien (2007). The occurrence of multicollinearity in regression models happens when two or more independent variables show a strong statistical correlation with each other. The dependent variable becomes challenging to analyse because multiple predictors share similar variance patterns when their correlation levels are high.

$$VIF = \frac{1}{1-R^2} \quad (3)$$

Where: R^2 - the coefficient of determination

Rule of thumb to interpret VIF values: 1 = not correlated, 1 to 5 = moderately correlated, 5 to 10 = highly correlated, 10 or higher = overly correlated.

Variables in research

The analysis of correlations helps researchers understand the relationship between sustainability performance and financial outcomes. European O&G firms need to present complete performance data from financial reports and sustainability reports to stakeholders who want a full understanding of their sustainability initiatives and financial performance. The analysis shows stakeholders require complete data sets that merge financial and non-financial information to evaluate Organisational sustainability and total value effectively. The relationship between financial disclosure and sustainability reporting forms an essential part of corporate reporting systems which ensure accountability.

The investment decisions of investors depend on both the information found in accounting reports and the content of sustainability reports, according to Carnevale and Mazucca (2014). The research examines financial performance relationships with E/S through an analysis of these reports. Financial reporting and sustainability reporting maintain a crucial relationship which supports corporate disclosure practices and accountability systems. Investors use both financial reports and sustainability reports to guide their investment choices because these reports deliver separate yet useful information about company performance. Sustainability reports maintain different levels of standardisation compared to annual reports, which follow established formats.

Below is a summary table of the interviewees' roles, institutional affiliations, and the interview logistics. This table 22 ensures transparency while protecting anonymity:

Table 22
Interview with Participants

INT		Date	Type of your organisation	Professional role	Mode
1	England	04/11/2025	Investment company	Financial analyst	In-person
2	England	04/15/2025	Oil and gas company	Head of department	In-person
3	England	04/15/2025	Consulting firm	Strategic Business Analyst	Record responses
4	England	04/15/2025	Investment company	Auditor	In-person
5	England	04/16/2025	Consulting firm	Director of Financial Crime Risk Management	In-person
6	France	04/16/2025	HEI	Graduate	Record responses
7	Sweden	04/16/2025	Oil and gas company	Engineering	In-person
8	Italy	04/16/2025	Consulting firm	Engineering in oil and gas	In-person
9	Kazakhstan	04/22/2025	Education	Business owner	In-person
10	England	04/23/2025	Investment company	Non-executive director	In-person
11	England	04/24/2025	HEI	Head of department	In-person
12	Spain	04/12/2025	Facility management	Administrator	In-person
13	Spain	04/24/2025	Electronics	Incidence Manager	In-person
14	Wales	04/28/2025	Oil and gas company	Financial analyst	In-person
15	England	04/25/2025	Biomedical research	Finance manager	In-person
16	Russia	04/29/2025	Employment centre	Specialist	In-person
17	England	04/29/2025	Oil and gas company	Financial analyst	In-person
18	England	04/30/2025	Construction company	Financial analyst	Record responses
19	Russia	04/30/2025	Consulting firm	Head of department	Record responses
20	England	05/01/2025	Investment company	Consultant	In-person
21	Austria	05/02/2025	Investment company	Head of department	In-person
22	England	05/02/2025	Consulting firm	UX Analyst	In-person
23	England	05/03/2025	Consulting firm	Financial analyst	In-person
24	Pakistan	05/06/2025	Consulting firm	Head of HR	In-person
25	Denmark	05/06/2025	Investment company	Head of department	Record responses

26	England	05/07/2025	Consulting firm	Business owner	Record responses
27	England	05/07/2025	Bank	Risk Analyst	Record responses
28	England	05/07/2025	Consulting firm	Account Manager	Record responses
29	England	05/07/2025	Investment company	Head of department	Record responses
30	Russia	05/07/2025	Logistics	Accountant	In-person
31	Russia	01/09/2000	Mechanical engineering company	Administrative Manager	In-person
32	England	05/08/2025	Accountancy firm	Chartered Accountant	Record responses
33	England	05/08/2025	Investment company	Financial analyst	Record responses
34	England	05/08/2025	Consulting firm	Lawyer	In-person
35	England	05/08/2025	Nursing Home	Business owner	In-person
36	Ukraine	05/01/2025	Investment company	Data analyst	In-person
37	England	05/09/2025	Investment company	Financial analyst	Record responses
38	Scotland	05/11/2025	Consulting firm	Head of department	Record responses
39	England	05/12/2025	Commercial Organisation	Jurisconsult	In-person
40	England	05/12/2025	Investment company	Head of department	In-person
41	Russia	05/12/2025	Semiconductor company	Architect	Record responses
42	Russia	05/17/2025	Investment company	Manager	Record responses
43	France	05/22/2025	Embassy	Administrator	Record responses

The semi-structured interview guide was developed based on the study's research questions and theoretical framework. It was reviewed by two academic supervisors. Their feedback informed the rewording of questions and sequencing to better suit a range of institutional actors. Most interviews were conducted in English, but Spanish and Russian languages as well. Transcripts were reviewed post-session for accuracy. The research used third-party translation services were required, but care was taken during transcription to preserve meaning, especially with technical or institutional language.

The study analysed 99 annual reports and 99 sustainability documents. The firms included in the sample for this study were selected based on their presence in the 2022 Fortune Global 500 ranking, which lists the world's largest corporations by total revenue. Specifically, European O&G firms from the United Kingdom, France, Finland, Italy, Norway, Spain, and Germany were chosen to represent the empirical domain of the research. The selection criteria ensured that each company had publicly available annual financial reports for the period between 2015 and 2021.

In total, the final sample consisted of 11 European O&G firms. Data for the study were extracted from eleven main sources (Shell, 2023; TotalEnergies, 2023; BP, 2023; Fortum, 2023; Enel, 2023; Equinor, 2023; Engie, 2023; Repsol, 2023; Iberdrola, 2023; Anglo American, 2023; EnBW, 2023), including annual reports, sustainability reports, and other publicly disclosed corporate documents.

The International Financial Reporting Standards (IFRS), which have been embraced by all EU member states for the compilation of consolidated financial statements for listed corporations, are used by all of the sample firms (UNCTAD, 2008). Comparability and transparency of financial data between businesses and nations are guaranteed by the adoption of IFRS. A single set of worldwide accounting standards is essential for fostering economic growth and strengthening global financial integration, as highlighted in a poll conducted by the worldwide Federation of Accountants (IFAC) (Atabey, 2014). Every document was posted on the official website without any issues. Through the cross-referencing of interview data with documentary information, triangulation was used.

4.4 Coding and Analysis Scheme

The process of developing and validating a coding framework for financial and non-financial indicators requires a structured methodology to organize and understand multiple performance metrics which affect business outcomes and market standing. The integrated method recognises that financial performance needs to be evaluated together with multiple non-financial elements which include environmental and social criteria and operational efficiency and innovation capabilities and brand power.

The development of financial and non-financial indicator coding schemes requires multiple cycles of work which needs complete comprehension of business performance through quantitative and qualitative methods. The system needs to remain flexible for various business sectors yet establish uniform methods for complete assessment.

4.4.1 Creating a coding scheme for financial indicators

European O&G firms require thorough financial document analysis through multiple financial reports to determine their business health and operational performance and strategic initiatives. The analysis serves stakeholders who include investors and analysts and competitors to support their decision-making processes. The analysis of European O&G firms' financial documents requires understanding their specific sector challenges and opportunities which stem from regulatory shifts and environmental rules and oil price instability and renewable energy adoption. The complete evaluation method delivers a complete understanding of business financial stability and market standing and growth prospects. Table 23 shows financial ratios and bankruptcy tests:

Table 23
Financial Ratios and Bankruptcy Tests

Liquidity ratios	*Solvency ratios*
1. Current ratio 2. Quick ratio 3. Cash ratio	1. Financial leverage 2. Debt-to-Equity ratio 3. Debt-to- Capital ratio
Profitability ratios	*Activity ratios*
1. Net profit margin 2. Return on assets 3. Return on equity 4. Gross profit margin 5. Pretax margin 6. Operating return on assets 7. Operating profit margin	1. Capital conversion period 2. Inventory conversion period 3. Receivables conversion period 4. Payables conversion period 5. Operating cycle 6. Operating return on assets

Bankruptcy tests	*Cash ratios*
1. Taffler's Model (UK) 2. Liss's Model (UK) 3. Altman's Model (USA) 4. Springate's Model (USA)	1. Cash to income 2. Cash return on equity ratio 3. Cash flow to revenue ratio 4. Cash return on assets ratio 5. Dividend payment ratio 6. Reinvestment ratio 7. Interest Coverage ratio 8. Debt coverage ratio

Source: the author uses the information gathered.

A confidence interval (CI) is a statistical range that quantifies the uncertainty of an estimate, providing an interval within which the true population parameter is expected to fall with a specified probability. A CI is a statistical range estimating where the true population parameter is likely to fall with a specified probability. Lika and Kooijman (2024) highlight profile-based interval estimates, addressing model plasticity and stochastic uncertainty in deterministic models. Kamae et al. (2014) applied CI estimation to Incremental Cost-Effectiveness Ratios (ICERs) using exponential and quadratic modeling. Aranishi and Ikeda (2015) refined conventional ICER confidence intervals, solving issues of undefined or overly broad ranges.

The function of CIs in clinical trials is highlighted by Agarwal and Rifkin (2022), who also explain statistical significance in hazard ratios. In order to increase the accuracy of CI estimate, their model uses curve-fitting approaches, including exponential and quadratic functions. By applying statistical analysis to financial data, the coding of 31 financial ratios utilising CI theory ensures sound decision-making.

$$CI = \overline{x} \pm t_{\frac{\alpha}{2},n-1} * \frac{s}{\sqrt{n}} \quad (4)$$

where:
$\overline{x}$ = sample mean
$t_{\frac{\alpha}{2},n-1}$ = critical value from the t-distribution with n−1 degrees of freedom
s = sample standard deviation
n = sample size

The analysis of these indicators is divided into three separate time periods: the "Past" period reconstructs the average of the indicators prior to the most recent reporting period; the "Present" period assesses the indicators' values as of the most recent reporting date; and the "Future" period projects the anticipated values of these indicators one year beyond the reporting date, utilising linear regression for estimation. Each financial position indicator's values are allocated as follows: "+2" means very good; "0" means bad; and "+1" means good.

For each period (t), the confidence interval for a financial ratio (R) is calculated:

$$CI_t = \overline{R}_t \pm Z_{\frac{\alpha}{2}} * SE(\overline{R}_t) \quad (5)$$

where:
$\overline{R}_t$= mean financial ratio for the period tt (Past, Present, Future)
$SE(\overline{R}_t)$ = standard error of the financial ratio

$Z_{\frac{\alpha}{2}}$ = critical value for the confidence level (95% CI)
For the Future period, the research estimate $\overline{R}_{future}$ using a linear regression model:

where:
β_0 = intercept of the regression model
β_1 = trend coefficient based on past data
t = time

Each financial ratio is categorized into five levels based on its position relative to its confidence interval (CI) shows in table 24.

Table 24
General Scoring Logic

Score	Criteria (Position Relative to CI)
+2 (Very Good)	Ratio is significantly above the upper bound of the CI ($R > CI_{upper}$)
+1 (Good)	Ratio is below mean but within CI ($CI_{lower} \leq R < CI_{upper}$)
0 (Bad)	Ratio is significantly below the lower bound of CI ($R < CI_{lower}$)

Source: the author uses the information gathered.

The final outcome of financial indicators depends on several elements which include industry type and analytical methods and time frames and Organisational strategic objectives. The analysis of past financial indicators helps businesses understand market patterns and evaluate their operational stability. The predictive power of historical financial indicators reaches only between 20-40% because they fail to reflect present market situations and Organisational strategic shifts. Fama & French (1992) demonstrated that historical financial indicators influence future profitability, but their impact is constrained. Lev & Zarowin (1999) argued that traditional financial reporting is losing its predictive value, especially for high-growth firms.

In O&G firms, financial indicators have the greatest influence (50%). Kaplan & Norton (1996) developed the BSC, proving that current financial and non-financial indicators directly correlate with future performance. Penman (2012) highlights that return on equity (ROE) and profitability are key drivers of a company's value. Financial forecasts can significantly influence company valuation (30-50%). Koller et al. (2020) show that future cash flows have a strong impact on a company's market capitalization.

The confidence interval (CI) provides financial estimates with uncertainty measurements that establish probable indicator value ranges for enhanced evaluation reliability. The research of Lika and Kooijman (2024) demonstrates how profile-based CIs improve the modeling of systems with built-in uncertainty while Kamae et al. (2014) and Aranishi and Ikeda (2015) developed methods to calculate Incremental Cost-Effectiveness Ratios (ICERs) with more precise intervals that address wide or unclear ranges. The research of Agarwal and Rifkin (2022) explains that when financial indicators between firms show overlapping confidence intervals it indicates statistical uncertainty rather than non-significance.

Historical data serves as a basis for trend evaluation but its ability to forecast future events remains restricted. The financial indicators in O&G operations represent the most significant factor at 50% of the total weight. The combination of forecast data with non-

financial information from Kaplan & Norton's BSC system produces better predictive results which affect both valuation processes and strategic planning activities.

4.4.2 Creating a coding scheme for sustainability indicators

One of the choices which must be made when conducting a content analysis study is to decide which documents to analyse (Unerman, 2000). Environmental or social information can be disclosed in a variety of types of reports such as annual reports, company brochures or special interest reports (Zeghal & Ahmed, 1990) as well as via standalone sustainability reports. While all these sources of information should ideally be used to capture the organisation's social and environmental disclosure (Gray et al, 1995). Table 25 shows social and environmental sustainability constructs:

Table 25
Social and Environmental Sustainability Constructs

Social	**Environmental**
Labour practices	*Emissions*
1. Employ Health and Safety programs 2. Encourage employee diversity 3. Establish supplier code of conduct 4. Source responsibly - ethically 5. Train on anti-corruption 6. Train and educate employees	1. Reduce carbon footprint 2. Reduce fuel consumption 3. Reduce GHG emissions 4. Reduce other gases emissions 5. Response to oil Spills
Human rights /society	*Supply Chain*
7. Engage employees 8. Conduct community support activities 9. Commit to employees	6. Assess/evaluate suppliers 7. Collaborate with suppliers 8. Procure sustainably (environmental purchasing) 9. Source locally
	Materials Consumption
	10. Reduce waste production 11. Reduce water consumption 12. Reduce packaging 13. Reduce consumption of resources 14. Reduce energy consumption 15. Use Renewable energy 16. Account for biodiversity 17. Recycle waste 18. Recycle water 19. Reuse resources 20. Use recyclable 21. Make product LCA (Life Cycle Assessment) 22. Use alternative modes of transportation (fuel) 23. Certify to ISO 14001 standard

Source: Final list of sustainability indicators (Abd El-Rahman, 2019)

The researchers develop their coding system before starting the actual coding process. Weber (1990) presents a method to create and validate and implement coding schemes which helps minimise rater bias during content analysis at its critical stage. The Weber Protocol appears frequently in academic literature so the research follow these steps for coding:

1. The research used "themes" as their coding unit according to Tangpong (2011). The researcher applied Papoutsi's (2018) 32 indicators to locate each indication throughout the primary text where indications appear as multiple related phrases within coherent sections. The disclosure of sustainability report themes appears throughout different sections of the document. The researcher implemented theme-level coding to verify that all presented information received proper documentation.

2. The researchers established the research domains: All text analysis requires content categories because they define the essential conceptual frameworks (Tangpong, 2011). The majority of statistical operations need distinct categories which must be clear to all users.

The analysis results become unreliable when recording units receive dual classification because both categories appear in the same statistical analysis. The development of content categories depends on the definition of the studied concept. The research of Papoutsi (2018) examined two established multi-dimensional constructs which included social and environmental sustainability. The two constructs consist of 32 distinct content categories. The list of individual social and environmental sustainability constructs appears in Table 26.

The qualitative data coding process integrated both deductive and inductive methods. The researchers started with deductive coding based on the TBL theoretical framework which divides into economic and environmental and social elements. The researchers applied deductive coding to existing theory before using inductive coding to identify new themes which included stakeholder dialogue and carbon capture technology innovation and climate risk disclosure practices in sustainability reports.

The researcher applied both deductive theory-based and inductive data-based coding methods to achieve complete qualitative data representation. The study used AntConc as a corpus analysis tool to perform qualitative content analysis of sustainability reports through systematic text data coding. The research applied a structured coding system which integrated deductive and inductive methods to detect both theoretical constructs and new themes in the qualitative data. The research followed:

1. The research gathered 110 independent sustainability reports from 11 European O&G firms spanning from 2015 to 2022. The researchers converted all reports into plain text (.txt) format to make them workable with AntConc.

2. The researchers established their first set of categories and codes through the Weber (1990) framework.

3. The AntConc concordance Tool and word Frequency Lists and collocation Analysis helped researchers find key terms and their surrounding text in the corpus and identify frequent sustainability terms and word combinations to develop their initial codes.

4. The researchers discovered new themes through keyword context evaluation which included climate risk disclosure and low-carbon technology innovation so they added these themes to the coding framework.

5. The researchers applied specific codes to text segments which contained relevant themes through short paragraphs or individual sentences. The researchers established binary or scaled indicators through the identification of quantitative targets and explicit initiatives which included "20% reduction in emissions by 2025" and "community investment programs."

6. Example of Coding Transformation: The company has set a goal to reach carbon neutrality across all operations by 2050 while achieving a 12% reduction in Scope 1 emissions since 2018. Assigned Codes: Environmental Sustainability – Carbon Neutrality Commitment (Presence = 1) Environmental Performance – Emissions Reduction (Scored based on %

achieved) The application of AntConc enabled a transparent and replicable coding process which produced objective sustainability theme extraction for creating quantifiable indicators for investment attractiveness ranking model analysis.

Non-financial indicators have emerged as essential drivers of long-term corporate value during the past several decades. The evaluation approach together with business sector and strategic goals determine how these factors affect Firms. The evaluation of historical non-financial indicators (ESG ratings from previous years) remains important but their power to influence firms is restricted because Firms can modify their plans.

The research by Eccles et al. (2014) shows that Firms with high ESG ratings and strong corporate culture and innovative practices will achieve better financial results in upcoming years. Research combining thirty studies shows that ESG indicators from past years create positive financial relationships but their total effect remains below 30-35% according to Orlitzky et al. (2003). The current non-financial indicators (60%) hold the greatest weight because investors together with regulators and consumers evaluate firms through their actual actions instead of their past statements (Ioannou & Serafeim, 2012). Kaplan & Norton (1996) established that financial performance directly results from current non-financial indicators which include customer satisfaction and corporate culture and innovation metrics.

The researcher conducted multiple readings of all interview recordings before starting the transcription process. The researcher wrote initial notes in the margins to record their first thoughts and repeated concepts. The researcher applied line-by-line open coding through NVivo to analyse 12 transcripts during the first stage. The researcher developed three initial codes which included "Country/Regional Differences" and "Suggestions for Improving the Model" and "Respondent's Attitude Toward TBL Model." The researcher organised similar patterns into potential themes through code grouping. The researcher combined agreement and conformation and totally agreement codes into a single theme which focused on "Respondent's Attitude Toward TBL Model."

The researcher checked all data points against the complete dataset for theme validation. The researcher combined "Country/Regional Differences" with "Emotional/Value-Based Motivations" into a single theme which they named "Criticism or Limitations of the TBL Model." The researcher defined each theme with precision to guarantee it contained a fundamental organising concept. The researcher enhanced the descriptive labels to achieve analytical value. The research questions received their thematic connections, which formed part of the analytical story. The researcher applied multiple methods to preserve coding reliability. The researcher performed double coding on selected transcripts after a week to verify code stability.

The researcher documented all coding choices and modifications through the use of memos. A qualitative researcher's peer debriefing session provided outside evaluation of the thematic coherence. The thematic structure followed the fundamental research questions of the study. The research question "How do environmental, social and financial elements affect European O&G firms' sustainability evaluations during crisis situations?" relates to adaptive business practices and stakeholder differences in opinion. The thematic connections between these elements receive detailed examination in Chapters 5 and 6.

The research will employ thematic analysis to discover recurring patterns which stakeholders express about sustainability. The initial open coding process of interview data identifies essential phrases and essential insights and recurring concepts about investment attractiveness and sustainability indicator validity and TBL dimension significance. The open codes receive organisation into axial codes which form categories that include TBL relevance assessment and sustainability reporting obstacles and industry-related obstacles.

The hierarchical framework unites both code sets for researchers to evaluate reported practices from content analysis against interview-based stakeholder perspectives. NVivo will

use its coding framework to identify essential themes which appear in both expert interviews and sustainability disclosure documents. The researchers conducted thematic analysis on sustainability reports and interview transcripts through Braun and Clarke's (2006) structured method. The analysis followed a deductive approach based on TBL theory yet allowed researchers to discover new subthemes inside each dimension through inductive methods. The research process consisted of six essential steps:

1. The researcher spent time reading and re-reading all reports and transcripts to develop deep knowledge of the data.

2. The researcher applied NVivo 12 software to perform initial coding which followed TBL categories for economic, environmental and social dimensions while adding new codes that represented stakeholder priorities and disclosure shortfalls.

3. The researcher organized the collected codes into wider conceptual categories during this stage. The "Environmental" dimension contained three specific codes which became the foundation for the "Environmental Impact Management" theme.

4. The researcher evaluated themes for both internal consistency and external separation to confirm that each theme received sufficient evidence from the data. The researcher performed multiple cycles of reviewing the coded material.

5. The researchers established clear definitions for themes while adding subthemes when necessary (e.g. Social Responsibility contained Employee Wellbeing and Community Engagement as its subthemes). 6. The report presentation linked themes to study objectives through the use of anonymized quotes and examples. NVivo enabled researchers to manage their coded data through systematic Organisation and retrieval and theme relationship visualization.

4.5 TBL framework for investment attractiveness

The classification of IAM is determined through a ranking method that assigns scores to both qualitative and quantitative indicators. This method systematically evaluates the data to rank investment opportunities accordingly. TBL theory is a valuable framework for assessing and calculating investment attractiveness (Verwaal et al., 2022).

The TBL is a framework linked to sustainable development that is used in this study to explain the social and environmental performance of this sector of the economy. It refers to the social, environmental, and economic value or impact of an investment (Hammer & Pivo, 2017). The basic assumption of the TBL is that the three kinds of capital (social, environmental, and economic) must all be renewed, for an activity to be called sustainable (Laasch and Conaway, 2017). However, one of the main difficulties is the absence of a universal or standard method for calculating the TBL or the measures comprised within each of the three TBL categories (Heim, et al, 2022).

The TBL approach emphasises the importance of balancing financial profitability with environmental responsibility and social impact (Svensson, 2018). TBL framework is a multifaceted and influential approach that has gained prominence in the realm of sustainability and CSR (Isil, 2017). It is often regarded as a valuable lens through which to evaluate investment attractiveness, particularly in industries with complex economic, environmental, and social dynamics, such as the O&G sector. The TBL approach has been widely adopted and acknowledged in both practice and research (Svensson, 2018). It has been used to assess and improve corporate sustainability performance (Sánchez-Chaparro, 2022) and to guide decision-making in areas such as product design, reverse logistics optimisation (Budak, 2020), and sustainable innovation (Longoni, 2016).

Prior studies have been conducted to investigate the impact of lean principles on Organisational performance (Alsawafi et al., 2021), financial performance (Shaw et al., 2021),

social performance (Chavez, 2022; Alonso-Martinez et al., 2021; Kumar et al., 2021; Wilhelm, 2015) and environmental outcome (Aigbedo, 2021; Liute & De Giacomo et, 2012). Nonetheless, these studies focused on the area of the impact of lean manufacturing on all three dimensions of sustainability (Jum'a, 2022).

Elkington (1997) emphasised the importance of an equal distribution of factors but noted that in resource-intensive industries, such as O&G, the economic aspect would prevail. Slaper & Hall (2011) pointed out that in the O&G sector, the economic component often accounts for 40-50%, while environmental and social aspects are assessed at around 20-35%. Norman & MacDonald (2004) argued that O&G firms tend to focus more on financial performance, with environmental and social factors remaining secondary. Kazancoglu et al. (2019) suggested strengthening CSR initiatives, as O&G firms have a significant impact on local communities. Mastrocinque et al. (2022) noted that with the advancement of decarbonisation and ESG standards, the weight of the environmental factor in the O&G industry is increasing.

The TBL framework, encompassing economic, environmental, and social dimensions, was explicitly integrated into the analytical phase. Predefined parent codes were created in NVivo for each TBL pillar. Sub-codes were then developed iteratively during analysis. These codes helped sort data systematically and allowed for comparative analysis across the three dimensions of investment attractiveness.

A hybrid coding strategy was used. Deductive (theory-driven) coding stemmed from the TBL framework, ensuring alignment with existing sustainability literature. However, inductive (data-driven) coding was employed within each TBL category to allow new insights to emerge from participant narratives and document reviews. For example, while "sustainability" was a predefined environmental code, the sub-code "temporary green compliance" emerged inductively from multiple references to performative environmental practices.

Specific interview and document data were matched to the three TBL pillars. Economic: One international investor (INT-27) described how inconsistent tax regimes "reduced long-term investor confidence," directly coded under investment risk. Environmental: Business owner (INT-12) noted, "Environmental audits were rushed or bypassed," which was categorised under regulatory compliance and ecological degradation. Social: In sustainability reports, local distrust in foreign-led infrastructure projects was noted, coded under community engagement and social licence to operate. These examples demonstrate how both interview data and institutional documents were cross coded within the TBL framework to assess multi-dimensional factors influencing post-crisis investment attractiveness.

IAM Specification is calculated:

$$IAM = F_i + S_i + E_i \tag{5}$$

Variables:

– Financial: $F_i = 0.2 * F_{past} + 0.5 * F_{present} + 0.3 * F_{future}$ (6)

– Social: $S_i = 0.4 * S_{past} + 0.6 * S_{present}$ (7)

– Environmental: $E_i = 0.4 * E_{past} + 0.6 * E_{present}$ (8)

Data sources: Annual reports, Sustainability reports
Weights: Equal weighting (⅓ each pillar).
Normalisation: Indicators scaled to 0–2 range for comparability.

The TBL pillars received their weight distribution through an exploratory research process which combined statistical methods with theoretical approaches. The analysis used Principal Component Analysis (PCA) to study variable relationships and determine how financial and environmental and social elements affect total performance variability. The analysis revealed that no single pillar controlled the variance distribution which validated the assumption of equal importance between dimensions.

The research adopted equal weighting as its method because sustainability theory supports equal value creation from all three pillars (Purvis et al., 2019; Ranjbari et al., 2021). The composite Investment Attractiveness Score benefits from equal weighting because it prevents users from introducing personal preferences when determining which pillars to prioritize. The overall ranking of firms proved stable when researchers applied different weighting schemes that changed pillar weights by 20% during sensitivity tests. The methodological approach achieves statistical neutrality through equal weighting which supports the theoretical requirement for TBL dimensional balance.

The six-level IAM shows high value for the O&G sector because it handles complex risk factors and high capital requirements and changing sustainability standards. The model enables investors and stakeholders to conduct comprehensive assessments of firms through multiple financial and environmental and social criteria which goes beyond basic evaluation methods.

The Author in Koller et al. (2020) support the use of detailed risk-adjusted assessments in capital-intensive industries through their emphasis on multi-tiered investment models. The Author Ioannou & Serafeim (2014) demonstrate that Firms with solid sustainability and governance systems perform better during market instability which requires a detailed investment evaluation system. The Author in Mastrocinque et al. (2022) state that O&G firms need to demonstrate their progress toward sustainable energy transition goals because of increasing decarbonization initiatives. Table 26 shows the six-level IAM:

Table 26
The Six-Level IAM

Indicator	Investment attractiveness
105 ÷ 126	Market Leaders
84 ÷ 105	Stable Investments
63 ÷ 84	Emerging Opportunities
42 ÷ 63	Moderate Risk Investments
21 ÷ 42	Speculative Investments
0 ÷ 21	High-Risk Investments

Source: the Author' calculation using the information gathered.

The six-level IAM delivers a complete evaluation system which considers risk factors and sustainability aspects to match the financial and operational and ESG requirements of the O&G sector. The model enables investors to choose between leaders and stable investments and emerging opportunities and moderate risks and speculative investments and high-risk firms. The structured method improves both decision-making clarity and accuracy because it operates in a sector that faces substantial changes.

4.6 Limitations and Ethical Considerations

4.6.1 Limitations of the Study

The research depends on sustainability and financial reports that O&G firms make available to the public. The quality of sustainability reports together with their level of detail and transparency varies because firms use different reporting standards and disclosure practices. The reliability of research results becomes compromised when firms practice greenwashing by exaggerating their sustainability initiatives to attract investors. The TBL framework requires researchers to evaluate three performance indicators which include financial data and environmental and social metrics.

The lack of standardized reporting metrics among different firms makes it difficult to perform direct performance assessments. The financial indicators follow established accounting standards, but social and environmental metrics exist without universal definitions and present inconsistent reporting practices. The research design combines content analysis with interviews and regression analysis through a mixed-methods approach, but researchers need to recognise specific methodological limitations. The convergent design method provides useful results from previous studies, yet it requires extensive time and depends on consistent data availability between research stages.

The qualitative research phases including coding and thematic analysis require interpretation which introduces researcher bias even when researchers use structured frameworks. The research depends on corporate sustainability reports as its primary data source. The essential role of corporate sustainability reports for TBL assessment comes with limitations because firms self-report data which might contain biased information selection. The reporting process of firms includes choosing to display positive results while hiding or minimizing their negative performance data which creates potential data biases and gaps.

The accuracy of these reports depends on each company's reporting transparency and maturity level because sustainability officers validate and explain the reported information. The O&G industry faces quick changes because of new regulations and changing investor interests and worldwide political instability. The study framework fails to detect how external events such as energy emergencies and price volatility and environmental policy changes affect investment appeal in the sector. The industry faces challenges in meeting sustainability targets because its dependence on fossil fuels creates barriers for progress.

The research examines European O&G firms which operate under established market and regulatory systems. The research provides valuable knowledge about sustainability and investment potential in the sector, but its findings may not directly apply to O&G businesses operating in regions with distinct regulatory systems and economic conditions and stakeholder requirements. The research selected 11 major European O&G firms for analysis based on their availability of sustainability and financial data. The research sample includes various European countries and industry segments, but it does not represent all global O&G operations.

The research results might not apply to European firms or Firms operating under different regulatory systems and social or environmental settings. The research findings provide essential European market-specific insights which can serve as a starting point for future studies examining other geographic areas. The research examines financial and sustainability reports from 2015 to 2022. The attractiveness of investments evolves through time because of enduring patterns and technological progress and changing policies. Future research needs to conduct extended time-based studies that monitor sustainability initiatives across multiple years.

4.6.2 Ethical Considerations

The research uses financial reports and sustainability reports which are accessible to the public. The subjective nature of sustainability reporting creates a risk of researcher bias when analysing qualitative data. The study will use systematic coding frameworks for content analysis and multiple coders will verify results to achieve data consistency. The research needs to handle financial data and environmental and social information with complete objectivity while maintaining full transparency during their analysis.

The research needs to present all data assumptions and limitations in a clear manner to establish valid research results. The research maintains its integrity by avoiding any alteration of data to confirm pre-existing research hypotheses. The study needs to deliver an impartial evaluation of investment potential and sustainability while recognizing both positive and negative aspects of the TBL framework when applied to the O&G sector. The researcher needs to reveal any business relationships with studied firms and funding sources from industry Firms.

The research needs to maintain complete academic independence and neutrality because it affects the validity of the study. The research needs to handle the study results with care when they present their findings about investment potential and sustainability. The presentation of false results that are misleading or the selection of positive data points can create confusion among investors and policymakers and industry professionals. The research needs to follow ethical reporting standards because the conclusions must stem from the evidence presented.

The qualitative research component includes semi-structured interviews which the researcher conducts with sustainability officers or company representatives who have been designated for this purpose. The research participants receive a written consent document which explains the study goals and their research involvement and voluntary participation status and guarantees their confidentiality protection. The research obtains participant consent before starting data collection while providing participants with the right to leave the study at any point without facing negative consequences.

The researchers protect company secrets and maintain participant privacy through complete anonymization of all findings extracted from interviews and corporate documents during the final analysis. The research uses publicly available data to make necessary company references while avoiding all disclosure of proprietary business information. The research maintains complete security for interview recordings and transcripts which serve only for this research project. The interpretive content analysis and qualitative interviews in this study create a risk that my personal interpretation of results will influence the findings.

A reflexivity statement has been added to show my position and possible personal influence on the interpretation process. The research documented all analytical choices about coding criteria and theme development and data interpretation to improve the study's trustworthiness and enable replication of results. The research depends mainly on publicly accessible secondary data consisting of corporate financial reports and sustainability disclosures and interviews with corporate representatives about non-sensitive matters, so it did not need approval from a Research Ethics Committee or Institutional Review Board (IRB).

The research study works with non-vulnerable subjects and protects personal information and avoids experimental procedures while all interview participants gave consent before starting and received guarantees about their freedom to leave and data protection. A systematic coding framework based on the TBL theoretical model was used to Analyse content because it helped reduce my personal bias when interpreting qualitative data. The research recorded all my analytical choices and conducted self-reflection about how my existing beliefs and expectations might affect my interpretation of the data.

The research used three different data sources including content analysis results and interview responses and financial records to validate the interpretation results (Appendix III). The research methods implemented in this study maintained complete ethical standards while reducing personal influence and delivering transparent results that built trust in the research methodology.

1. The Participant Information Sheet and the Consent Form explained the exact nature of their participation while ensuring identity protection and stating that no proprietary business data would be revealed. The researchers obtained written consent from participants to fulfil all ethical requirements for research.

2. Confidentiality and Anonymity Measures. The research implemented multiple safeguards to safeguard participants, together with their institutional affiliations. The researchers used coded identifiers (INT-07 and Manager) to protect interview data from identification. The researchers removed all identifying information from direct quotes including company names and job titles, except when this information was already available in public sources. The research protected confidentiality by removing sensitive company information from non-public sources through verification with public documents.

3. Data Protection and Storage The research followed University of Reading data protection rules which met UK GDPR and Data Protection Act 2018 requirements. The University's MS365 license enabled Microsoft Forms to collect interview data through encrypted channels with restricted access. The research encountered potential power imbalances because many participating firms operated with hierarchical structures.

I handled these issues through three strategies: the research stressed that participation remained voluntary while maintaining complete confidentiality in all interactions and the research used non-directive open-ended questions to let participants steer the discussion, and the research analysed data by focusing on thematic patterns instead of all organisational levels. The research worked to achieve institutional balance through the inclusion of both mid-level staff and senior leadership participants. Research participants received mandatory data protection information about how their personal data would be processed under the University of Reading's authority.

The Participant Information document stated that all collected personal data, and confidential information would receive secure storage at the University while access remained restricted to authorised personnel. The Data Protection and Research web page contains additional information about data protection. The University manages all information collected through Microsoft Forms, which operates under their MS 365 license. The University's Microsoft contract contains provisions which guarantee that cloud service data processing meets all legal requirements for data protection.

The University of Reading controls data access through its MS Forms system which requires authentication of university accounts for access to shared data. The research depended on participants to recall and interpret events which might result in biased or distorted memories because of their natural tendency to remember past events differently. The research framework (TBL or institutional response theories) could influence how researchers understand the collected data. The research used peer debriefing as a method to reduce this risk.

Senior management and communications teams-controlled participant access to documents and participants, which influenced who could join the study and what information could be disclosed. The research handled these constraints by using multiple data sources and keeping detailed records of their analytical choices and reflective notes. The study maintains academic integrity and research credibility through its acknowledgement of limitations and ethical concerns, which advance European O&G industry sustainable investment research.

4.6.3. Reflection on the researcher's role or potential biases

The study depends on interpretive methods, which include content analysis and semi-structured interviews, so the research need to examine my position and possible biases. My academic background in sustainability and financial analysis and my professional interest in corporate transparency and ESG performance, enable me to analyse the TBL framework and investment choices. My academic background provides essential knowledge about the TBL framework and investment choices, yet it creates a risk of biased interpretation when analysing qualitative data by focusing on sustainability narratives that match theoretical predictions.

The research process included a reflexive method which served as a bias reduction strategy. The research process included reflexive journaling to record all assumptions and decisions and emotional responses during data collection and analysis. The research maintained constant awareness of my personal beliefs and preconceptions when the research analysed both subjective sustainability disclosures and conducted stakeholder interviews. The systematic development of coding schemes received peer review to guarantee both analytical consistency and complete transparency in the research process.

The study-maintained independence from investigated entities because the research maintained no professional or financial ties with the analysed firms. The process of participant selection might have been influenced by the gatekeeping function of communications departments which mediated my access to interview participants. The research included diverse Organisational positions to achieve balanced participant representation. The study maintains methodological rigor through positional awareness and uses triangulation and peer debriefing and transparent documentation to build credibility and trustworthiness in its findings.

Chapter 5: Data Analysis of European O&G Firms' Reports

5.1 Introduction to Data Analysis

In this chapter, the research presents the results of our empirical investigation into the investment attractiveness of European O&G firms, using the TBL framework as an organizing lens. Drawing on a sequential mixed-methods design (QUANT-QUAL), the research first analyses quantitative financial data to assess economic performance, then undertake qualitative content analysis of standalone sustainability reports to capture social and environmental dimensions. Finally, the research integrates these two strands through a comparative ranking method to reveal synergies and trade-offs between financial health and sustainability practices.

This chapter addresses all three core research objectives systematically. Objective 1, to evaluate the financial health of major European O&G firms, is fulfilled through the analysis of 31 financial indicators over a 10-year period (2014–2023), highlighting trends in liquidity, solvency, profitability, and bankruptcy risk. Notable findings include declining current and quick ratios and fluctuating profitability metrics, especially during the pandemic. Objective 2, to assess social and environmental sustainability performance, is addressed via content analysis of sustainability reports using a structured set of 32 indicators derived from Papoutsi (2018), capturing the extent and depth of disclosure across firms.

This analysis revealed moderate progress in reporting, with stronger attention to emissions and diversity, but a weaker focus on supply chain and spill management. Objective 3, to integrate financial and non-financial data using the TBL framework for assessing investment attractiveness, is realised through the development of a composite ranking index. The analysis combined standardised financial scores with sustainability scores to identify leaders (e.g., Shell and Total Energies) and potential trade-offs, where firms with strong financials underperformed on sustainability. These integrative insights illustrate how the TBL framework adds value beyond traditional financial evaluation alone.

Specifically, Section 5.2 examines a panel of 11 European O&G firms' annual reports (2015–2024), computing 31 key financial ratios—liquidity, solvency, profitability, activity and bankruptcy tests, and applying confidence intervals and linear regression to segment their "Past," "Present," and "Future" performance. Section 5.3 then analyses a corpus of 99 standalone sustainability reports (2015–2022) using AntConc to code social (e.g., labour practices, community engagement) and environmental (e.g., emissions reduction, resource efficiency) indicators into binary and scaled scores. In Section 5.4, the research juxtapose these quantitative and qualitative findings, employing a standardized scoring index and ranking method, to determine how financial robustness correlates with sustainability commitment, and to identify leaders and laggards in TBL performance.

By structuring the chapter in this way, the research provide a clear narrative: from the assembly and statistical treatment of hard financial metrics, through the systematic extraction of non-financial performance themes, to an integrated assessment that directly informs the TBL-based IAM developed in Chapter 6. This approach ensures transparency, replicability, and a holistic understanding of how European O&G firms balance profit with people and planet.

5.2 Analysis of Financial Indicators

The analysis of European O&G firms' financial performance during the last ten years evaluates their investment potential through essential economic indicators. The evaluation of company financial stability through liquidity and solvency and profitability and cash flow and bankruptcy risk assessment helps understand their ability to withstand external disruptions like

the pandemic. The financial baseline provides essential information for TBL analysis because it demonstrates how each company operates economically which is vital for sustainable investment choices. The research selected financial indicators to evaluate O&G sector corporate health through economic

TBL framework indicators which provide a complete assessment of company financial stability. The selected indicators stem from financial analysis literature (Kaplan, 2018, Altman, 1968; Beaver, 1966; Taffler, 1983) and corporate finance and investment analysis frameworks (Brigham & Ehrhardt, 2016; Penman, 2013). The analysis combines conventional financial metrics with predictive indicators to maintain academic strength and practical value which produces a dependable economic assessment within the TBL framework.

Eleven of the biggest (according to 2022 Fortune Global 500) European firms were analysed in relation to the following indicators for 10 years (2014 to 2023): liquidity, solvency, profitability, activity, cash indicators and bankruptcy ratios. The average indicators of 11 O&G firms for 2022 were calculated using linear regression. Their descriptive statistics are presented in Table 27 and Table 28.

Table 27
O&G Firms' Ratios for 9 years (2014 to 2023)

Indicator	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Current ratio	1.40	1.63	1.42	1.39	1.23	1.24	1.23	1.21	1.14	1.14
Quick ratio	1.17	1.43	1.21	1.16	1.01	1.01	1.01	1.03	1.05	0.94
Cash ratio	0.45	0.53	0.40	0.47	0.53	0.72	0.35	0.29	0.32	0.36
Financial leverage	2.98	2.96	3.36	2.82	2.84	2.94	3.33	4.39	3.46	3.75
Debt-to-Equity ratio	1.97	1.96	2.36	1.82	1.84	1.94	2.33	3.39	2.46	2.75
Debt ratio	0.60	0.61	0.61	0.59	0.60	0.62	0.67	0.70	0.67	0.68
Working capital turnover		1.56	1.49	1.67	1.69	1.65	1.47	1.82	2.48	2.13
Total assets turnover		0.00	0.01	0.04	0.04	0.03	-0.01	0.05	0.05	0.05
Fixed assets turnover		0.01	0.01	0.05	0.06	0.03	-0.01	0.08	0.09	0.08
Inventory turnover		11.09	10.79	11.94	12.85	11.07	7.81	9.46	11.78	9.99
Receivables turnover		6.71	6.53	7.18	7.84	7.76	5.86	6.24	7.03	6.72
Payables turnover		11.07	5.45	5.48	5.96	6.14	4.83	5.06	6.07	4.18
Operating cycle		99.73	104.31	96.53	91.68	97.07	147.24	175.10	122.33	152.62
Cash conversion cycle		35.38	33.13	27.58	25.67	32.64	61.48	40.89	29.02	41.24
Operating profit margin		2.92	9.41	14.73	14.69	5.90	9.21	24.06	20.22	21.70
Net profit margin		7.90	3.22	8.08	7.62	6.49	-2.13	13.52	7.79	7.58
Return on assets		0.44	1.01	3.72	4.15	2.57	-0.89	5.01	5.47	4.82
Return on equity		0.34	-0.54	11.84	10.02	6.55	-2.10	15.09	16.29	14.93

Gross profit margin		26.74	27.94	27.98	26.35	33.50	35.98	32.79	27.70	33.20
Pretax margin		-2.16	4.14	11.89	10.95	8.83	-1.06	18.98	13.83	15.95
Operating return on assets		2.25	4.12	7.79	8.87	1.79	3.80	11.13	15.14	12.55
Taffler's Model (UK)		0.22	0.29	0.41	0.45	0.22	0.27	0.47	0.55	0.50
Liss's Model (UK)		0.04	0.04	0.04	0.04	0.03	0.03	0.04	0.05	0.05
Altman's Model (USA)		-1.97	-1.99	-1.85	-1.74	-1.66	-1.63	-1.65	-1.67	-1.53
Springate's Model (USA)		0.51	0.66	0.95	1.04	0.73	0.58	1.18	1.44	1.30
Cash to income		0.45	14.57	1.17	1.11	0.76	0.87	0.88	1.39	-1.73
Cash return on equity ratio		0.22	0.19	0.15	0.18	0.21	0.20	0.27	0.32	0.29
Cash flow to revenue ratio		2.13	15.00	2.16	1.95	2.93	-0.71	2.49	1.27	-1.68
Cash return on assets ratio		0.08	0.07	0.07	0.08	0.08	0.07	0.08	0.10	0.09
Dividend payment ratio		5.63	4.44	3.85	4.86	4.26	2.43	2.90	3.80	2.66
Reinvestment ratio		0.22	0.17	0.18	0.22	0.23	0.18	0.21	0.30	0.26
Interest Coverage ratio		-7.72	-9.28	22.69	-8.35	-22.37	-18.21	-17.29	-15.06	27.39
Debt coverage ratio		0.14	0.11	0.12	0.14	0.15	0.12	0.13	0.16	0.15

Source: the Author' own calculation using the information gathered.

The current and quick ratio values have shown a steady decrease since 2015 when they reached their highest points at 1.63 and 1.14 in 2023. The company increased its debt financing usage after the pandemic struck because of its financial needs. The debt ratio shows a rising trend which indicates that the company has taken on more debt. The Springate and Taffler bankruptcy models indicate better scores during recent years which indicates reduced chances of insolvency. The interest coverage ratio shows significant volatility between 2019 and 2023 because the company's earnings have not consistently met its interest payments.

Table 28
O&G Firms' Ratios for 9 years (2014 to 2023)

Indicator	Max	Min	SD	Mean
Current ratio	1.63	1.08	0.02	1.31
Quick ratio	1.43	0.89	0.02	1.10
Cash ratio	0.72	0.29	0.01	0.45
Financial leverage	4.39	2.82	0.24	3.30
Debt-to-Equity ratio	3.39	1.82	0.24	2.30
Debt ratio	0.70	0.59	0.00	0.64
Working capital turnover	2.48	1.47	0.08	1.73

Total assets turnover	0.05	-0.01	0.00	0.03
Fixed assets turnover	0.09	-0.01	0.00	0.04
Inventory turnover	12.85	7.81	2.41	10.60
Receivables turnover	7.84	5.86	0.39	6.85
Payables turnover	11.07	2.96	4.19	5.89
Operating profit margin	24.06	2.92	47.13	13.60
Net profit margin	13.52	-2.13	15.80	6.63
Return on assets	5.47	-0.89	4.24	2.82
Return on equity	16.29	-2.10	43.48	7.75
Gross profit margin	37.28	26.35	15.77	30.70
Pretax margin	18.98	-2.16	48.64	9.08
Operating return on assets	15.14	1.79	17.84	7.12
Taffler's Model (UK)	0.55	0.22	0.01	0.37
Liss's Model (UK)	0.05	0.03	0.00	0.04
Altman's Model (USA)	-1.57	-1.99	0.02	-1.75
Springate's Model (USA)	1.44	0.51	0.09	0.91
Cash to income	14.57	-1.91	20.15	2.14
Cash return on equity ratio	0.32	0.15	0.00	0.22
Cash flow to revenue ratio	15.00	-1.57	20.47	2.85
Cash return on assets ratio	0.10	0.07	0.00	0.08
Dividend payment ratio	5.63	1.94	1.25	3.79
Reinvestment ratio	0.30	0.17	0.00	0.21
Interest Coverage ratio	39.00	7.13	86.10	22.18
Debt coverage ratio	0.16	0.11	0.00	0.13

Source: the Author' own calculation using the information gathered.

To project "future" performance, a simple linear regression method was employed. The regression equations were developed using historical data from 2014 to 2022, providing a nine-year time series sufficient for identifying linear trends. Each liquidity ratio was regressed against year, and the resulting equations were then used to calculate the forecasted value for 2023.

This approach was chosen for its interpretability and practical relevance. Linear regression allows for trend extrapolation while offering insights into the direction and magnitude of change over time. Importantly, it accounts for the cumulative effect of year-on-year changes, as opposed to relying on the final year's trajectory alone, forecast indicators for 2023 have been greatly affected by the pandemic. This shows the deviation of the ratios between 2022 and 2023. The equation also shows a positive and negative trendline and its slope. Their descriptive statistics are presented in Table 29.

Table 29
Deviation Ratios Between 2022 and 2023 years

Indicator	Approximation equation	2022	2023	Deviation, %
Current ratio	y = -0.0386x + 1.5267	1.27	1.14	-9.99

Quick ratio	y = -0.036x + 1.3004	1.05	0.94	-10.78
Cash ratio	y = -0.0179x + 0.5405	0.32	0.36	11.75
Financial leverage	y = 0.1046x + 2.7065	3.46	3.75	8.59
Debt-to-equity ratio	y = 0.1047x + 1.706	2.46	2.75	12.12
Debt-to-capital ratio	y = 0.011x + 0.5745	0.67	0.68	2.18
Operating cycle	y = 7.9715x + 80.879	122.33	152.62	24.76
Cash conversion cycle	y = 1.226x + 30.204	29.02	41.24	42.11
Operating profit margin	y = 1.7286x + 0.3976	20.22	21.70	7.29
Net profit margin	y = 0.2254x + 5.5473	7.79	7.58	-2.72
Return on assets	y = 0.4738x + 0.5535	5.47	4.82	-11.91
Return on equity	y = 1.7185x - 0.5497	16.29	14.93	-8.36
Gross profit margin	y = 0.7387x + 26.548	27.70	33.20	19.86
Pretax margin	y = 1.7286x + 0.3976	13.83	15.95	15.36
Operating return on assets	y = 1.2644x + 1.1689	15.14	12.55	-17.09
Taffler's Model (UK)	y = 0.0312x + 0.2204	0.55	0.50	-9.28
Liss's Model (UK)	y = 0.0015x + 0.0327	0.05	0.05	-9.45
Altman's Model (USA)	y = 0.0531x - 2.0095	-1.67	-1.53	-8.51
Springate's Model (USA)	y = 0.0922x + 0.4723	1.44	1.30	-9.79
Cash to income	y = -0.7519x + 6.0329	1.39	-0.73	-152.92
Cash return on equity ratio	y = 0.015x + 0.1513	0.32	0.29	-10.42
Cash flow to revenue ratio	y = -0.9069x + 7.4854	1.27	-0.68	-153.15
Cash return on assets ratio	y = 0.0922x + 0.4723	0.10	0.09	-10.20
Dividend payment ratio	y = 1.2217x + 15.401	3.80	2.66	-29.97
Reinvestment ratio	y = 0.003x + 0.1214	0.30	0.26	-13.58
Interest Coverage ratio	y = -0.3025x + 5.3842	24.78	27.39	10.53
Debt coverage ratio	y = 0.003x + 0.1214	0.16	0.15	-9.56

Source: the Author' own calculation using the information gathered.

The table compares actual 2023 financial indicator values with those forecasted via linear regression equations based on past trends. Key deviations highlight notable variances. Positive deviations include cash ratio (+11.75%) and interest coverage (+10.53%), suggesting better-than-expected liquidity and earnings relative to interest obligations. However, several profitability and solvency indicators underperformed projections—return on assets (-11.91%), Springate score (-9.79%), and cash flow to revenue (-153.15%), indicating reduced efficiency and cash flow strength. Deteriorating internal financial capacity is indicated by significant negative variances in cash-to-income and cash flow ratios. In general, several indications show growing financial stress and operational inefficiencies in 2023, even though certain metrics surpassed projections.

Analysis of liquidity

The financial situation of European O&G enterprises is depicted in aggregate from financial reports, as seen below. The annual aggregated liquidity ratios are disclosed first. The company's current ratio has an acceptable range (between 1-2) for 2022 and 2023 years, and it generally indicates good short-term financial strength. The forecast current ratio is 9.99% less than last year's ratio. The quick liquidity ratio for 2022 and 2023 years greater than the

recommended value (>0.8) shows that the company has free resources, which were formed due to its own sources. The forecast quick ratio is 10.78% less than last year's ratio. A cash ratio for 2022 with an acceptable range (0.2-0.5) signifies that all the company's short-term current liabilities will be paid in full. The forecast cash ratio is 11.75% more than last year's ratio. Changes in liquidity ratios are presented in figure 11.

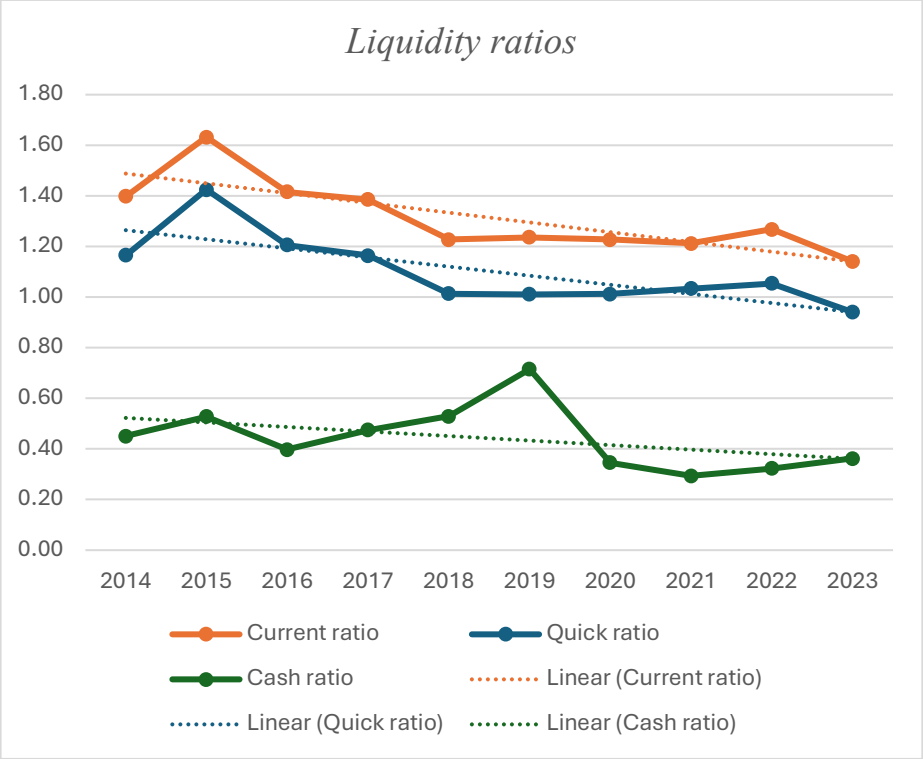


Fig. 11. Dynamics of Liquidity Indicators from 2015 to 2023 years

5.2.1 Analysis of solvency

Second, information on the annual aggregated solvency ratios is described. The fact that equity financial leverage is higher for the years 2022 and 2023 suggests that total asset debt is rising, which increases financial leverage for the firms. Businesses will need to generate more cash flow to sustain their existing operational levels since higher debt burdens will result in higher debt servicing expenses. A corporation with high financial leverage may be unduly reliant on debt for financing, which could make an investment in the company dangerous.

The forecast financial leverage is 8.59% more than last year's ratio. The debt-to-equity ratio shows how much debt a corporation is utilising to finance operations. If debt-to-equity ratio is greater than one over the studied period, it may be putting itself at danger of loan default should interest rates suddenly grow. The higher the operation of the enterprise is, the higher the indicator will be. Moreover, a poor borrowing capacity may be indicated by a high debt-to-assets ratio, which would reduce the firm's financial flexibility.

The forecast debt-to-equity ratio is 12.12% more than last year's ratio. The debt to capital ratio calculates a company's level of leverage by showing the link between capital provided by outsiders and capital provided by shareholders. Debt-to-capital ratios below one over the studied period show that equity financing accounts for most of the company's asset financing. The projected debt-to-equity indicator is 2.18% higher than the ratio from the previous year. Changes in solvency ratios are presented in Figure 12.

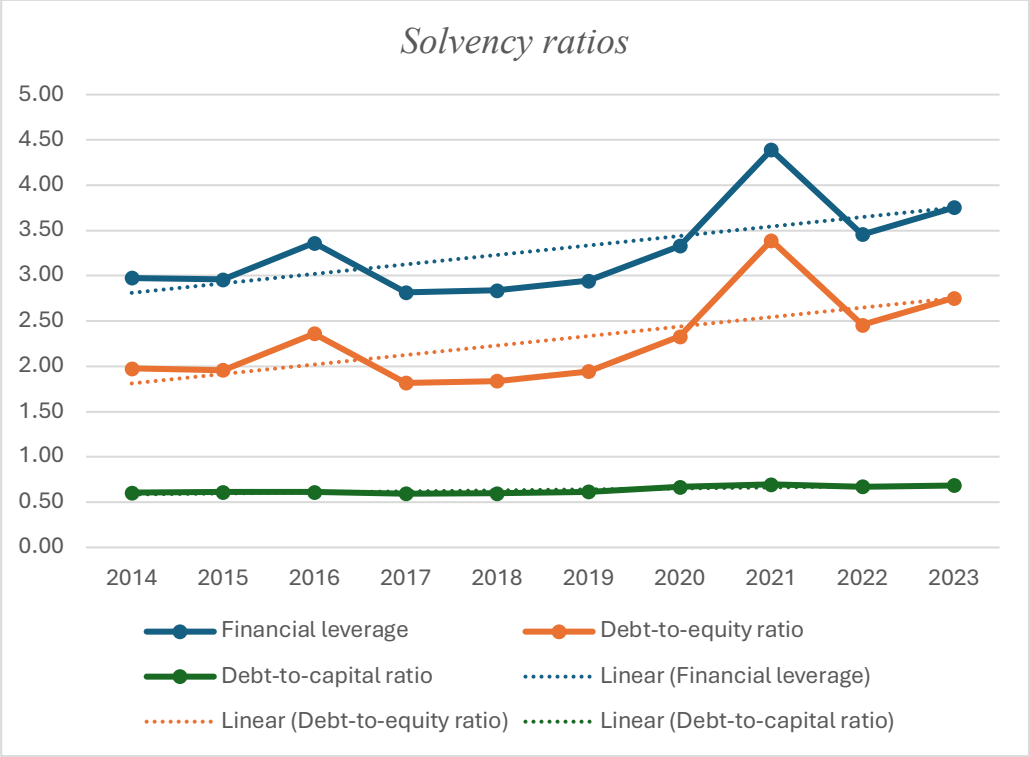


Fig. 12. Dynamics of Solvency Indicators from 2015 to 2023 years

Analysis of turnover

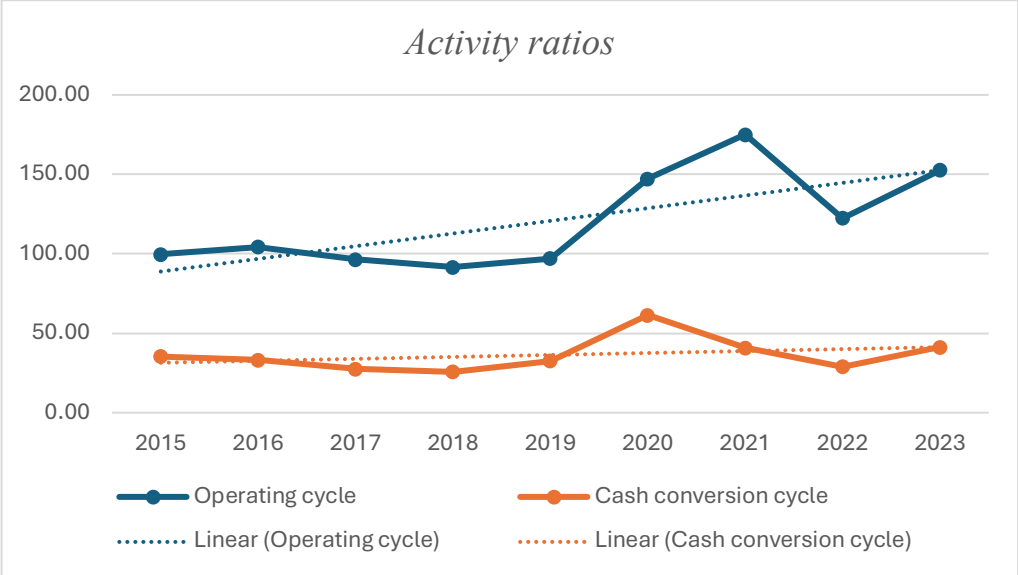


Fig. 13. Dynamics of Activity Indicators from 2015 to 2023 years

Analysis of profitability

Fourth information on the annual aggregated profitability ratios is described. The profitability of O&G enterprises comprehensively reflects the degree of efficiency in the use of resources. Figures 15 and 16 show that during the pandemic period in 2020 year, all aggregate profitability ratios had a negative value, but then they began to gradually grow. Due to this, all predicted profitability indicators have a negative deviation compared to the current 2022 year. The forecast operating profit margin is 7.29% higher than last year's ratio. The forecast net profit margin is 2.72% less than last year's ratio.

The forecast return on assets is 11.91% less than last year's ratio. The forecast return on equity is 8.36% less than last year's ratio. The forecast gross profit margin is 19.86% more than last year's ratio. The forecast pretax margin is 153.15% lower than last year's ratio. The forecast operating return on assets is 10.20% less than last year's ratio. During a pandemic, the average profitability of O&G firms is negative. The pandemic has affected profitability, especially for 2020, as can be seen in Figures 14 and 15.

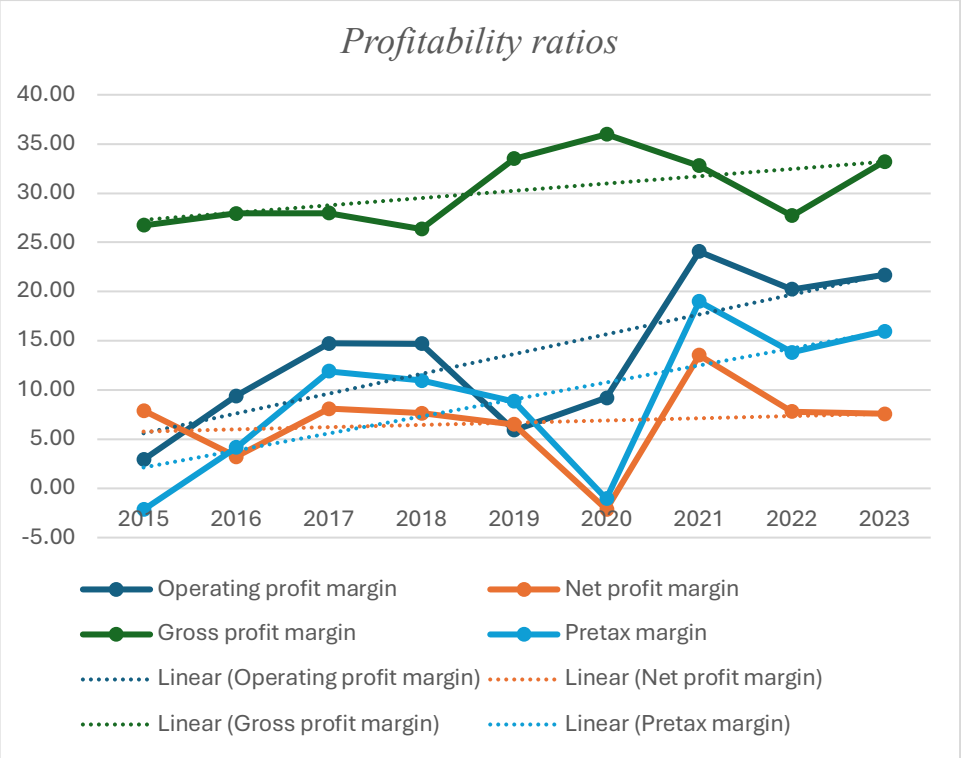


Fig. 14. Dynamics of Profitability Indicators from 2015 to 2023 years

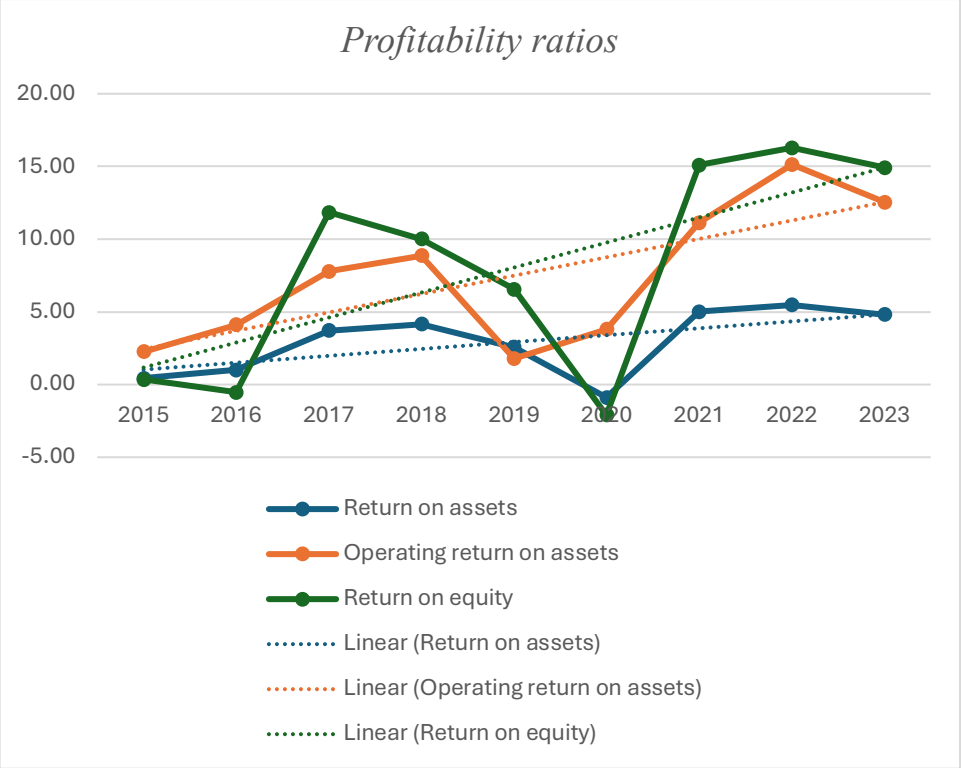


Fig. 15. Dynamics of Profitability Indicators from 2015 to 2023 years

The profitability indicators for the O&G industry show their performance in Figures 15 and 16 from 2015 to 2023. All profitability indicators showed a significant decline in 2020 because of the pandemic. The gross profit margins demonstrated stable performance through a rising pattern which indicates that the operations maintained their stability. The operating and pretax margins demonstrated continuous growth following their initial decline which shows better cost control and revenue growth. The majority of indicators show positive linear trends which demonstrate that profitability improved after the crisis even though there were brief periods of uncertainty. The industry achieved a robust recovery during 2021 and 2022 after the initial downturn.

5.2.2 Analysis of bankruptcy

Fifth, information on the annual aggregated bankruptcy ratios is described. Altman's model shows that for 2015-2022 bankruptcy indicators Z=0,2÷0,3, which means that bankruptcy is possible, but in the pandemic period, the trend is increasing. The forecast bankruptcy indicator is 8.51% less than last year's ratio. Taffler's model shows that for 2015-2018 years bankruptcy indicators $Z > 0.03$, which means that bankruptcy was low.

The forecast bankruptcy indicator is 9.28% less than last year's ratio. Liss's model shows that for 2015-2022 bankruptcy indicators $Z \geq 0{,}037$, which means that bankruptcy is low. In the pandemic period, the trend has almost no change. The forecast bankruptcy indicator is 9.45% less than last year's ratio. Springate's model shows that for 2015 and 2020 bankruptcy indicators $Z < 0.862$, which means that bankruptcy was high, but for the current 2022-year bankruptcy indicators $Z > 0.862$, which means that bankruptcy is low. The forecast bankruptcy indicator is 9.79% less than last year's ratio. It shows that bankruptcy will be low. Changes in bankruptcy indicators are presented in Figure 16.

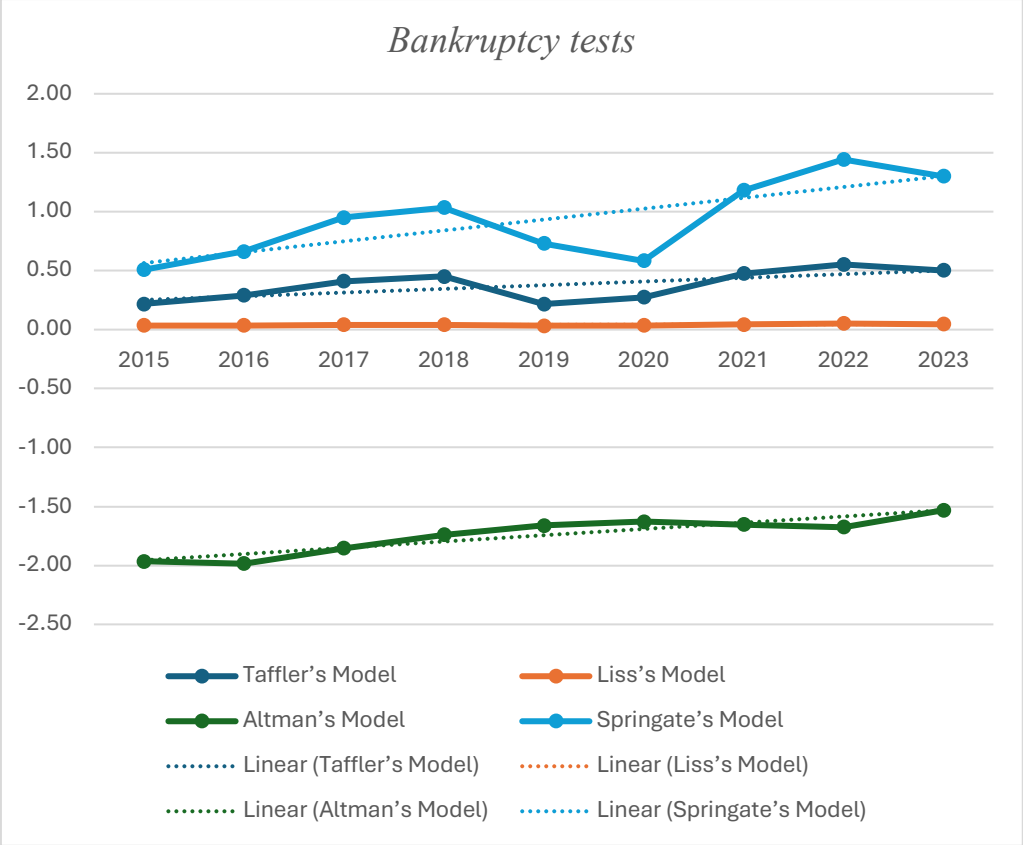


Fig. 16. Dynamics of Bankruptcy Indicators from 2015 to 2023 years

5.2.3 Analysis of cash ratios

Finally, information on annual aggregate cash performance and coverage ratios is disclosed. Cash to income characterizes the financial cycle of the company, for 2022 indicator > 1. It shows the effectiveness of managing mutual settlements with counterparties. The forecast cash-to-income is negative and 152.92% less than last year's ratio. It considers long-term funded debt in addition to common and preferred share equity as sources of capital. For the analysed period, indicator > 1, makes clear the results of the capital investment strategy being employed. The forecast cash return on equity ratio is 10.42% less than last year's ratio.

The company's capacity to convert sales into cash is demonstrated by the cash flow to revenue ratio. For the analysed period, indicator > 1. This ratio indicates the ability to translate sales into cash. During the pandemic period 2020, indicator <1. The forecast cash flow to revenue ratio is 153.15% less than last year's ratio. The cash return on assets ratio calculates the proportionate net cash generated by owning a collection of assets. Indicator > 1 for the studied time period. An environment with a lot of assets requires a high cash return on assets since the money is needed for upkeep, upgrades, and investments in new assets. The forecast cash return on assets ratio is 10.20% less than last year's ratio. Changes in performance ratios are presented in Figure 17.

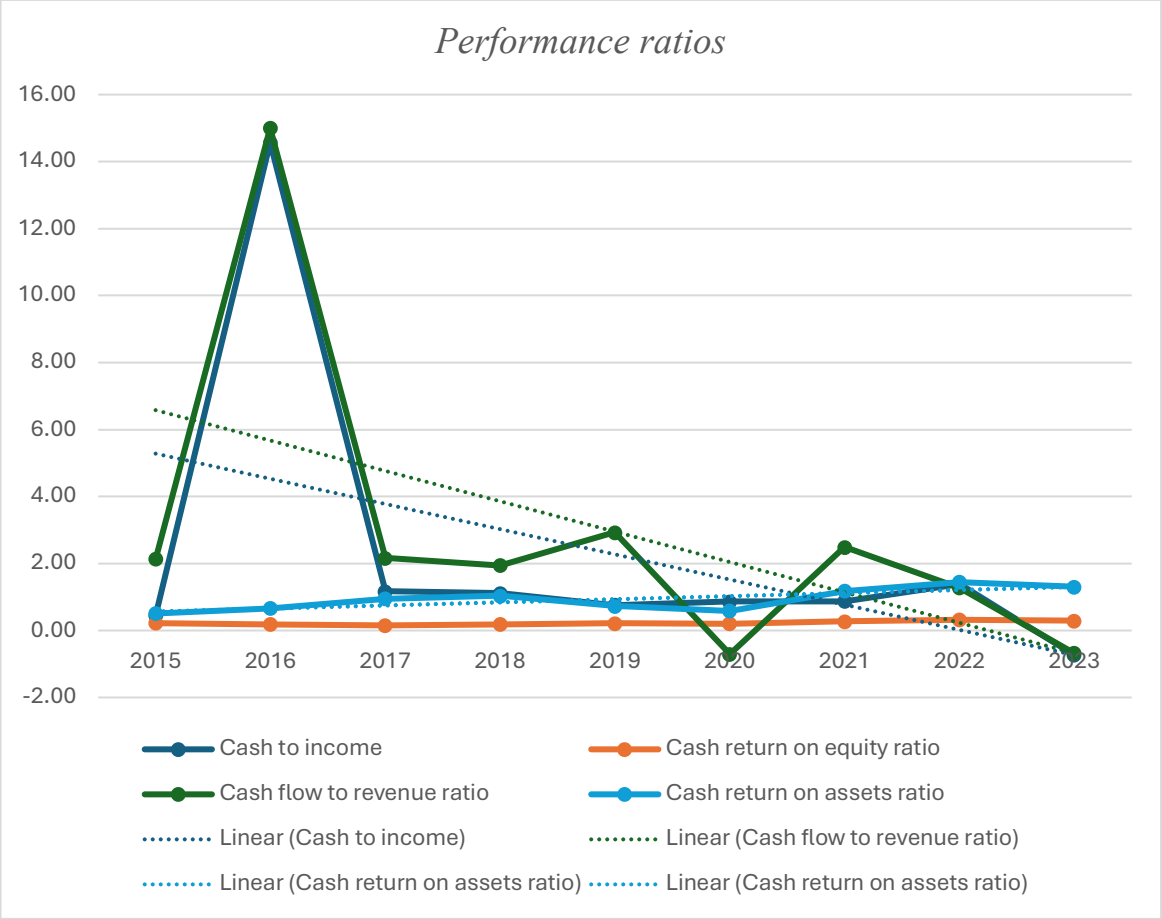


Fig. 17. Dynamics of Performance Indicators from 2015 to 2023 years

Coverage ratios show how well O&G company's earnings can cover its fixed expenses. How effectively earnings sustain dividend payments is indicated by the dividend payment ratio. For the analysed period, the indicator is negative and <1. The ratio indicates that the stock price is cheaper, as investors looking for other dividend payments. The forecast dividend payment ratio is 29.92% less than last year's ratio.

The ability of the businesses to buy long-term assets with operational cash flow is gauged by the reinvestment ratio. For the analysed period, indicator > 1. The forecast reinvestment ratio is 13.58% less than last year's ratio. Except for 2017, the interest coverage ratio was negative and 1 over the studied period. An increased debt load for the company and a higher chance of failure or bankruptcy are both indicated by a lower interest coverage ratio.

The corporation is more vulnerable to increases in interest rates if the ratio is smaller since there are fewer earnings available to make interest payments. The anticipated interest coverage ratio is 10.53% higher than it was in the previous year. The debt coverage ratio is used to assess a business's capacity to make enough money from its operations to pay off its debt. The forecast debt coverage indicator is 9.56% less than last year's ratio. Changes in coverage ratios are presented in Figure 18.

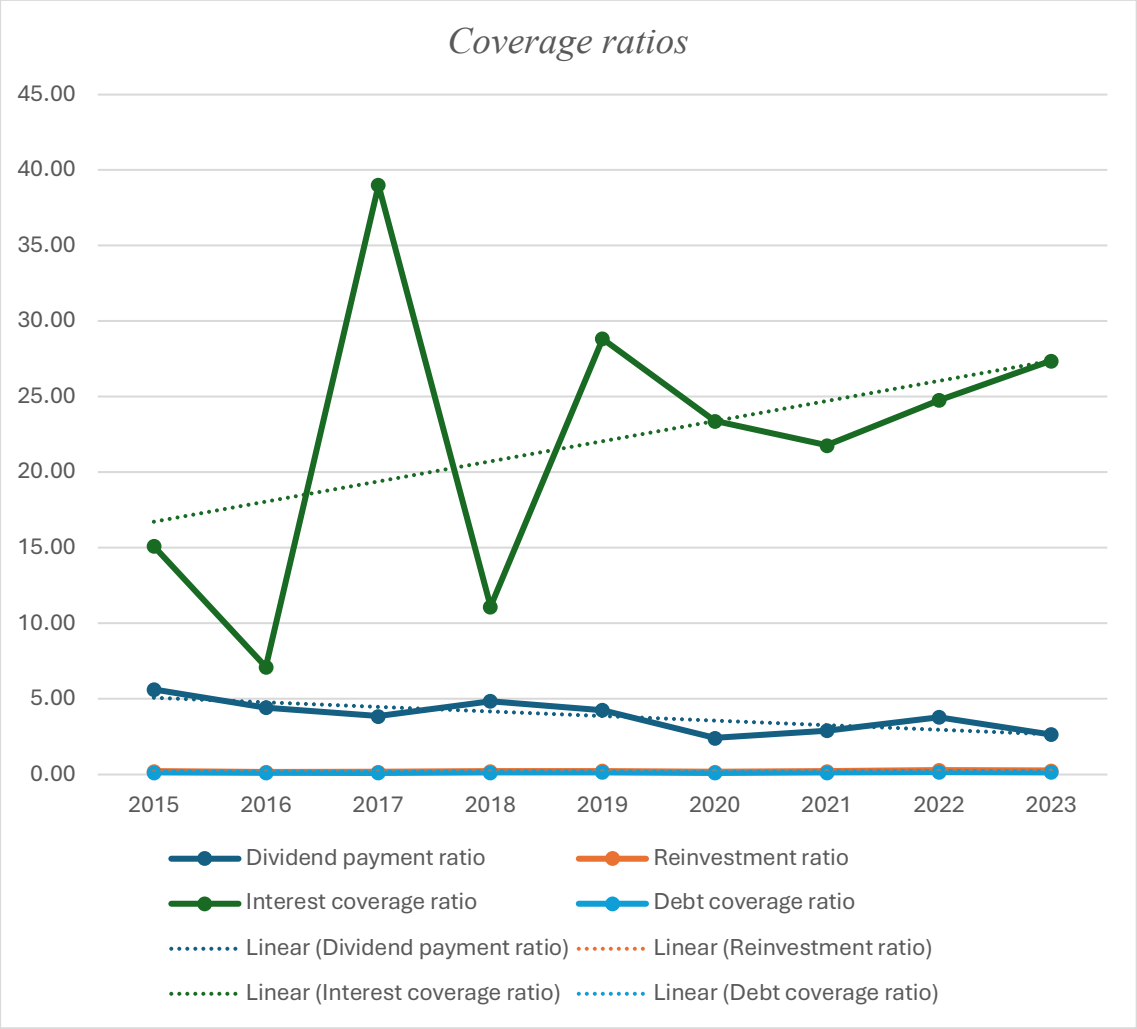


Fig. 18. Dynamics of Coverage Indicators from 2015 to 2023 years

The interest coverage ratios in Figure 19 demonstrate an upward trend which indicates that firms have better capacity to fulfil before it dropped in 2020 because of the pandemic. The dividend payment ratio shows a downward trend in their interest payments. The interest coverage ratio experienced a significant increase during 2017 and 2019, which indicates that businesses are taking a more conservative approach to distributing funds to shareholders. The debt coverage ratio and reinvestment ratio show no significant changes at their current low levels because firms have not increased their reinvestment activities, and their debt repayment capabilities remain limited. The interest coverage ratio shows an upward trend despite occasional fluctuations, which indicates better financial stability, but the stable reinvestment ratio could indicate challenges for future strategic expansion.

Correlation indicator shows the relationship between the financial indicators and bankruptcy, and are presented in Table 30:

Table 30
Correlation Indicator Between Financial Indicators and Bankruptcy

Indicator	Altman's Model (USA)	Taffler's Model (UK)	Liss's Model (UK)	Springate's Model (USA)

Current ratio	-0.9022	-0.5964	-0.4943	-0.6805
Quick ratio	-0.8955	-0.4515	-0.2860	-0.5249
Cash ratio	-0.1787	-0.5710	-0.5807	-0.4261
Financial leverage	0.4667	0.4283	0.4444	0.4476
Debt-to-Equity ratio	0.4670	0.4283	0.4442	0.4476
Debt ratio	0.7053	0.4173	0.4661	0.4633
Working capital turnover	0.3616	0.7609	0.9123	0.8599
Total assets turnover	0.3751	0.8555	0.8178	0.9320
Fixed assets turnover	0.3877	0.8834	0.8833	0.9615
Inventory turnover	-0.4684	0.1988	0.2263	0.2098
Receivables turnover	-0.0816	0.0669	0.0328	0.1782
Payables turnover	-0.6360	-0.4408	-0.2371	-0.4397
Operating profit margin	0.5516	0.9118	0.8142	0.8921
Net profit margin	0.0349	0.4990	0.5163	0.5713
Return on assets	0.3751	0.8555	0.8178	0.9320
Return on equity	0.4764	0.8618	0.8192	0.9383
Gross profit margin	0.7419	-0.1238	-0.2057	-0.0355
Pretax margin	0.5240	0.7946	0.6946	0.8721
Operating return on assets	0.4084	0.9859	0.9780	0.9651
Cash to income	-0.6340	-0.2237	-0.1740	-0.2900
Cash return on equity ratio	0.4518	0.5035	0.7209	0.6268
Cash flow to revenue ratio	-0.6909	-0.2624	-0.2027	-0.2945
Cash return on assets ratio	0.4011	0.4290	0.6504	0.5919
Dividend payment ratio	-0.7568	-0.3352	-0.2128	-0.3378
Reinvestment ratio	0.3726	0.4965	0.6887	0.6531
Interest Coverage ratio	0.4406	0.1791	0.1187	0.2766
Debt coverage ratio	0.3045	0.3020	0.4846	0.4787
Mean	0.0964	0.2909	0.3384	0.3433
SD	0.2700	0.2476	0.2262	0.2770

Source: the Author' own calculation using the information gathered.

In a comprehensive examination of various financial metrics, the empirical analysis reveals distinct correlations with established bankruptcy prediction models. Specifically, the current and quick ratios, in tandem with the payable turnover and its forecasted values, manifest a pronounced negative statistical correlation with Altman's Z-Score Model. Concurrently, metrics such as the cash ratio, inventory turnover, and receivables turnover ratios register a marginal negative statistical correlation with the aforementioned Altman model.

In terms of positive correlations, both the debt ratio and the operating profit margin exhibit significant positive statistical correlation with the Altman's model. Conversely, liquidity ratios, along with payables turnover, reflect both average and intensified negative statistical correlations when juxtaposed with the Taffler's, Liss's, and Springate's models.

The gross profit margin, cash to income, and dividend payment ratio offer a tepid negative statistical correlation. Notably, operating profit margin, return on assets, and return

on equity ratios are characterized by robust and extremely high direct statistical correlations in relation to Taffler's, Liss's, and Springate's models.

Other turnover ratios illustrate nominal positive affiliations. Delving into the correlation indicator, there is a marked direct statistical correlation observed between the cash return on assets ratio, reinvestment ratio, and both Liss's and Springate's models. The cash ratio alone exhibits a mild negative statistical correlation specifically with the Liss's model, whereas other profitability and cash ratios delineate insubstantial associations with the bankruptcy prediction models under scrutiny.

5.2.4 Correlation analysis between financial indicators and bankruptcy

The coefficient of determination between financial indicators and bankruptcy

In summary, the aggregate correlation indicator displays a negligible positive statistical correlation with Altman's model and a subtle positive statistical correlation with Taffler's, Liss's, and Springate's models. It is pivotal to note that Springate's model elucidates the most potent relationship interlinking the ratios. The coefficient of determination financial indicators and bankruptcy are presented in Table 31:

Table 31
The Coefficient of Determination Between Financial Indicators and Bankruptcy

Indicator	Altman's Model (USA)	Taffler's Model (UK)	Liss's Model (UK)	Springate's Model (USA)
Current ratio	0.8139	0.3557	0.2444	0.4631
Quick ratio	0.8019	0.2039	0.0818	0.2755
Cash ratio	0.0319	0.326	0.3373	0.1816
Financial leverage	0.2179	0.1835	0.1975	0.2004
Debt-to-Equity ratio	0.2181	0.1834	0.1973	0.2003
Debt ratio	0.4975	0.1741	0.2173	0.2146
Working capital turnover	0.1307	0.5789	0.8322	0.7396
Total assets turnover	0.1407	0.7319	0.6687	0.8685
Fixed assets turnover	0.1503	0.7805	0.7803	0.9245
Inventory turnover	0.2194	0.0395	0.0512	0.0440
Receivables turnover	0.0067	0.0045	0.0011	0.0318
Payables turnover	0.4045	0.1943	0.0562	0.1934
Operating profit margin	0.3042	0.8314	0.6629	0.7958
Net profit margin	0.0012	0.2490	0.2666	0.3464
Return on assets	0.1407	0.7319	0.6687	0.8685
Return on equity	0.227	0.7428	0.6711	0.8804
Gross profit margin	0.5503	0.0153	0.0423	0.0013
Pretax margin	0.2746	0.6314	0.4824	0.7605
Operating return on assets	0.1668	0.9720	0.9564	0.9315
Cash to income	0.4020	0.0500	0.0303	0.0841
Cash return on equity ratio	0.2043	0.2535	0.5196	0.3929
Cash flow to revenue ratio	0.4773	0.0689	0.0411	0.0867

Cash return on assets ratio	0.1609	0.184	0.4231	0.3503
Dividend payment ratio	0.5727	0.1124	0.0453	0.1141
Reinvestment ratio	0.1388	0.2465	0.4743	0.4265
Interest Coverage ratio	0.1942	0.0321	0.0141	0.0765
Debt coverage ratio	0.0927	0.0912	0.2348	0.2291
Mean	0.2793	0.3322	0.3407	0.3956
SD	0.0457	0.0846	0.0821	0.0998

Source: the Author' own calculation using the information gathered.

The coefficient of determination measures how well a statistical model predicts an outcome. The better a model is at making predictions, the closer its R^2 will be to 1. The average coefficient of determination shows that 29%, 33%, 34% and 40% and the standard deviation shows that 4%, 8%, 8% and 10% of the financial ratios' variance is unexplained by Altman's, Taffler's, Liss's and Springate's models respectively.

The variance inflation factor between financial indicators and bankruptcy

VIF quantifies how much the variance of an estimated regression coefficient increases if predictors are correlated and are presented in Table 32:

Table 32
The Variance Inflation Factor Between Financial Indicators and Bankruptcy

	Altman's Model (USA)	Taffler's Model (UK)	Liss's Model (UK)	Springate's Model (USA)
Current ratio	2.9624	1.1448	1.0635	1.2730
Quick ratio	2.8015	1.0434	1.0067	1.0821
Cash ratio	1.0010	1.1189	1.1284	1.0341
Financial leverage	1.0498	1.0348	1.0406	1.0418
Debt-to-Equity ratio	1.0499	1.0348	1.0405	1.0418
Debt ratio	1.3289	1.0313	1.0496	1.0483
Working capital turnover	1.0174	1.5040	3.2526	2.2075
Total assets turnover	1.0202	2.1537	1.8088	4.0699
Fixed assets turnover	1.0231	2.5587	2.5567	6.8823
Inventory turnover	1.0506	1.0016	1.0026	1.0019
Receivables turnover	1.0000	1.0000	1.0000	1.0010
Payables turnover	1.1956	1.0392	1.0032	1.0389
Operating profit margin	1.1020	3.2386	1.7839	2.7270
Net profit margin	1.0000	1.0661	1.0765	1.1364
Return on assets	1.0202	2.1537	1.8088	4.0699
Return on equity	1.0543	2.2309	1.8194	4.4465
Gross profit margin	1.4344	1.0002	1.0018	1.0000
Pretax margin	1.0816	1.6630	1.3033	2.3717
Operating return on assets	1.0286	18.1107	11.7235	7.5581

Cash to income	1.1928	1.0025	1.0009	1.0071
Cash return on equity ratio	1.0436	1.0687	1.3698	1.1826
Cash flow to revenue ratio	1.2950	1.0048	1.0017	1.0076
Cash return on assets ratio	1.0266	1.0350	1.2180	1.1399
Dividend payment ratio	1.4881	1.0128	1.0021	1.0132
Reinvestment ratio	1.0196	1.0647	1.2903	1.2223
Interest Coverage ratio	1.0392	1.0010	1.0002	1.0059
Debt coverage ratio	1.0087	1.0084	1.0583	1.0554
Mean	1.2346	1.9751	1.7190	2.0247
SD	0.2349	10.3509	4.1305	3.2046

The observed relationships within regression model, particularly those involving the operating return on assets and various bankruptcy prediction models (Springate's, Taffler's, and Liss's models), indicate varying degrees of multicollinearity. The strong correlation between the operating return on assets and Springate's model, as indicated by a VIF greater than 5, suggests the presence of significant multicollinearity.

This high VIF value points to a strong linear relationship between these variables, which can lead to less precise estimation of regression coefficients. Similarly, the operating return on assets exhibits a high degree of correlation with Taffler's and Liss's models. While a high VIF in these cases does not render the models invalid, it does imply that the associated coefficients are estimated with lower precision.

These coefficients are also more susceptible to changes in the model, indicating that their stability and reliability might be compromised. For other variable relationships in the model, with VIF values between 1 and 5, there is an indication of moderate correlation. While this level of multicollinearity is generally less concerning, it still warrants attention as it can impact the precision of coefficient estimates to some extent.

The VIF values between 1 and 5 for all bankruptcy models indicate that the model contains moderate multicollinearity. The researchers selected linear regression instead of simple linear trend extrapolation because it offers statistical linearity between ratios. The model maintains reliable predictions despite showing moderate multicollinearity its and clear forecasting methods for financial performance prediction. The statistical method of linear regression surpasses basic extrapolation techniques because it uses formal statistical procedures to determine financial indicator-time relationships. The method allows researchers to determine: The study uses linear regression to determine trend direction and strength through regression coefficients and to establish uncertainty ranges through confidence intervals and to measure data fit through the coefficient of determination (R^2). The study uses The methodological strength of this approach becomes essential when using forecasted data to evaluate financial stability and investment linear regression to generate forecasts based on empirical evidence which supports reproducibility instead of visual pattern recognition. potential across different firms throughout multiple time periods. The study evaluated projection reliability through R^2 coefficient analysis and 95% confidence interval assessment of forecasted values. The results section presents forecasts from ratios with R^2 values below 0.3 with caution because these ratios demonstrate weak explanatory power.

5.2.2 Discussion of annual report results

Although the research has assumed that the impact of the pandemic on the forecasting financial indicators of European O&G enterprises would be just negative, this is not entirely

true, as linear regression proves. The pandemic had a negative impact on aggregated liquidity indicators. The current liquidity ratio tends from 2015 to 2023, which shows a decline in the adequacy of the enterprises working capital. It can use its operating capital to settle its short-term liabilities. The quick liquidity ratio tends to decline, which indicates a decrease in free resources for settlements with debtors. The cash ratio tends to decrease, which shows a decline in the enterprise's ability to immediately pay off its debts. Although the forecast cash ratio increased by 24.10%.

Solvency ratios show a positive trend. Although forecast all solvency ratios have dropped, financial leverage tends to increase, which indicates the loss of financial independence of the Organisation, but too high indicators indicate that the financial situation is becoming extremely unstable, especially during a pandemic. The debt-to-equity tends to increase, which indicates the loss of financial independence of the Organisation, but too high indicators indicate that the financial situation is becoming extremely unstable, therefore, it is more difficult for the firms to take a loan. Debt-to-capital ratio dependence tends to increase, which indicates an increase in the risk of the enterprise's activities. Additionally, a high debt-to-asset indicator may show an enterprise's poor creditworthiness, which in turn reduces its financial flexibility.

During the pandemic period from 2020 operating cycle has higher indicators, because of which the trend for the period increases. Long operating cycles for O&G firms will leave them with less cash available to pay off short-term obligations, which could result in higher borrowing and interest expenses. The trend of changing the cash conversion cycle directly affects the financial stability of firms. A decrease in the duration of the cash conversion cycle shows an enhancement in the financial condition of the enterprises, and an increase in the efficiency of managing accounts payable, receivables and current assets. Increasing solvency and liquidity.

The pandemic affected profitability in different ways. For the analysed period from 2015 to 2023 years, all profitability indicators trend to increase. These indicators for the forecasted period are less than for the current period, except for operating profit margin, gross profit margin and pretax margin.

Different types of bankruptcy tests give a more precise assessment of the financial position of O&G firms during the crisis period. All bankruptcy models' ratio Z tends to increase, which indicates the chances of increasing bankruptcy. The biggest impact of the pandemic has been on models Taffler and Springate. These models' performance declined precipitously beginning in 2019, but by 2022, it started to improve. Despite it, forecast aggregated indicators and their trend for the period also decreased.

The crisis affected the performance ratios more than the coverage ratios, which are used in financial modelling to forecast how a enterprise will behave in the future, such as the ability to repay loans. Cash to income tends to decrease, which reflects the non-efficient management of mutual settlements with counterparties. The cash return on equity ratio tends to increase, which shows the efficiency of the enterprise's management and the results of the applied investment strategy. The cash flow to revenue ratio is on a downward trend, indicating poor investment opportunities.

The cash return on assets ratio tends to be higher, indicating the high return on the cash required to maintain, upgrade, and invest in additional assets. The dividend payment ratio is trending higher, which indicates a good dividend policy. The reinvestment ratio tends to decrease, which shows the possibility of cash flow to cover the needs for updating the fixed and working capital used in the current activities of the company.

The interest coverage ratio tends to decrease, which indicates the highest probability of default. Firms will have to borrow money to service their liabilities. The debt coverage ratio is on a downward trend, indicating that the company cannot cover its debts from operating cash

flow, but the debt coverage ratio for the forecasted period is more than for the current period. Other all cash ratios, which measure a company's ability to sustain operations and attract investment, for the forecasted period less than for the current period.

Upon rigorous examination of various financial metrics, Altman's Z-Score Model, when juxtaposed with forecasted values, manifests a pronounced direct statistical correlation with liquidity ratios. Furthermore, it exhibits a moderate direct statistical correlation with metrics such as the gross profit margin and the dividend payment ratio. When scrutinizing Taffler's Model, the empirical data reveals a spectrum of correlations ranging from average to exceptionally high direct statistical associations, specifically between turnover, profitability ratios, and bankruptcy predictions.

Liss's Model, in its analytical framework, showcases a robust direct statistical correlation with turnover and profitability ratios. Additionally, there is an observed average direct statistical correlation when paired with the cash return on equity ratio. Springate's Model, in its empirical evaluation, presents a heightened direct statistical correlation, particularly concerning turnover, profitability ratios, and bankruptcy predictions.

It is imperative to highlight that, among the assessed models, Springate's stands out with the most elevated correlation indicator. This empirical finding suggests that, when considering forecasted values, Springate's model emerges as the most precise in bankruptcy predictions. However, the coefficient of determination underscores that these statistical models possess a relatively limited.

5.2.5 Conclusions of annual report results

Based on the computed financial indicators and the application of a linear regression model for the forecast period, this section has provided a financial characterization of selected European O&G enterprises. The analysis identified statistically significant relationships between the pandemic and key financial measures, including liquidity, solvency, profitability, and bankruptcy indicators. Among the evaluated models, the correlation indicator guided the selection of the most accurate bankruptcy prediction model. While several ratios such as the cash ratio and debt coverage ratio appeared to increase, their upward trend primarily reflected historical momentum rather than improved financial health. Linear regression findings suggest that even small changes in certain indicators can significantly affect bankruptcy forecasting.

This analysis confirms that financial indicators are useful for assessing short-term and long-term vulnerabilities in the sector. The financial structure of these businesses has been quantified by the epidemic, and these metrics show how resilient or fragile these businesses are. Following the establishment of a baseline for financial performance, the following section examines sustainability disclosures made by businesses. This qualitative analysis explores how E/S may complement or contrast with financial results in assessing overall investment attractiveness.

Significant trends and variances throughout the sample are shown by the financial evaluation. Some businesses showed evidence of susceptibility, especially during pandemic-induced stress, while others maintained solid liquidity and solvency ratios. Significantly, the regression analysis facilitated a forward-looking investment assessment by forecasting near-future financial circumstances. These insights provide a foundation for the following section, which explores how these same firms report and perform on social and environmental dimensions of the TBL framework.

5.3 Analysis of Sustainability Indicators (Social, Environmental)

The evaluation of selected firms in this section examines their non-financial performance through social and environmental sustainability indicators which appear in their sustainability reports. The section uses systematic content analysis of established frameworks to measure the extent and occurrence of disclosure data in employee diversity and human rights and GHG emissions and supply chain management areas. The evaluation of sustainability performance by firms helps Firms determine their long-term risks and reputation value and stakeholder satisfaction which are fundamental elements of the TBL framework.

The research Analysed sustainability reports from eleven major European firms (ranked by Fortune Global 500 in 2022) across nine years (2015-2022) to assess their social and environmental sustainability indicators including labour practices and human rights and emissions and supply chain and materials consumption. The research examined the main texts of sustainability indicators from Papoutsi (2018) to determine their expression through connected thematic statements. The research evaluated sustainability communication practices of each company by studying narrative disclosures which contained indicators throughout various sections of their reports. The research indicators and gas industry.

The indicators used in this study stem from Papoutsi (2018) who created a content analysis system to extract sustainability data from corporate disclosure reports. The research follows established academic methods for sustainability evaluation followed established frameworks and academic studies to achieve complete TBL dimension coverage suitable for the oil which strengthens the validity of the study. The indicators used in this study match the Global Reporting Initiative (GRI) Standards which serve as the leading framework for sustainability reporting. The indicators used in this study including greenhouse gas emissions and employee diversity and community engagement and health, and safety practices correspond to GRI 300 (Environmental) and GRI 400 (Social) and GRI 200 (Economic) categories.

The qualitative content analysis achieved reliability through a structured coding system which followed Weber (1990) indicator adaptation and Global Reporting Initiative (GRI) standards. The researchers applied this scoring system to evaluate sustainability reports through a systematic review process which defined three evaluation levels based on disclosure extent (full paragraph = +2, keyword mention = +1 and no disclosure = 0).

To reduce subjectivity, the researcher conducted a second round of coding after a two-week interval to check for internal consistency in scoring. This intra-coder reliability approach allowed for reflection and validation of coding decisions over time. This rigorous approach to coding strengthens the methodological transparency of the study and ensures that conclusions drawn from the sustainability disclosures are based on consistent and reliable analysis. Aggregated social and environmental sustainability indicators are presented in table 32 and figure 19.

Table 32
Disclosure of Social and Environmental Sustainability

Social and Environmental sustainability constructs			2015	2016	2017	2018	2019	2020	2021	2022
Social	Labour practices	1. Employ Health and Safety programs	19	21	22	24	21	23	24	22
		2. Encourage employee diversity	23	21	23	24	22	24	26	24
		3. Establish supplier code of conduct	16	15	17	17	15	15	15	16
		4. Source responsibly - ethically	17	14	18	17	16	16	13	13

		5. Train on anti-corruption	13	13	14	14	16	17	14	13
		6. Train and educate employees	20	19	20	21	22	22	22	23
	Human rights	7. Engage employees	20	19	19	19	18	21	19	22
		8. Conduct community support activities	17	16	17	17	15	15	16	16
		9. Commit to employees	18	18	19	19	19	22	21	20
Environmental	Emissions	1. Reduce carbon footprint	14	16	17	17	18	18	19	18
		2. Reduce fuel consumption	15	18	14	14	14	16	15	15
		3. Reduce GHG emissions	24	24	27	24	26	25	27	27
		4. Reduce other gases emissions	19	20	19	23	19	19	23	24
		5. Response to oil Spills	8	9	7	5	6	7	6	6
	Supply Chain	6. Assess/evaluate suppliers	20	20	18	20	18	17	19	21
		7. Collaborate with suppliers	19	18	21	21	19	19	20	21
		8. Procure sustainably	18	14	17	15	14	19	14	16
		9. Source locally	5	6	7	2	1	1	1	3
	Materials Consumption	10. Reduce waste production	18	16	18	19	20	22	24	24
		11. Reduce water consumption	21	21	17	17	19	19	18	19
		12. Reduce packaging	7	7	9	8	7	9	14	15
		13. Reduce consumption of resources	17	19	13	15	18	17	19	21
		14. Reduce energy consumption	23	24	22	22	23	22	21	23
		15. Use Renewable energy	23	21	19	22	22	24	20	20
		16. Account for biodiversity	22	22	19	19	21	23	24	23
		17. Recycle waste	10	12	12	12	15	14	14	15
		18. Recycle water	9	8	8	8	8	9	8	10
		19. Reuse resources	11	11	11	9	14	12	13	12
		20. Use recyclable	6	8	10	8	11	11	14	11
		21. Make product LCA	7	10	9	7	8	12	11	14
		22. Use alternative modes of transportation	8	10	11	11	10	13	14	9
		23. Certify to ISO 14001 standard	9	11	6	6	8	9	10	8

Source: the Author' calculation using the information gathered.

Figure 20 illustrates the total disclosure scores for European O&G firms from 2015 to 2022 years. Since 2020, the research can observe a gradual increase in total sustainability scores use. The increase in the use of sustainability indicators by O&G firms after 2020 can be attributed to several factors. Due to environmental pressures and stakeholder scrutiny, businesses are being pushed to change their behaviour and match it with sustainable principles through launching sustainable industry initiatives towards energy transition (IEA, 2020).

Sustainability reporting is one means via which this accountability is expressed. Social sustainability involves the involvement of the enterprise in social processes; it contributes to the rise of the welfare of the community and the level of social security of its employees. Table 34 shows the most disclosure in labour practices for encouraging employee diversity, which has a maximum score of 187 and a minimum total score of 114 trained on anti-corruption indicators.

O&G firms' disclosures in their corporate communication channels make it clear who is responsible for these duties. A company will continue to exist if there are people on the globe and in the society to which it belongs. The acknowledgement, valuation, and advancement of employees' abilities utilising suitable human resources practises for justice, wealth, and growth is another example of social sustainability within different firms. Table 33 shows the most disclosure in human rights for engaged employees, which has a maximum score of 157 and a minimum total score of 129 has conducting community support activities indicator.

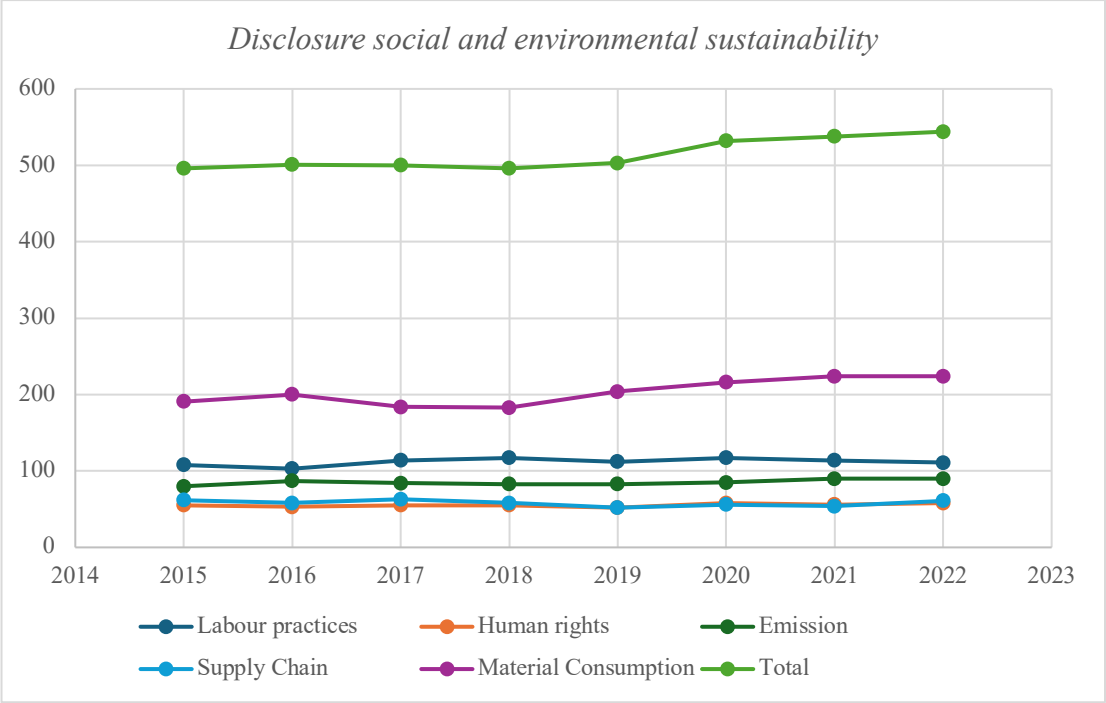


Fig. 19. Dynamics of Disclosure of Social and Environmental Sustainability from 2015 to 2022 years

Figure 19 shows that emission indicators change slightly during the analysed period and include the highest reduced GHG emissions total score of 204 and the lowest response to oil spills total score 54. Evident that the importance the O&G industry places on environmental issues can have a significant impact on production and production research. Table 34 shows the most disclosure in the supply chain for collaborating with suppliers, which has a maximum score of 157 and a minimum total score of 26 has source local indicator. Corporate environmental sustainability is demonstrated by how well environmental practices are joined with the enterprise's everyday operations and strategic planning operations.

The data in Figure 20 demonstrates that firms disclose their GHG emissions, yet their reporting frequency and level of detail differ from one another. The two major oil firms Shell and BP present detailed emission reports while smaller businesses only share basic trend information. Multiple Firms present their energy-saving strategies which connect to their carbon intensity reduction goals. The environmental commitments of these Firms differ in their level of detail and their ability to undergo verification processes.

The data in Table 34 demonstrates that biodiversity protection stands as a secondary concern compared to emission reporting. The analysis shows that four out of eleven firms have included information about their land use and restoration activities. The level of environmental disclosure varies between firms because they provide different amounts of information about their emissions. The inconsistent reporting of environmental data between firms creates doubts

about their ability to handle long-term environmental threats and maintain operational stability. Most Firms publish gender distribution information which focuses on executive positions.

The available data about ethnic diversity and intersectional equity remains scarce among Firms. Health and Safety: The data in Table 34 demonstrates that safety metrics serve as the most frequently reported social indicator because the industry faces high operational risks. A consistency validation procedure was developed to guarantee the reliability of qualitative scoring during content analysis. The researcher conducted this study independently yet implemented multiple methods to reduce personal bias in the assessment process.

The researcher performed a second review of sustainability reports after the first scoring session to confirm that the coding framework was applied consistently. The researcher documented all instances where they needed to decide about numerical clue status for scoring purposes because they wanted to verify their decisions through time-based comparison. The analysis demonstrates that sustainability focuses areas in the European O&G sector underwent significant changes during the 2015–2022 time period. The indicator "Encourage employee diversity" showed continuous improvement in scores which indicates firms now focus more on diversity and inclusion practices because of EU-wide equity initiatives and social equality movements.

The disclosure scores for "GHG emissions" and "energy consumption" remained high throughout the study period because of rising regulatory requirements and stakeholder requirements for climate transparency. The indicators "supplier code of conduct" and "oil spill response" received lower scores throughout the entire sample population. The low scores for these indicators might result from weak internal monitoring systems or deliberate decisions to avoid revealing sensitive information to the public. The minimal supply chain governance reporting by firms indicates possible underreporting of third-party risk exposure which represents a critical deficiency.

The European O&G sector demonstrates inconsistent levels of sustainability theme emphasis through these observed patterns. The analysis uses score variations to understand how corporate sustainability narratives transform based on institutional and societal and market forces. The disclosed information shows significant differences between Firms. Some Firms detail their financial support for local development, but others focus on stakeholder engagement without quantifiable results. The health and safety sector demonstrates high disclosure consistency between Firms, but diversity and community impact reporting shows wide variations.

The extent of disclosure information determines how investors determine a company's social operating authorisation. The main observation in sustainability reporting across environmental and social aspects reveals that Firms have different levels of maturity in their reporting practices. The industry has well-established indicators for GHG emissions and safety, but biodiversity and community investment receive inadequate attention. The inconsistent reporting of sustainability data creates problems for investors who need complete and comparable information to build effective investment models.

The sustainability analysis highlights both progress and persistent gaps. While disclosures related to environmental impact (such as GHG emissions) are increasingly comprehensive, social aspects such as supply chain labour practices remain inconsistently reported. Moreover, firms show different strengths: some emphasize environmental responsibility, while others focus more on social equity. These differentiated sustainability profiles will be integrated with the earlier financial findings in the next section to evaluate firms holistically under the TBL IAM.

5.4 Limitations of Methodology and Data Analysis

The research provides a detailed framework for TBL application to evaluate European O&G firms' investment potential, yet researchers need to recognise specific methodological and analytical restrictions. The research foundation requires a more detailed explanation of its philosophical and methodological structure. The research design uses mixed methods to evaluate financial performance and sustainability metrics yet the connection between these two elements remains weak.

The research needs to establish a defined mixed-methods approach between explanatory sequential or convergent parallel to create better coherence and strengthen the findings' connections between different dimensions. The sampling approach together with the chosen analysis units creates potential biases in the research. The selection of firms for analysis depends on their sustainability disclosure practices which leads to biased results because advanced reporting firms dominate the sample while firms with weak or unclear performance remain underrepresented (self-selection bias).

The research sample fails to consider regional regulatory variations and industry sub-sector differences which might affect direct TBL performance assessments. The use of sustainability data from firms faces two main challenges because it comes from self-reported sources. The reporting standards for sustainability information differ between Firms and countries while firms tend to choose data that presents their performance in a positive light.

The reliability and validity of social and environmental indicators become uncertain because of this issue. The research lacks sufficient robustness because it does not combine its findings with independent ESG data from CDP and Sustainalytics or stakeholder feedback. The systematic approach to qualitative sustainability dimension coding does not provide enough clarity about the methods used to quantify subjective elements in community engagement and labour practices.

The TBL framework's financial-social-environmental indicator weights remain unexplained, which creates challenges for understanding and comparing the combined results. The analysis focuses on descriptive methods but fails to use advanced statistical methods to discover relationships between TBL components and their potential causal effects. The research results lack external sustainability benchmarking against established global standards which reduces their ability to provide context-specific insights.

The study provides valuable insights but additional research is needed to address these identified limitations which will enhance the TBL framework's effectiveness for sustainability-driven market investment assessment. The TBL framework requires improved methodological support and enhanced data verification methods and deeper analytical approaches and external benchmarking to achieve better validity and practicality in sustainability-driven market assessments.

5.5 Comparative Analysis of Financial and Sustainability Indicators

The following section combines financial and sustainability assessments to create an investment attractiveness ranking system for the selected firms based on their TBL dimensions. The scoring system uses standardised economic and social and environmental indicators to analyse their relationships through correlation and comparative methods, which reveal synergies and trade-offs. The integrated assessment method provides a detailed understanding of how businesses manage their financial performance with their social and environmental duties because it goes beyond financial metrics.

The financial performance of the 11 largest European firms was evaluated through their annual reports which included 9 years of data from 2014 to 2022 for liquidity and solvency and

profitability and activity and cash flow and bankruptcy ratios. The analysis used a 5% significance level to evaluate statistical results while only considering correlations with p-values below 0.05. The R^2 values from regression forecasts reached between 0.26 and 0.81 based on indicator type with profitability metrics showing the highest trend reliability.

The linear regression analysis spanned nine years from 2014 to 2022 because this duration provides enough statistical power to detect financial performance patterns throughout time. A minimum of 8 to 10 observations in regression models with time as the single independent variable will detect linear patterns when the trend remains stable and free from major outliers. The nine data points used in this analysis enable accurate slope and intercept estimation while preserving model interpretability and preventing overfitting.

The model incorporates essential macroeconomic changes including the pandemic period through this time span which allows it to demonstrate both typical business years and times of economic instability. The nine-year time span strikes an optimal balance between statistical power and real-world data limitations and firm data consistency. The nine-year linear regression model provides a reliable method to predict financial indicators and track performance changes in the O&G industry. Table 34 shows the combined financial performance indicators.

Table 34
O&G Firms' Ratios for 9 years (2014 to 2022)

Indicator	2014	2015	2016	2017	2018	2019	2020	2021	2022
Current ratio	1.40	1.63	1.42	1.39	1.23	1.24	1.23	1.21	1.14
Quick ratio	1.17	1.43	1.21	1.16	1.01	1.01	1.01	1.03	1.05
Cash ratio	0.45	0.53	0.40	0.47	0.53	0.72	0.35	0.29	0.32
Financial leverage	2.98	2.96	3.36	2.82	2.84	2.94	3.33	4.39	3.46
Debt-to-Equity ratio	1.97	1.96	2.36	1.82	1.84	1.94	2.33	3.39	2.46
Debt ratio	0.60	0.61	0.61	0.59	0.60	0.62	0.67	0.70	0.67
Working capital turnover		1.56	1.49	1.67	1.69	1.65	1.47	1.82	2.48
Total assets turnover		0.00	0.01	0.04	0.04	0.03	-0.01	0.05	0.05
Fixed assets turnover		0.01	0.01	0.05	0.06	0.03	-0.01	0.08	0.09
Inventory turnover		11.09	10.79	11.94	12.85	11.07	7.81	9.46	11.78
Receivables turnover		6.71	6.53	7.18	7.84	7.76	5.86	6.24	7.03
Payables turnover		11.07	5.45	5.48	5.96	6.14	4.83	5.06	6.07
Operating cycle		99.73	104.31	96.53	91.68	97.07	147.24	175.10	122.33
Cash conversion cycle		35.38	33.13	27.58	25.67	32.64	61.48	40.89	29.02
Operating profit margin		2.92	9.41	14.73	14.69	5.90	9.21	24.06	20.22
Net profit margin		7.90	3.22	8.08	7.62	6.49	-2.13	13.52	7.79
Return on assets		0.44	1.01	3.72	4.15	2.57	-0.89	5.01	5.47
Return on equity		0.34	-0.54	11.84	10.02	6.55	-2.10	15.09	16.29
Gross profit margin		26.74	27.94	27.98	26.35	33.50	35.98	32.79	27.70
Pretax margin		-2.16	4.14	11.89	10.95	8.83	-1.06	18.98	13.83
Operating return on assets		2.25	4.12	7.79	8.87	1.79	3.80	11.13	15.14
Taffler's Model (UK)		0.22	0.29	0.41	0.45	0.22	0.27	0.47	0.55

Liss's Model (UK)		0.04	0.04	0.04	0.04	0.03	0.03	0.04	0.05
Altman's Model (USA)		-1.97	-1.99	-1.85	-1.74	-1.66	-1.63	-1.65	-1.67
Springate's Model (USA)		0.51	0.66	0.95	1.04	0.73	0.58	1.18	1.44
Cash to income		0.45	14.57	1.17	1.11	0.76	0.87	0.88	1.39
Cash return on equity ratio		0.22	0.19	0.15	0.18	0.21	0.20	0.27	0.32
Cash flow to revenue ratio		2.13	15.00	2.16	1.95	2.93	-0.71	2.49	1.27
Cash return on assets ratio		0.08	0.07	0.07	0.08	0.08	0.07	0.08	0.10
Dividend payment ratio		-6.80	-6.79	-10.92	-8.71	-6.50	-5.54	-6.87	-6.68
Reinvestment ratio		0.22	0.17	0.18	0.22	0.23	0.18	0.21	0.30
Interest Coverage ratio		-7.72	-9.28	22.69	-8.35	-22.37	-18.21	-17.29	-15.06
Debt coverage ratio		0.14	0.11	0.12	0.14	0.15	0.12	0.13	0.16

Source: the Author' calculation using the information gathered.

The company experienced a decline in its current ratio from 2022 which resulted in reduced short-term liquidity. The unfavourable direction of these statistics indicates that businesses face deteriorating cash flow stability and poor working capital management because of the unstable energy market conditions. Following the pandemic, financial leverage increased, peaking at 4.39 in 2021.

The efficiency ratios demonstrated significant changes throughout the period. The working capital turnover ratio showed a significant improvement from 1.47 in 2020 to 2.48 in 2022 which indicates better management of short-term assets. The inventory turnover and receivables turnover maintained stable levels but the payables turnover experienced a significant decrease in 2019 to 4.83 which indicates longer payment durations because of cash flow problems. The operating cycle and cash conversion cycle reached their highest points in 2020 at 147.24 days and 61.48 days, respectively because of pandemic-related supply chain disruptions.

The operating cycle experienced temporary inefficiencies during the pandemic which matches industry-wide reports about delivery delays and payment issues. The post-2020 period brought about a significant improvement in all profitability indicators. The operating profit margin experienced a substantial increase from 5.90% in 2019 to 24.06% in 2021 because of rising energy market prices. The three profitability metrics ROA and ROE and net profit margin showed substantial growth from their pandemic lows in 2020 to their strong 2022 levels where ROE achieved 16.29%. The profit margins experienced significant fluctuations between negative values in 2020 and their highest points during the recovery period.

The O&G sector faces ongoing cyclicality as a structural risk even though profit levels have increased since the crisis. The indicators used to predict bankruptcy have shown positive developments. The Taffler's Model score increased from 0.22 in 2015 to 0.55 in 2022 which indicates lower chances of insolvency. Springate's score demonstrated a continuous upward trend which indicates better financial stability of the company. The Altman's Z-score maintained negative values throughout the period according to U.S. model assumptions, yet these results might not accurately represent European financial characteristics. The company's cash performance showed inconsistent results.

The cash return on equity reached 0.32 in 2022, while cash to income and cash return on assets showed improvement after 2020 which indicates better internal funding capabilities. The negative interest coverage ratio of -15.06 in 2022 indicates that debt service costs exceed earnings which creates long-term financial stability concerns. The financial data shows

European O&G firms faced reduced liquidity and increased debt, but their profitability and operational efficiency have mostly recovered from pandemic impacts. The combination of high debt levels and inadequate interest coverage creates ongoing threats to financial stability. The financial baseline established through these results enables future assessments of social and environmental performance indicators and TBL framework investment attractiveness.

Correlation indicator between non-financial and liquidity and solvency indicators

The correlation indicators and coefficient of determination to identify the relationship between the non-financial and financial indicators. Correlation indicators are presented in Table 37:

Table 37
Correlation Indicator Between Non-financial and Liquidity and Solvency Indicators

	Current ratio	Quick ratio	Cash ratio	Financial leverage	Debt-to-Equity ratio	Debt ratio
1. Employ Health and Safety programs	-0.7650	-0.8038	-0.4245	0.4225	0.4228	0.4189
2. Encourage employee diversity	-0.4561	-0.3821	-0.5298	0.6092	0.6093	0.6956
3. Establish supplier code of conduct	0.1435	0.1590	0.1777	-0.5717	-0.5718	-0.5587
4. Source responsibly - ethically	0.4552	0.2792	0.6167	-0.8236	-0.8235	-0.7504
5. Train on anti-corruption	-0.3946	-0.5644	0.2177	-0.0784	-0.0780	0.1888
6. Train and educate employees	-0.7940	-0.6863	-0.1854	0.3672	0.3672	0.7006
7. Engage employees	-0.1886	0.0191	-0.6106	0.1551	0.1548	0.4938
8. Conduct community support activities	0.5072	0.5448	0.0248	-0.3029	-0.3030	-0.5040
9. Commit to employees	-0.6597	-0.6469	-0.5626	0.5547	0.5548	0.8058
1. Reduce carbon footprint	-0.9201	-0.9157	-0.3022	0.5316	0.5319	0.6325
2. Reduce fuel consumption	0.2086	0.2356	-0.4759	0.3147	0.3146	0.1688
3. Reduce GHG emissions	-0.5076	-0.4080	-0.2593	0.4005	0.4005	0.4756
4. Reduce other gases emissions	-0.5964	-0.4223	-0.4691	0.4877	0.4875	0.4594
5. Response to oil Spills	0.7264	0.7190	-0.1329	-0.0553	-0.0554	-0.2192
6. Assess/evaluate suppliers	0.1142	0.3175	-0.1740	0.0787	0.0784	-0.0484
7. Collaborate with suppliers	-0.4255	-0.3356	-0.1345	-0.0757	-0.0757	0.0260
8. Procure sustainably	0.3136	0.3241	-0.1675	-0.3136	-0.3137	0.0125
9. Source locally	0.6838	0.7105	0.0024	-0.3851	-0.3853	-0.5910
10. Reduce waste production	-0.7204	-0.5826	-0.4892	0.6466	0.6466	0.8880
11. Reduce water consumption	0.5585	0.6242	-0.0009	0.0362	0.0359	0.0023
12. Reduce packaging	-0.5948	-0.3858	-0.7012	0.7082	0.7080	0.7931
13. Reduce consumption of resources	-0.3114	-0.1244	-0.3752	0.6076	0.6074	0.6508
14. Reduce energy consumption	0.3788	0.4331	0.2900	-0.4019	-0.4022	-0.4263
15. Use Renewable energy	0.1893	0.0871	0.2535	-0.2568	-0.2567	-0.0279
16. Account for biodiversity	-0.1725	-0.0339	-0.6178	0.8093	0.8092	0.8751
17. Recycle waste	-0.8753	-0.8186	-0.1546	0.4062	0.4063	0.6201

18. Recycle water	-0.1147	0.1111	-0.3820	0.0561	0.0557	0.4218
19. Reuse resources	-0.2996	-0.2818	0.0596	0.4395	0.4395	0.5341
20. Use recyclable	-0.7441	-0.7170	-0.3936	0.7004	0.7006	0.7540
21. Make product LCA	-0.5703	-0.3921	-0.7758	0.5840	0.5839	0.7729
22. Use alternative modes of transportation	-0.5078	-0.6162	-0.4465	0.5897	0.5901	0.5340
23. Certify to ISO 14001 standard	0.1898	0.2348	-0.4090	0.6303	0.6302	0.4687
Average correlation	-0.1922	-0.1350	-0.2354	0.2147	0.2147	0.2896

Source: the Author' calculation using the information gathered.

The majority of social and environmental sustainability indicators show a strong negative statistical relationship with liquidity ratios. The statistical relationship between supply chain sustainability indicators and liquidity ratios shows a moderate negative correlation. The relationship between liquidity ratios and social and environmental sustainability performance shows an inverse pattern, except for supply chain sustainability, where the connection remains less intense.

Financial ratios show a weak negative relationship with labour practices and supply chain sustainability metrics, but create a strong positive link with emissions and materials usage sustainability metrics. The statistical analysis reveals that financial ratios show stronger connections to emissions and materials usage and human rights but demonstrate weaker negative relationships with labour practices and supply chain sustainability metrics. The implementation of social and environmental initiatives leads to negative relationships with liquidity indicators such as current and quick and cash ratios because sustainability efforts reduce short-term liquidity (e.g. “Employ Health and Safety programs” has a -0.7650 correlation with current ratio).

Sustainable firms tend to use financing through debt ratios because their initiatives create positive relationships with these financial metrics (e.g. “Account for biodiversity” has a 0.8751 correlation with debt ratio). The data indicates that Firms must choose between sustainability dedication and financial adaptability because their short-term financial stability suffers from sustainability initiatives. Table 36 shows correlation indicator between non-financial and profitability indicators:

Table 36

Correlation Indicator Between Non-financial and Profitability Indicators

	Return on assets	Return on equity	Gross profit margin	Pretax margin	Operating return on assets
1. Employ Health and Safety programs	0.4604	0.4786	0.2916	0.6010	0.5583
2. Encourage employee diversity	-0.4561	0.5551	0.2443	0.5032	0.6157
3. Establish supplier code of conduct	0.1435	0.3830	-0.7127	0.1818	0.3262
4. Source responsibly - ethically	0.4552	-0.3093	-0.1787	-0.4175	-0.5175
5. Train on anti-corruption	-0.3946	-0.3134	0.8633	-0.2306	-0.4124
6. Train and educate employees	-0.7940	0.4911	0.4961	0.4040	0.4886
7. Engage employees	-0.1886	0.0380	-0.0321	-0.1862	0.4464
8. Conduct community support activities	0.5072	0.2495	-0.8575	0.1101	0.2345

9. Commit to employees	-0.6597	0.1617	0.7486	0.1914	0.3213
1. Reduce carbon footprint	-0.9201	0.5485	0.6230	0.6719	0.4930
2. Reduce fuel consumption	0.2086	-0.5711	0.0607	-0.4076	-0.2044
3. Reduce GHG emissions	-0.5076	0.7580	0.2739	0.7220	0.5834
4. Reduce other gases emissions	-0.5964	0.7268	-0.2725	0.6972	0.8833
5. Response to oil Spills	0.7264	-0.6812	-0.1319	-0.6220	-0.5104
6. Assess/evaluate suppliers	0.1142	0.3053	-0.7759	0.1977	0.4799
7. Collaborate with suppliers	-0.4255	0.8252	-0.3474	0.6521	0.7659
8. Procure sustainably	0.3136	-0.3903	0.0892	-0.6171	-0.1915
9. Source locally	0.6838	-0.1377	-0.6659	-0.2004	-0.0998
10. Reduce waste production	-0.7204	0.5469	0.4842	0.4870	0.6208
11. Reduce water consumption	0.5585	-0.6599	-0.0556	-0.6568	-0.4849
12. Reduce packaging	-0.5948	0.7474	0.0966	0.6817	0.8870
13. Reduce consumption of resources	-0.3114	0.0931	0.1801	0.1271	0.2829
14. Reduce energy consumption	0.3788	-0.4624	-0.3576	-0.4803	-0.3652
15. Use Renewable energy	0.1893	-0.7677	0.3537	-0.7931	-0.6451
16. Account for biodiversity	-0.1725	-0.0663	0.4746	-0.0220	0.1645
17. Recycle waste	-0.8753	0.4034	0.6328	0.4680	0.3634
18. Recycle water	-0.1147	0.0538	-0.0711	-0.2122	0.3565
19. Reuse resources	-0.2996	0.1053	0.7197	0.1861	-0.1102
20. Use recyclable	-0.7441	0.5408	0.6745	0.6602	0.4547
21. Make product LCA	-0.5703	0.2716	0.3300	0.2541	0.5872
22. Use alternative modes of transportation	-0.5078	0.1572	0.6520	0.3628	0.1800
23. Certify to ISO 14001 standard	0.1898	-0.4287	0.3068	-0.2530	-0.2268
Average correlation	-0.1539	0.1141	0.1293	0.0956	0.1977

Source: the Author' calculation using the information gathered.

The analysis of profitability ratios reveals inconsistent relationships with social and environmental sustainability indicators. The statistical analysis reveals that profitability ratios maintain a weak positive relationship with sustainability indicators because Firms with higher profitability tend to achieve superior social and environmental sustainability results. The net profit margin shows a weak negative relationship with human rights indicators because higher profit margins lead to slightly worse human rights outcomes.

The operating profit margin and pretax margin demonstrate weak negative statistical connections with supply chain sustainability indicators which indicates that rising profitability margins result in minimal deterioration of supply chain sustainability performance. The research demonstrates that profitability ratios maintain a positive relationship with sustainability, but human rights and supply chain sustainability performance show negative correlations. The operating return on assets demonstrates a weak to moderate positive relationship with social and environmental practices (avg. 0.1977), which indicates that sustainability initiatives can lead to better operational performance.

The operating returns show strong positive correlations with “Reduce other gases emissions” and “Train and educate employees” at 0.8833 and 0.4886 respectively. The return on assets demonstrates a small negative average relationship (-0.1539) because short-term

investments might create operational trade-offs. The indicators “Recycle waste” and “Use recyclable” show positive relationships with gross profit and pretax margins which suggests that specific environmental practices might boost profitability. Table 37 shows correlation indicator between non-financial and activity indicators:

Table 37
Correlation Indicator Between Non-financial and Activity Indicators

	Working capital turnover	Total assets turnover	Fixed assets turnover	Inventory turnover	Receiv-ables turnover	Payables turnover	Operating profit margin	Net profit margin
1. Employ Health and Safety programs	0.1796	0.4604	0.4319	-0.1447	-0.0465	-0.7573	0.7397	0.1267
2. Encourage employee diversity	0.3768	0.4588	0.4929	-0.2632	-0.2782	-0.1790	0.7111	0.4473
3. Establish supplier code of conduct	0.1944	0.3884	0.3415	0.7536	0.5578	0.1995	0.1381	0.2765
4. Source responsibly - ethically	-0.5402	-0.3441	-0.4291	0.2787	0.3825	0.3237	-0.5594	-0.2050
5. Train on anti-corruption	-0.3727	-0.4094	-0.4351	-0.5966	-0.1311	-0.4001	-0.2468	-0.5428
6. Train and educate employees	0.6412	0.4019	0.4625	-0.2374	0.0131	-0.2922	0.4490	0.1045
7. Engage employees	0.5554	-0.0440	0.0847	-0.2280	-0.4243	0.0825	0.1977	-0.2994
8. Conduct community support activities	0.0352	0.2934	0.2574	0.6688	0.2972	0.4523	0.1097	0.4823
9. Commit to employees	0.1785	0.0281	0.0803	-0.7149	-0.5379	-0.5490	0.4668	-0.2003
1. Reduce carbon footprint	0.3846	0.4866	0.4894	-0.3106	-0.0547	-0.8169	0.6767	0.1165
2. Reduce fuel consumption	-0.2639	-0.5038	-0.4506	-0.4382	-0.6366	-0.1396	-0.1550	-0.4963
3. Reduce GHG emissions	0.6018	0.6433	0.6697	-0.0430	-0.0007	-0.4117	0.6541	0.4548
4. Reduce other gases emissions	0.7523	0.7779	0.8165	0.2923	0.1414	-0.2524	0.8075	0.5060
5. Response to oil Spills	-0.4650	-0.6555	-0.6248	-0.2588	-0.5049	0.2954	-0.5067	-0.3855
6. Assess/evaluate suppliers	0.5534	0.4273	0.4748	0.5889	0.2406	0.3727	0.2319	0.4084
7. Collaborate with suppliers	0.6221	0.7773	0.7661	0.5242	0.4302	-0.1788	0.6526	0.4878
8. Procure sustainably	-0.1541	-0.5294	-0.4739	-0.3287	-0.4003	0.3318	-0.3317	-0.4864
9. Source locally	-0.1430	-0.1050	-0.1167	0.4129	0.0299	0.2900	-0.2075	0.0167
10. Reduce waste production	0.6442	0.4416	0.5193	-0.3791	-0.2649	-0.3137	0.6449	0.2361
11. Reduce water consumption	-0.2071	-0.6072	-0.5382	-0.2601	-0.3833	0.5223	-0.5863	-0.3294
12. Reduce packaging	0.8193	0.6769	0.7610	-0.1172	-0.2569	-0.3251	0.8708	0.4477
13. Reduce consumption of resources	0.5157	0.1300	0.2320	-0.2656	-0.2978	-0.0339	0.2191	0.0492
14. Reduce energy consumption	-0.0334	-0.3527	-0.3257	0.2604	0.1650	0.3153	-0.5772	-0.3820
15. Use Renewable energy	-0.5083	-0.7759	-0.7629	-0.4392	-0.2063	0.3332	-0.6825	-0.6334
16. Account for biodiversity	0.2457	-0.1186	-0.0069	-0.7071	-0.7496	-0.0260	0.2303	-0.0207

17. Recycle waste	0.5056	0.3507	0.3879	-0.3002	0.0013	-0.6365	0.4270	-0.0481
18. Recycle water	0.6249	-0.0203	0.1104	-0.1126	-0.2548	0.2837	0.0530	-0.2057
19. Reuse resources	0.1500	0.0247	0.0598	-0.4946	-0.2047	-0.1790	0.0353	0.0866
20. Use recyclable	0.3588	0.4471	0.4673	-0.4496	-0.2544	-0.6800	0.6802	0.2500
21. Make product LCA	0.6022	0.1957	0.3060	-0.4369	-0.5311	-0.4968	0.5549	-0.1793
22. Use alternative modes of transportation	-0.2028	0.0873	0.0604	-0.5945	-0.4387	-0.7053	0.5173	0.0071
23. Certify to ISO 14001 standard	-0.1963	-0.3939	-0.3294	-0.6136	-0.7039	0.0291	-0.0938	-0.1544

Source: the Author' calculation using the information gathered.

The statistical analysis reveals that most activity ratios show negative relationships with sustainability indicators except for supply chain performance which demonstrates a weak positive relationship. The data shows that Firms with higher turnover ratios tend to achieve lower sustainability results in their different performance areas. The supply chain dimension shows a weak positive relationship between turnover ratios and sustainability performance although other dimensions show negative relationships.

The environmental initiatives “Reduce other gases emissions” and “Reduce packaging” demonstrate strong positive relationships with asset turnover and profit margins which indicates environmental actions can support operational success. The practices of “Collaborate with suppliers” and “Reduce GHG emissions” create positive relationships with fixed asset turnover and operating and net profit margins.

The use of renewable energy and oil spill response practices generate negative relationships with efficiency metrics which suggests short-term performance costs. The analysis demonstrates that sustainability initiatives which boost performance exist alongside those which need initial investments that temporarily affect turnover ratios. Table 38 shows correlation indicator between non-financial and bankruptcy indicators

Table 38
Correlation Indicator Between Non-financial and Bankruptcy Indicators

	Taffler’s Model (UK)	Liss’s Model (UK)	Altman’s Model (USA)	Springate’s Model (USA)
1. Employ Health and Safety programs	0.6388	0.4107	0.6577	0.5493
2. Encourage employee diversity	0.6111	0.5490	0.6148	0.5549
3. Establish supplier code of conduct	0.4130	0.2744	-0.2289	0.2996
4. Source responsibly - ethically	-0.4244	-0.5836	-0.2780	-0.5052
5. Train on anti-corruption	-0.3970	-0.4995	0.6325	-0.3474
6. Train and educate employees	0.4139	0.4898	0.9219	0.5585
7. Engage employees	0.3465	0.4998	0.2005	0.2849
8. Conduct community support activities	0.3051	0.2251	-0.5893	0.1541
9. Commit to employees	0.2945	0.2371	0.8108	0.2631
1. Reduce carbon footprint	0.4954	0.4069	0.8778	0.5831
2. Reduce fuel consumption	-0.2421	-0.1611	-0.4069	-0.3370
3. Reduce GHG emissions	0.5440	0.5634	0.5229	0.6648

4. Reduce other gases emissions	0.8723	0.8824	0.3859	0.8736
5. Response to oil Spills	-0.5466	-0.4386	-0.7755	-0.6278
6. Assess/evaluate suppliers	0.4374	0.5886	-0.3599	0.4407
7. Collaborate with suppliers	0.8129	0.6983	0.3538	0.7796
8. Procure sustainably	-0.2203	-0.2022	-0.0537	-0.3554
9. Source locally	-0.0727	-0.0663	-0.8638	-0.1816
10. Reduce waste production	0.5424	0.6144	0.8432	0.6263
11. Reduce water consumption	-0.5901	-0.3368	-0.5280	-0.5484
12. Reduce packaging	0.8184	0.8943	0.5336	0.8512
13. Reduce consumption of resources	0.1493	0.4059	0.2255	0.2920
14. Reduce energy consumption	-0.4235	-0.2348	-0.5717	-0.3454
15. Use Renewable energy	-0.6664	-0.6308	0.0721	-0.6947
16. Account for biodiversity	0.0363	0.2406	0.2786	0.0866
17. Recycle waste	0.3042	0.3526	0.8474	0.4842
18. Recycle water	0.2279	0.4567	0.1793	0.2516
19. Reuse resources	-0.2089	-0.0581	0.4841	0.0229
20. Use recyclable	0.4285	0.3935	0.7837	0.5258
21. Make product LCA	0.4960	0.6028	0.4527	0.5057
22. Use alternative modes of transportation	0.2413	0.0338	0.5636	0.1526
23. Certify to ISO 14001 standard	-0.3114	-0.1468	-0.1997	-0.2981
Average correlation	0.1664	0.2019	0.1996	0.1739

Source: the Author' calculation using the information gathered.

The correlation analysis shows that the chosen correlation indicator maintains a strong positive relationship with bankruptcy metrics when combined with social and environmental sustainability performance indicators. The correlation indicator shows a stronger relationship with bankruptcy risk than other sustainability indicators do. The statistical analysis reveals that supply chain sustainability performance creates an opposite relationship with the Z-score model from Altman which predicts bankruptcy.

The model indicates that Firms with strong supply chain sustainability practices do not show reduced bankruptcy risk according to its financial distress assessment. The Altman and Springate models show strong positive relationships between environmental and social indicators and bankruptcy resilience. The financial stability indicators “Reduce other gases emissions,” “Recycle waste” and “Reduce waste production” receive high scores in all models because they demonstrate alignment with financial stability. The financial performance of Firms appears to suffer from short-term costs according to the negative correlations between “Response to oil spills” and “Use renewable energy.”

All models demonstrate small positive relationships between sustainability initiatives and financial stability which supports the idea that Firms with strong ESG practices face lower financial distress risks. The correlation indicator shows strong positive relationships with bankruptcy indicators in social and environmental sustainability but displays a weak negative connection with Altman's model for supply chain sustainability. Table 39 shows the coefficient of determination between non-financial and cash indicators:

Table 39
The Coefficient of Determination Between Non-financial and Cash Indicators

	Cash to income	Cash return on equity	Cash flow to revenue	Cash return on assets	Dividend payment	Reinvest-ment ratio	Interest coverage ratio	Debt coverage ratio
1. Employ Health and Safety programs	-0.2072	0.0687	-0.2837	-0.0306	-0.6279	0.0131	0.0650	-0.0877
2. Encourage employee diversity	-0.6261	0.4927	-0.6533	0.3519	-0.5002	0.2947	0.1610	0.1994
3. Establish supplier code of conduct	-0.3168	-0.2870	-0.2947	-0.0055	0.4277	0.1507	0.1853	0.1812
4. Source responsibly - ethically	-0.3292	-0.7734	-0.2968	-0.4791	0.3822	-0.3915	0.2604	-0.2094
5. Train on anti-corruption	-0.3500	-0.2538	-0.4281	-0.2272	-0.5706	-0.2527	0.3580	-0.1893
6. Train and educate employees	-0.6143	0.7010	-0.6659	0.7247	-0.5329	0.6979	0.3488	0.6211
7. Engage employees	-0.1742	0.5833	-0.3511	0.4981	-0.2650	0.4614	0.0046	0.2849
8. Conduct community support activities	-0.0545	-0.2270	0.0217	-0.1032	0.6051	-0.0249	-0.1411	0.0085
9. Commit to employees	-0.4161	0.3427	-0.5584	0.1271	-0.9113	0.0585	0.3039	-0.0803
1. Reduce carbon footprint	-0.2632	0.3391	-0.3120	0.2180	-0.8112	0.2317	0.4210	0.1052
2. Reduce fuel consumption	0.8488	-0.0083	0.7407	-0.3209	-0.1273	-0.4055	-0.5731	-0.5145
3. Reduce GHG emissions	-0.3998	0.4274	-0.3759	0.3286	-0.5556	0.3565	0.8016	0.1985
4. Reduce other gases emissions	-0.1032	0.6661	-0.1158	0.6317	-0.1154	0.6580	-0.2363	0.5307
5. Response to oil Spills	0.6846	-0.2834	0.6564	-0.4908	0.2032	-0.5620	-0.2778	-0.5893
6. Assess/evaluate suppliers	0.2749	0.4934	0.3181	0.5497	0.5678	0.5684	-0.5481	0.5240
7. Collaborate with suppliers	-0.5652	0.1954	-0.5648	0.3601	-0.0767	0.4883	0.4330	0.4110
8. Procure sustainably	-0.3959	-0.1303	-0.5312	-0.1156	-0.1169	-0.1466	0.2442	-0.1673
9. Source locally	0.4607	-0.4083	0.4841	-0.4156	0.4518	-0.3443	0.0326	-0.3830
10. Reduce waste production	-0.5472	0.7840	-0.6067	0.6507	-0.6579	0.5852	0.3026	0.4444
11. Reduce water consumption	0.5194	0.1647	0.5154	0.0468	0.3432	-0.0781	-0.5056	-0.0517
12. Reduce packaging	-0.2821	0.8103	-0.3294	0.6116	-0.5335	0.5846	0.2561	0.3619
13. Reduce consumption of resources	0.2641	0.8241	0.2401	0.6370	-0.1697	0.5287	-0.3164	0.4143
14. Reduce energy consumption	0.6479	-0.0505	0.6484	0.0465	0.5383	0.0639	-0.3681	0.0996
15. Use Renewable energy	-0.1264	-0.1633	-0.1985	-0.0767	0.0984	-0.1698	-0.4016	-0.0162
16. Account for biodiversity	0.0695	0.7215	0.0082	0.3721	-0.4749	0.1936	-0.1761	0.0560
17. Recycle waste	-0.2033	0.5122	-0.2563	0.4554	-0.6738	0.4530	0.3934	0.3428
18. Recycle water	-0.2549	0.6763	-0.3785	0.6774	-0.0790	0.6348	0.0461	0.5097
19. Reuse resources	-0.1807	0.4110	-0.1294	0.2744	-0.4636	0.1774	0.4561	0.1497
20. Use recyclable	-0.2870	0.4273	-0.3064	0.2065	-0.8431	0.1697	0.5009	0.0253

21. Make product LCA	0.0722	0.6381	-0.0867	0.3666	-0.7161	0.3277	0.1971	0.0640
22. Use alternative modes of transportation	-0.1462	-0.0765	-0.2097	-0.3417	-0.8126	-0.3849	0.1698	-0.4706
23. Certify to ISO 14001 standard	0.5738	0.2969	0.5537	-0.0667	-0.1817	-0.2354	-0.4822	-0.3042

Source: the Author' calculation using the information gathered.

The financial cash-based indicators show multiple important patterns when Analysed against sustainability initiatives through the table data. The data shows that employee-centered activities including training and diversity promotion and employee engagement lead to better long-term financial results in cash return on equity and cash return on assets. The data shows that employee training programs lead to positive results in both cash return on equity (0.701) and cash return on assets (0.7247) which indicates that human capital development leads to better operational and equity performance.

The short-term liquidity indicators of cash to income and cash flow to revenue show negative correlations with environmental initiatives that include carbon reduction and anti-corruption training and responsible sourcing programs. The correlation between "Train on anti-corruption" and cash flow to revenue amounts to -0.4281 which suggests that compliance investments create short-term financial expenses. The analysis shows that ISO 14001 certifications and energy reduction practices create positive relationships with cash flow indicators because they lead to process improvements and better stakeholder trust.

The activities of "Reduce water consumption" and "Assess suppliers" demonstrate strong positive relationships with reinvestment and debt coverage which indicates better financial stability. The research demonstrates that social and governance investments create long-term financial benefits, yet some environmental programs reduce short-term liquidity while building sustainability reputation. The research reveals how different sustainability indicators relate to financial performance indicators through their various correlation patterns in the O&G sector. The O& financial ratio values. Table 40 shows the coefficient of determination between non-financial and financial indicators:

Table 40
The Coefficient of Determination Between Non-financial and Financial Indicators

Financials indicator	Labour practices	Human rights	Emissions	Supply Chain	Materials Consumption	Total scores
Current ratio	0.3126	0.1268	0.4004	0.2482	0.3294	0.4228
Quick ratio	0.4108	0.0421	0.2262	0.3818	0.1827	0.2339
Cash ratio	0.0004	0.5479	0.5737	0.0338	0.3609	0.5460
Financial leverage	0.0003	0.1196	0.6338	0.1553	0.6340	0.5568
Debt-to-Equity ratio	0.0003	0.1195	0.6336	0.1555	0.6338	0.5567
Debt ratio	0.0490	0.4122	0.5440	0.1388	0.8972	0.9015
Working capital turnover	0.0045	0.2246	0.3664	0.0450	0.2452	0.3780
Total assets turnover	0.0529	0.0115	0.2719	0.0024	0.0263	0.0878
Fixed assets turnover	0.0386	0.0428	0.3465	0.0069	0.0701	0.1607
Inventory turnover	0.0187	0.1249	0.0550	0.2070	0.3701	0.2706

Receivables turnover	0.0139	0.2522	0.1326	0.0009	0.2943	0.2768
Payables turnover	0.1360	0.0189	0.3920	0.1805	0.1234	0.1716
Operating profit margin	0.1159	0.2264	0.6648	0.0004	0.2195	0.4201
Net profit margin	0.0002	0.0163	0.0467	0.0029	0.0000	0.0018
Return on assets	0.0529	0.0115	0.2719	0.0024	0.0263	0.0878
Return on equity	0.1132	0.0526	0.2786	0.0050	0.0530	0.1555
Gross profit margin	0.1523	0.0202	0.0361	0.5567	0.3366	0.2215
Pretax margin	0.0800	0.0032	0.4012	0.0296	0.0750	0.1383
Operating return on assets	0.0659	0.3371	0.5373	0.0565	0.1648	0.3886
Taffler's Model (UK)	0.1035	0.2800	0.4677	0.0573	0.0840	0.2807
Liss's Model (UK)	0.0141	0.3063	0.5319	0.0734	0.2005	0.3953
Altman's Model (USA)	0.5467	0.1865	0.1570	0.3446	0.3741	0.4525
Springate's Model (USA)	0.0754	0.1689	0.4979	0.0089	0.1526	0.3198
Cash to income	0.5694	0.1647	0.0550	0.0002	0.0048	0.0527
Cash return on equity ratio	0.0044	0.2473	0.3920	0.0082	0.6300	0.6034
Cash flow to revenue ratio	0.6606	0.3356	0.0266	0.0005	0.0224	0.1199
Cash return on assets ratio	0.0017	0.1225	0.1005	0.0004	0.2580	0.2629
Dividend payment ratio	0.2314	0.2832	0.3907	0.1590	0.4720	0.5784
Reinvestment ratio	0.0077	0.0977	0.0854	0.0030	0.1524	0.1876
Interest Coverage ratio	0.1839	0.0225	0.0015	0.0067	0.0073	0.0426
Debt coverage ratio	0.0099	0.0155	0.0018	0.0003	0.0453	0.0458
Average R	0.1299	0.1594	0.3071	0.0927	0.2402	0.3006

Source: the Author' calculation using the information gathered.

About 1.78% of the variance in financial ratios cannot be explained by the social and environmental sustainability indicators, according to Table 40 and Figure 20's total coefficient of determination, or R2. To put it another way, although these sustainability indicators offer valuable information about financial performance, the variance in financial ratios is influenced by additional variables or aspects that are not covered in this analysis. This emphasises how intricate financial performance is and how it relates to sustainability, implying that factors other than those the study looked at influence financial results.

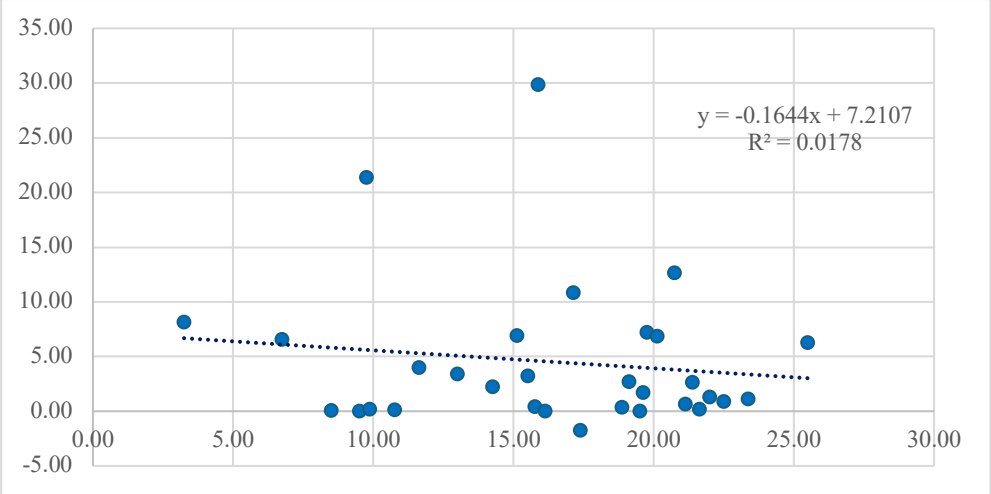


Fig. 20. The Relationships Between Sustainability and Financial Indicators from 2015 to 2022 years

Interestingly, the largest average correlations with financial performance are seen for emissions and materials usage (R = 0.3071 and 0.2402), indicating that businesses that address environmental concerns typically have healthier financial KPIs. For instance, debt ratio and cash return on equity correlate positively with emissions management and resource efficiency. Labour practices and human rights show weaker but still meaningful associations, particularly with bankruptcy models like Altman's and Springate's. These results support the idea that sustainability, especially environmental responsibility, is financially relevant in the O&G sector.

Exploring the relationship between financial metrics and sustainability indicators

A growing realisation that most O&G firms' operations may have negative unintended consequences on future ecosystems, societies, and habitats has given corporate sustainability issues more global prominence in recent years. The main goal of developing and presenting sustainable indicators by European O&G firms is to influence stakeholders with whom the firms engage in direct or indirect economic interaction. In general, sustainability indicators cover all aspects of an organisation's activities social, environmental, and economic performance.

This study finds the relationship between financial and non-financial indicators first, explaining the relationship between them and what kind of. This suggests that to offer stakeholders a comprehensive understanding, it's essential to include indicators from both annual reports and sustainability reports. This study employs a context analysis approach to evaluate the narrative within sustainability reports, aligning European O&G firms' sustainability reporting within the broader context of corporate sustainability.

The comparative analysis of financial and non-financial indicators revealed several noteworthy relationships:

1. Firms that focus on employee training and development show lower quick ratios because they dedicate resources to long-term talent development instead of short-term liquidity management.

2. The disclosure of greenhouse gas emissions by firms leads to better profit margins because their detailed environmental reports show higher gross and operating profit margins. The implementation of effective environmental management systems through disclosure of

GHG emissions leads to operational improvements and better corporate reputation which results in higher profitability.

3. The analysis shows that firms with transparent and sustainable supply chains maintain lower debt-to-equity ratios because they build stronger relationships with stakeholders and achieve better operational stability.

4. Firms that excel in community engagement activities achieve average to high ROA levels because their strong stakeholder relationships create better market opportunities and local stability which supports asset productivity.

The research Analysed European O&G firms which published sustainability reports and annual reports between 2015 and 2023. Findings reveal a rather limited positive statistical correlation between the overall social and environmental sustainability indicators and financial indicators. Specifically, the total coefficient of determination suggests that approximately 30% of the variance observed in financial ratios remains unaccounted for by the social and environmental sustainability indicators. These results underscore the complexity of the relationship between sustainability performance and financial performance in the context of the O&G industry.

This study is the first attempt to investigate the use of sustainability indicators by the O&G sector. In future research, it's important to address issues that call for the development of a methodical approach to evaluating the sustainability of European O&G firms, taking into account the risk element under the influence of outside forces. It is now necessary to create a reliable method for evaluating the sustainability of European O&G firms based on the number of variables which can be used to track changes in sustainability during a crisis. This methodology will then be able to provide unbiased data on the level of riskiness of sustainability and stabilise it by the most crucial target variables.

In fact, despite the emphasis of stakeholders on sustainability, firms still put a greater emphasis on financial performance than on social and environmental concerns. The connection between these elements and how businesses can strike the best balance for both enterprise and society has not yet been fully examined in the literature.

Although correlation analysis between financial and sustainability indicators revealed limited but positive relationships, especially between liquidity and certain social indicators, the results imply a complex interaction. This could mean sustainability efforts are not yet fully rewarded by financial markets—or that financial metrics alone do not capture long-term value from ESG practices. Such findings support the argument for adopting a TBL in investment analysis to capture dimensions that traditional financial analysis may overlook.

The literature review about corporate sustainability in the O&G sector contains extensive research that examines sustainability reporting development and its effects on the industry. The review demonstrates how Firms now use sustainability reports to measure performance through financial data and social and environmental metrics. The industry now recognises that corporate success and investor appeal extend beyond financial performance. Sustainability reports serve as essential tools for Firms to reveal their non-financial information to stakeholders.

The research demonstrates how O&G firms use sustainability reports to share their social and environmental effects with their stakeholders. The research demonstrates how sustainability reporting shapes how stakeholders view Firms and make their choices. The research provides essential knowledge about how these reports create effects that extend past basic regulatory requirements. The review provides detailed information about sustainability indicators which helps identify essential elements for environmental and social sustainability in the O&G industry.

The detailed evaluation enables researchers to identify particular areas where O&G businesses should focus their sustainability initiatives. The integrated assessment shows that

Shell and TotalEnergies lead the TBL framework by achieving high scores in all three dimensions of financial performance and social responsibility and environmental sustainability, which proves the framework's effectiveness for complete corporate evaluation. The firms prove that firms which focus on sustainability performance do not need to sacrifice their financial performance.

The data shows that firms which dedicate resources to social initiatives through diversity programs and anti-corruption training experience reduced short-term liquidity levels before achieving financial returns. Sustainability theory supports this finding because firms must choose between long-term value generation and short-term profitability.

The weak or negative relationship between environmental disclosure data about renewable energy usage and profitability indicators demonstrates how difficult it becomes to unite environmental goals with financial targets. The research shows that TBL integration remains possible, but firms must handle multiple conflicting priorities during the process. The study demonstrates the value of TBL analysis for investment decisions in the O&G industry through its identification of positive and negative relationships between sustainability and financial performance.

Scoring and Integration Methodology for Investment Attractiveness

To evaluate investment attractiveness through a TBL framework, this study developed a composite scoring system that integrates financial and sustainability indicators into a standardized investment attractiveness index. The goal was to classify firms based on a balanced view of their economic, social, and environmental performance.

Step 1: Standardization of Indicators

Given the differing scales of financial ratios and sustainability indicators, all metrics were normalized using code system. This standardization ensures comparability by converting raw values into dimensionless scores reflecting their position relative to the mean across all firms and years. The TBL investment attractiveness score was calculated by equally weighting each pillar: financial (quantitative ratios), social, and environmental (qualitative indicators from sustainability reports). All indicators were normalized onto a unified 0–2 scale (bad, good, very good), ensuring comparability across metrics. The final TBL score was the sum of the normalized indicators, resulting in a range between 0 and 126. Firms were then ranked and classified into categories such as “Market Leaders” and “Moderate Risk Investments.”

Step 2: Weighted Aggregation

To construct the final investment attractiveness score, each company’s standardized indicators were aggregated. The goal of the study was to evaluate performance holistically across the TBL categories, and this was reflected in the equal weighting of sustainability and financial indicators (50% each). To avoid placing too much emphasis on any one component, sub-dimensions including profitability, liquidity, environmental responsibility, and social equality were equally weighted within each category (financial or sustainability).

Step 3: Company Ranking

Based on the final IAM, firms were ranked from highest to lowest to identify relative leaders and laggards in terms of integrated TBL performance. This ranking allows for comparative evaluation of firms' attractiveness to sustainability-oriented investors.

Example: $IAM_i = \Sigma_{\text{financial score}} (0.2 * S_{i\ past} + 0.5 * S_{i\ present} + 0.3 * S_{i\ future}) + \Sigma_{\text{non-financial score}} (0.4 * S_{i\ past} + 0.6 * S_{i\ present})$

IAM (Total Energy) = (36*0.2 + 46*0.5 + 40*0.3) + (43.13*0.4 + 51*0.6) = 90.05 score

TotalEnergies achieved high scores in financial performance indicators (current ratio and debt coverage) and performed better than average in sustainability metrics (proactive climate disclosures and workforce diversity). The normalized and combined IAS results positioned TotalEnergies as the second most attractive company for ESG-focused investors among the 11 Analysed firms. TotalEnergies achieved a TBL Score of 90.05 which positions it in the "Stable Investments" category between 84 and 105.

TotalEnergies achieves a balanced performance in financial strength and social responsibility and environmental sustainability which makes it appealing to investors who want secure investments with ethical alignment. Shell and TotalEnergies and Anglo American achieved top positions in both financial and sustainability metrics which demonstrates their ability to achieve TBL framework goals. EnBW and Engie demonstrated average financial performance, yet their sustainability disclosure metrics were lower than other firms which might indicate they are prioritizing financial goals over environmental initiatives.

Equinor demonstrated excellent financial performance and superior social performance, but its environmental performance was below average which indicates focused sustainability efforts. The observed patterns indicate that some businesses achieve profit and sustainability equilibrium, yet other Firms focus more on financial gains than TBL obligations. The scoring system treats all three assessment dimensions with equal importance. The method provides equal treatment of ESG and financial criteria through its simple approach, yet additional refinement could be achieved by implementing stakeholder-based or industry-specific weighting schemes.

The method enables data-driven assessment which produces transparent results that can be duplicated and follows current sustainable finance standards. The TBL framework provides both detailed and relevant assessment capabilities when used to evaluate investment potential in European O&G firms. The evaluation of financial performance alongside social and environmental metrics produced multiple essential findings which answer the research questions directly. The analysis shows that Firms which disclose their sustainability information effectively about employee welfare and environmental emissions and corporate transparency tend to maintain sound financial health through liquidity and profitability and solvency.

The data confirms that Firms can achieve financial stability while maintaining their commitment to sustainability because these elements create a supportive relationship. The two leading financial performers Shell and TotalEnergies demonstrate high sustainability disclosure performance which indicates a positive connection between TBL elements. The indicators show different levels of connection between each other. The implementation of large-scale environmental projects which included decarbonization investments and supply chain transformations resulted in temporary cash flow decreases and higher debt levels.

The short-term financial costs of implementing extensive environmental programs might lead to benefits that emerge during extended periods of time. The analysis shows that social performance metrics between firms differ widely while financial results show limited connection to social performance which indicates TBL dimensions can operate independently. The analysis that combines financial data with social and environmental metrics proves the TBL framework works effectively for assessment purposes. Firms that focus on environmental protection through GHG emission reduction and waste management initiatives achieved better financial results including higher return on equity and improved bankruptcy model scores (e.g., Altman, Springate).

The positive relationship between sustainability investments and financial performance becomes evident through the connection between employee training and recycling practices and profitability and solvency metrics. The implementation of diversity and ethics training programs resulted in decreased liquidity levels because of initial expenses for human capital

development. The results show that TBL dimension alignment remains achievable but Firms need to handle intricate relationships between different elements when making sustainable investment choices. The TBL framework proves its worth in sustainable investment decision-making because Firms can achieve excellence in one area-specific performance when conditions are favourable.

The chapter presented a new TBL score which unites financial metrics with sustainability performance indicators. The standardized evaluation system demonstrated how businesses succeed through their economic performance and their sustainability impact. The TBL framework showed that firms with typical financial results such as Repsol and Enel achieved better positions in the ranking when sustainability factors were included which proved the value of TBL assessment. Financially strong firms lost their position in the rankings because their environmental and social disclosure practices were weak.

The TBL framework provides investors with a complete assessment of corporate attractiveness through its multidimensional evaluation system. The research combines quantitative and qualitative evaluation methods to create a more accurate sustainable investment decision framework which moves beyond financial assessments. The research confirms that TBL dimensions become more effective for investment attractiveness evaluation when properly measured and integrated. The research results establish a foundation for Chapter 6 to develop IAM with combined indicators and study their effects on stakeholders including investors and company managers and regulators.

The research objective to identify European O&G firms' TBL performance leaders and laggards was achieved by uniting financial and non-financial data into a single evaluation system. the research developed a standardized scoring system to evaluate financial ratios and sustainability indicators from 2015 to 2023 before performing company rankings. The TBL scores which combined financial and social and environmental elements equally provided a complete assessment of investment potential in the sector.

The research used regression and correlation analysis to evaluate core financial indicators throughout a 10-year period. The analysis used content assessment of sustainability reports to develop scoring criteria which evaluated narrative depth. The scoring system used a composite method to merge standardized indicators from all three TBL pillars into a single ranking system. The results demonstrate that businesses can achieve success in all three TBL pillars while proving sustainability and profitability exist together as a single entity.

Triangulation Convergence: 1. The positive relationship between Return on Equity and Gross Profit Margin and Operating Return on Assets matches the high sustainability scores from human capital development initiatives. The research demonstrates that social dimension investments in labour practices create financial benefits which proves the TBL framework's effectiveness.

2. The indicators "Recycle Waste" and "Reduce Waste Production" demonstrate positive relationships with profitability margins and Altman’s and Taffler’s models which proves environmental sustainability initiatives can benefit financial stability according to the TBL model.

3. The indicator "Encourage Employee Diversity" shows positive relationships with equity returns and solvency indicators, which indicates that social equity investments create financial stability.

Trade-Offs: 1. The reduction of carbon emissions leads to better environmental outcomes but results in lower Return on Assets and decreased profit margins in particular situations. The implementation of carbon reduction measures might require short-term financial expenses and capital outlays.

2. The implementation of renewable energy systems produces environmental advantages but shows weak or negative financial connections with net profit and liquidity ratios because of current O&G system inefficiencies and implementation expenses.

3. The adoption of ISO 14001 certification standards results in negative financial correlations with multiple profitability metrics because standardization enhances environmental reputation but requires initial compliance expenses that do not generate immediate financial returns. The TBL analysis shows that firms either maintain balanced performance across all dimensions, or they show different patterns where financial success exists with minimal sustainability disclosure or sustainability performance exists with weak financial results. The combined ranking system helps investors identify suitable responsible investment opportunities in the O&G industry.

The TBL framework proves its worth through these findings, which create a foundation for Chapter 6 to analyse theoretical and practical implications and future research directions.The quantitative results in Chapter 5 show that firms which excel in all TBL dimensions match the qualitative findings from Chapter 7. The interview participants throughout Chapter 7 confirmed that businesses which showed strong financial stability also received recognition for their genuine dedication to environmental and social responsibility. The study's findings gain strength through the combination of financial data with sustainability metrics and perceptual assessments.

The integrated findings from this research create a basis for Chapter 6 to Analyse the complete implications of the results regarding corporate sustainability strategy and investor choices and practical TBL framework implementation in financial assessments. The research will concentrate on determining if sustainability integration produces different investment positions and if this combined approach provides better risk-adjusted forward-looking corporate performance assessments.

Chapter 6: Triple Bottom Line Framework for Investment Attractiveness

The IAM system used in this research combined financial and non-financial performance elements into a single TBL framework. The researchers standardized all performance indicators from financial ratios to social and environmental metrics into a dimensionless 0–2 scale for comparison purposes. The three pillars of the index received equal weight in the calculation because the study aimed to unite financial performance with sustainability metrics.

The standardization process enabled researchers to merge various data types into uniform measurements which worked for both company assessments and time-based evaluations. The standardized indicators received equal weight in the aggregation process. The financial dimension received equal weight for its three subcategories of solvency and liquidity and profitability while social indicators and environmental indicators received equal weight in their respective categories. The assessment process generated a complete IAM score for each company which spanned from low to high attractiveness levels. The firms received peer-based rankings that led to their placement in three performance categories which included Market Leaders and Stable Investments and Moderate Risk.

The IAM system evaluated investment potential through a combination of historical data and current conditions and projected future readiness. The framework design incorporated both past performance stability and upcoming readiness factors including energy transition readiness. The framework enabled investors to conduct transparent multi-dimensional assessments of the oil and gas sector through a replicable tool which accommodated profitability versus sustainability trade-offs.

The thesis uses the IAM score as its operational definition for investment attractiveness. The IAM score combines financial and environmental and social TBL pillars into one index which evaluates both present performance and future transition potential. The IAM score functions as a structured composite measure which provides future-oriented comparison capabilities for different firms rather than being a latent construct or an external financial outcome validation tool.

6.1 TBL Framework Application in the O&G Sector

European O&G firms demonstrate different performance levels when applying the TBL framework to their operations. Firms with solid liquidity and solvency and profitable financial ratios maintained stable investment positions but those with high leverage and decreasing profitability faced rising investment risks. Financial strength by itself did not guarantee leadership position in the overall IAM rankings.

The environmental pillar results demonstrate that organizations with better emission control and renewable energy implementation and transparent reporting systems outperformed their competitors who lacked strong disclosure practices and compliance standards. Organizations which implemented clear transition plans for decarbonization spent initial funds to achieve better IAM results. Organizations with excellent health and safety records and open diversity reporting and active stakeholder relations achieved better social pillar scores. Firms which experience community disputes and labour issues and poor governance practices receive lower scores because social authorization stands as a critical factor for business success.

The results show that successful O&G firms need to maintain economic stability with environmental responsibility and social accountability to become most attractive to investors. Leaders demonstrate superior results in every pillar, yet laggards show excellence in one area while performing poorly in the others. The TBL framework proves its worth through empirical

evidence because it reveals hidden risks and opportunities which standard financial metrics fail to detect.

6.2 Financial Performance and TBL Integration

The evaluation of O&G sector investment attractiveness requires a complete analysis that combines financial results with TBL framework outcomes. The evaluation system uses multiple dimensions to measure firms based on their financial performance and their ability to withstand environmental and social challenges because of rising regulatory requirements and investor interest in sustainable operations. The confidence interval (CI) serves as a statistical instrument which enables the combination of financial data with other information. Table 41 demonstrates how CI determines the establishment of boundaries:

Table 41
CI for Determination of Boundaries

Indicator	Confidence Interval	
Current ratio	1.20	1.45
Quick ratio	1.00	1.23
Cash ratio	0.32	0.58
Financial leverage	2.87	3.65
Debt-to-equity ratio	1.87	2.65
Debt-to-assets ratio	0.61	0.66
Working capital turnover	1.51	1.95
Total assets turnover	0.17	0.37
Fixed assets turnover	0.02	0.05
Inventory turnover	9.54	12.16
Receivables turnover	6.30	7.49
Payables turnover	4.82	7.70
Operating profit margin	9.55	15.72
Net profit margin	3.14	9.98
Return on assets	1.68	3.69
Return on equity	4.35	10.03
Gross profit margin	26.36	33.39
Pretax margin	5.22	11.13
Operating return on assets	4.76	8.96
Cash to income	-0.56	5.86
Cash return on equity ratio	0.20	0.24
Cash flow to revenue ratio	0.86	5.95
Cash return on assets ratio	0.07	0.09
Dividend payment ratio	2.03	6.01
Reinvestment ratio	0.19	0.24
Interest Coverage ratio	11.59	31.19
Debt coverage ratio	0.12	0.15

Financial analysis under CI theory enables the thorough assessment of 31 financial ratios which include liquidity indicators and solvency metrics and profitability and efficiency performance measures. The evaluation process spans three time periods which enable analysts to track historical patterns and assess present conditions and predict upcoming results through linear regression analysis. The scoring system for each indicator consists of three levels which range from "0" for bad to "+1" for good and "+2" for very good. The standardized coding system enables analysts to perform quantitative assessments and visualize trends between different firms and time periods.

Shell plc

Based on the financial data for Shell from 2014 to 2023, Shell demonstrates a generally strong and stable financial position, particularly in the post-2020 recovery period, which aligns well with TBL indicators to form a cohesive investment attractiveness profile. Table 43 shows financial analysis of Shell plc. Liquidity indicators show gradual improvement, reflecting Shell's ability to meet short-term obligations, a critical economic component of TBL.

This correlates well with TBL indicators to provide a coherent investment attractiveness profile. Shell plc's financial analysis is displayed in Table 42. Return on equity changed from -12.34% in 2019 to 23.00% in 2021. Shell's ability to satisfy short-term obligations, a crucial economic component of TBL. Profitability ratios improved after 2020: net and operational profit margins remained more than 20%, supporting robust economic indicators.

Table 42
Financial Analysis of Shell plc

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Current ratio	1.16	1.32	1.17	1.20	1.25	1.16	1.25	1.35	1.38	1.34
Quick ratio	0.93	1.09	0.88	0.88	0.98	0.86	0.98	1.08	1.12	1.06
Cash ratio	0.25	0.45	0.26	0.25	0.34	0.23	0.43	0.39	0.34	0.37
Financial leverage	2.04	2.07	2.18	2.06	1.97	2.12	2.39	2.31	2.30	2.35
Debt-to-Equity ratio	1.04	1.07	1.18	1.06	0.97	1.12	1.39	1.31	1.29	1.34
Debt ratio	0.51	0.52	0.54	0.51	0.49	0.53	0.58	0.57	0.56	0.57
Working capital turnover		1.62	1.36	1.61	1.98	1.79	1.05	1.63	2.10	1.80
Total assets turnover		0.01	0.01	0.03	0.06	0.04	-0.05	0.05	0.10	0.06
Fixed assets turnover		0.01	0.02	0.04	0.08	0.05	-0.07	0.07	0.15	0.09
Inventory turnover		12.54	10.16	10.64	13.87	12.37	6.48	8.89	9.94	8.55
Receivables turnover		5.22	5.25	6.53	8.59	8.20	4.76	6.28	6.45	6.84
Payables turnover		67.12	8.28	5.67	7.51	7.18	3.91	5.06	5.42	-10.53
Operating cycle		99.02	105.45	90.20	68.79	74.01	133.05	99.18	93.30	98.72
Cash conversion cycle		93.58	61.40	25.78	20.22	23.16	39.62	27.07	25.95	7.42
Operating profit margin		13.76	15.38	16.44	16.10	17.66	17.59	22.96	23.13	23.68
Net profit margin		0.81	1.99	4.31	6.03	4.67	-11.75	7.57	10.96	5.72
Return on assets		0.63	1.27	3.28	5.93	4.09	-5.50	5.27	9.99	6.19
Return on equity		1.31	2.71	6.96	11.94	8.36	-12.34	12.36	23.00	14.21
Gross profit margin		18.16	20.42	19.81	18.96	20.64	22.98	27.11	26.46	27.32
Pretax margin		0.75	2.34	5.81	8.98	7.24	-14.72	10.94	16.78	9.69
Operating return on assets		10.81	9.83	12.53	15.83	15.48	8.22	15.98	21.08	18.51

Taffler's Model (UK)		0.49	0.47	0.56	0.68	0.65	0.39	0.61	0.71	0.66
Liss's Model (UK)		0.06	0.05	0.05	0.06	0.06	0.05	0.05	0.06	0.06
Altman's Model (USA)		-1.68	-1.69	-1.63	-1.67	-1.65	-1.65	-1.75	-1.82	-1.77
Springate's Model (USA)		0.95	0.85	1.07	1.42	1.28	0.45	1.29	1.77	1.45
Cash to income		1.00	0.68	0.55	0.70	0.77	1.18	0.63	0.64	0.72
Cash return on equity ratio		0.22	0.14	0.15	0.22	0.24	0.22	0.24	0.31	0.29
Cash flow to revenue ratio		17.01	5.28	2.09	1.86	2.90	-1.77	1.92	1.34	-3.51
Cash return on assets ratio		0.11	0.07	0.07	0.11	0.12	0.10	0.10	0.13	0.12
Dividend payment ratio		3.93	2.62	2.67	3.22	2.98	3.25	5.53	7.99	6.40
Reinvestment ratio		0.38	0.20	0.20	0.36	0.38	0.27	0.28	0.43	0.37
Interest Coverage ratio		17.63	10.82	11.33	15.70	14.69	10.96	11.84	18.18	14.26
Debt coverage ratio		0.21	0.13	0.13	0.22	0.23	0.18	0.18	0.24	0.22

Shell has committed to energy transition initiatives, such as investing in renewables and carbon reduction, while integrating social and environmental issues. However, its execution falls short of that of its peers, such as Equinor. Shell's social performance and stakeholder interactions are comparatively stable, which is in moderate agreement with TBL's social pillar. Confidence ranges surrounding important ratios, such ROE and debt coverage, indicate less uncertainty and greater resilience beyond 2020 from the perspective of financial forecasting. All things considered, Shell offers a reasonably high level of investment appeal due to its solid financials and growing (although not leading) sustainability alignment. Table 43 shows Shell plc coding scheme:

Table 43
Shell plc Coding Scheme

	Last	Present	Future	Mean
Current ratio	2	2	2	2.00
Quick ratio	0	2	2	1.60
Cash ratio	2	2	2	2.00
Financial leverage	1	1	1	1.00
Debt-to-Equity ratio	1	1	1	1.00
Debt ratio	1	1	1	1.00
Working capital turnover	1	2	1	1.50
Total assets turnover	0	0	0	0.00
Fixed assets turnover	1	2	2	1.80
Inventory turnover	1	1	0	0.70
Receivables turnover	1	1	1	1.00
Payables turnover	2	1	0	0.90
Operating profit margin	2	2	2	2.00
Net profit margin	0	1	2	1.10
Return on assets	1	2	2	1.80
Return on equity	2	2	2	2.00
Gross profit margin	0	1	1	0.80

Pretax margin	0	2	1	1.30
Operating return on assets	2	2	2	2.00
Taffler's Model (UK)	2	2	2	2.00
Liss's Model (UK)	2	2	2	2.00
Altman's Model (USA)	1	1	1	1.00
Springate's Model (USA)	1	2	2	1.80
Cash to income	1	1	1	1.00
Cash return on equity ratio	1	2	2	1.80
Cash flow to revenue ratio	1	1	0	0.70
Cash return on assets ratio	2	2	2	2.00
Dividend payment ratio	2	2	2	2.00
Reinvestment ratio	1	2	2	1.80
Interest Coverage ratio	1	1	1	1.00
Debt coverage ratio	2	2	2	2.00
Total				44.60

For the company Shell plc, the research will assign a code to the average value for the previous period from 2014 to 2021, for the current year 2022, and for the forecasted year 2023. The total score for the analysed period is 44.60.

TotalEnergies

TotalEnergies exhibits a steady financial profile that closely corresponds with robust TBL performance, boosting its overall investment appeal, according to financial data spanning 2014 to 2023. TotalEnergies' financial analysis is displayed in Table 44. Although they show a slow fall after 2020, liquidity ratios like the current and quick ratios are still considered to be in good financial standing. Resilience after pandemic-induced disruptions is demonstrated by profitability metrics, including net profit margin, ROA, and ROE, which indicate a robust rebound after 2020 and a peak in 2021. Notably, operating return on assets increased dramatically from 6.18% in 2019 to 21.45% in 2021, demonstrating operational efficiency, and gross profit margins were continuously high (around 30%).

Table 44
Financial Analysis of TotalEnergies

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Current ratio	1.45	1.38	1.33	1.50	1.28	1.21	1.23	1.17	1.15	1.11
Quick ratio	1.17	1.12	1.05	1.21	1.04	0.97	1.00	0.96	0.94	0.91
Cash ratio	0.47	0.46	0.45	0.59	0.45	0.39	0.48	0.22	0.30	0.30
Financial leverage	2.46	2.35	2.27	2.13	2.17	2.29	2.51	2.55	2.65	2.54
Debt-to-Equity ratio	1.46	1.35	1.27	1.13	1.17	1.29	1.51	1.55	1.65	1.54
Debt ratio	0.59	0.57	0.56	0.53	0.54	0.56	0.60	0.61	0.62	0.61
Working capital turnover		1.52	1.30	1.38	1.59	1.48	1.06	1.67	2.29	1.87
Total assets turnover		0.02	0.03	0.04	0.05	0.04	-0.03	0.06	0.07	0.05
Fixed assets turnover		0.03	0.04	0.05	0.07	0.06	-0.04	0.09	0.12	0.08

Inventory turnover		6.83	5.88	6.26	8.01	7.25	4.86	6.84	7.90	7.13
Receivables turnover		10.89	11.20	11.00	11.45	9.86	7.35	10.24	11.36	9.67
Payables turnover		6.36	5.79	6.00	6.71	6.46	4.82	6.11	6.74	6.15
Operating cycle		86.96	94.67	91.50	77.43	87.34	124.68	88.99	78.32	92.34
Cash conversion cycle		29.60	31.68	30.66	23.03	30.88	48.89	29.28	24.14	31.68
Operating profit margin		15.62	15.83	16.58	16.73	18.65	13.93	21.19	24.33	22.24
Net profit margin		3.34	4.85	5.57	6.27	6.49	-6.13	8.86	7.99	5.61
Return on assets		2.11	2.73	3.50	4.63	4.32	-2.72	5.85	7.05	5.10
Return on equity		5.07	6.30	7.70	9.95	9.64	-6.51	14.81	18.33	13.11
Gross profit margin		32.60	34.82	33.33	31.66	34.12	35.27	35.75	35.65	35.99
Pretax margin		4.49	5.61	7.60	9.81	9.82	-5.86	14.06	16.44	12.33
Operating return on assets		9.86	8.89	10.44	12.34	12.40	6.18	13.98	21.45	16.97
Taffler's Model (UK)		0.44	0.41	0.46	0.52	0.49	0.32	0.49	0.62	0.53
Liss's Model (UK)		0.05	0.05	0.06	0.06	0.06	0.05	0.06	0.07	0.06
Altman's Model (USA)		-1.87	-1.81	-1.87	-1.84	-1.69	-1.67	-1.63	-1.59	-1.56
Springate's Model (USA)		0.97	0.91	1.05	1.21	1.14	0.61	1.26	1.70	1.40
Cash to income		1.02	0.90	0.79	0.76	0.75	1.18	0.58	0.61	0.65
Cash return on equity ratio		0.24	0.19	0.18	0.20	0.21	0.18	0.20	0.34	0.26
Cash flow to revenue ratio		4.76	2.94	2.34	2.04	2.16	-2.69	1.38	1.85	-0.46
Cash return on assets ratio		0.10	0.08	0.08	0.09	0.09	0.07	0.08	0.13	0.10
Dividend payment ratio		4.38	6.40	7.01	6.03	4.20	2.90	3.02	4.18	3.02
Reinvestment ratio		0.28	0.24	0.26	0.32	0.31	0.22	0.25	0.48	0.36
Interest Coverage ratio		38.47	24.44	20.61	18.95	15.93	12.01	14.04	24.16	11.38
Debt coverage ratio		0.17	0.14	0.15	0.18	0.17	0.13	0.13	0.21	0.17

The increasing use of debt financing becomes evident through rising debt metrics that include debt-to-equity ratios and financial leverage ratios. The company can maintain debt servicing ability through continuous monitoring, but its strong interest coverage ratios provide ongoing support. TotalEnergies maintains its worldwide presence through its social commitment to community development and ongoing stakeholder engagement. Table 45 shows TotalEnergies coding scheme:

Table 45
TotalEnergies Coding Scheme

	Past	Present	Future	Mean
Current ratio	1	1	0	0.70
Quick ratio	1	1	0	0.70
Cash ratio	1	1	0	0.70
Financial leverage	1	1	1	1.00
Debt-to-Equity ratio	1	1	1	1.00
Debt ratio	0	0	1	0.30
Working capital turnover	0	2	1	1.30
Total assets turnover	0	0	0	0.00
Fixed assets turnover	1	2	2	1.80

Inventory turnover	0	1	0	0.50
Receivables turnover	2	1	2	1.50
Payables turnover	1	1	1	1.00
Operating profit margin	2	2	2	2.00
Net profit margin	1	2	1	1.50
Return on assets	1	2	2	1.80
Return on equity	1	2	2	1.80
Gross profit margin	2	1	2	1.50
Pretax margin	1	2	2	1.80
Operating return on assets	2	2	2	2.00
Taffler's Model (UK)	2	2	2	2.00
Liss's Model (UK)	2	2	2	2.00
Altman's Model (USA)	2	2	2	2.00
Springate's Model (USA)	1	2	2	1.80
Cash to income	1	1	1	1.00
Cash return on equity ratio	1	2	2	1.80
Cash flow to revenue ratio	0	0	0	0.00
Cash return on assets ratio	1	2	1	1.50
Dividend payment ratio	1	2	1	1.50
Reinvestment ratio	2	2	2	2.00
Interest Coverage ratio	2	2	1	1.70
Debt coverage ratio	2	2	2	2.00
Total				42.20

For the company TotalEnergies, the research will assign a code to the average value for the previous period from 2014 to 2021, for the current year 2022, and for the forecasted year 2023. The total score for the analysed period is 42.20.

British Petroleum

British Petroleum's (BP) financial data from 2014 to 2023 presents a mixed investment attractiveness profile when integrated with TBL considerations. Table 46 shows financial analysis of BP. In terms of finance, liquidity metrics like the quick and current ratios gradually decrease, signifying more stringent short-term asset coverage. Additionally, the cash ratio is trending down, which is indicative of recent years' low liquidity reserves. Concern is raised by debt indicators. Elevated financial risk is shown by the steadily rising debt-to-equity and financial leverage ratios, which peaked in 2022 at 2.47 and 3.47, respectively. The debt coverage ratio remains low, indicating a weak ability to service long-term obligations, even though interest coverage stayed over key criteria for the majority of the years.

Table 46
Financial Analysis of BP

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023

Current ratio	1.37	1.29	1.16	1.16	1.05	1.12	1.22	1.15	1.09	1.05
Quick ratio	1.08	1.03	0.86	0.86	0.78	0.83	0.93	0.86	0.80	0.77
Cash ratio	0.47	0.48	0.44	0.36	0.33	0.31	0.52	0.38	0.29	0.32
Financial leverage	2.52	2.66	2.72	2.75	2.78	2.93	3.13	3.18	3.47	3.43
Debt-to-Equity ratio	1.52	1.66	1.72	1.75	1.78	1.93	2.13	2.18	2.47	2.43
Debt ratio	0.60	0.62	0.63	0.64	0.64	0.66	0.68	0.69	0.71	0.71
Working capital turnover		2.14	1.91	2.48	3.01	2.79	1.17	1.87	2.87	2.32
Total assets turnover		-0.02	0.00	0.01	0.03	0.01	-0.07	0.03	0.00	0.00
Fixed assets turnover		-0.03	0.00	0.02	0.05	0.02	-0.10	0.04	-0.01	0.00
Inventory turnover		12.41	10.15	11.12	13.67	11.91	4.25	5.85	6.55	4.94
Receivables turnover		8.47	7.91	10.75	13.45	11.55	5.15	7.28	8.14	7.79
Payables turnover		6.27	5.34	5.96	6.71	6.07	2.63	3.71	4.27	3.36
Operating cycle		72.49	82.11	66.78	53.83	62.23	156.86	112.48	100.55	122.00
Cash conversion cycle		14.29	13.78	5.50	-0.53	2.12	18.25	13.97	15.06	12.83
Operating profit margin		3.95	5.79	10.24	11.65	11.80	12.85	18.65	25.89	24.70
Net profit margin		-2.83	0.09	1.42	3.15	1.48	-19.00	5.17	-0.55	-2.54
Return on assets		-2.34	0.07	1.28	3.43	1.45	-7.37	3.06	-0.47	-0.10
Return on equity		-6.07	0.18	3.52	9.49	4.14	-22.26	9.64	-1.56	-0.57
Gross profit margin		10.69	13.56	16.61	16.74	18.09	26.50	27.67	31.84	33.58
Pretax margin		-4.24	-1.23	2.94	5.51	2.89	-22.82	9.27	6.19	2.26
Operating return on assets		3.27	4.12	9.28	12.67	11.55	4.98	11.04	22.40	18.19
Taffler's Model (UK)		0.31	0.31	0.46	0.55	0.50	0.27	0.43	0.64	0.56
Liss's Model (UK)		0.02	0.02	0.03	0.03	0.03	0.02	0.03	0.04	0.04
Altman's Model (USA)		-1.78	-1.67	-1.60	-1.53	-1.51	-1.59	-1.61	-1.55	-1.50
Springate's Model (USA)		0.62	0.66	1.00	1.26	1.10	0.34	1.03	1.51	1.26
Cash to income		2.90	1.38	0.59	0.59	0.73	1.35	0.58	0.50	0.09
Cash return on equity ratio		0.25	0.15	0.15	0.21	0.24	0.20	0.20	0.37	0.29
Cash flow to revenue ratio		-4.05	86.70	4.27	2.18	5.80	-0.91	2.11	-23.78	-21.66
Cash return on assets ratio		0.10	0.06	0.05	0.07	0.08	0.07	0.06	0.11	0.09
Dividend payment ratio		4.04	2.60	2.69	3.18	3.47	2.76	3.20	6.96	4.90
Reinvestment ratio		0.24	0.14	0.13	0.19	0.21	0.16	0.15	0.29	0.21
Interest Coverage ratio		30.22	16.16	13.98	15.72	13.46	9.18	9.15	17.84	8.30
Debt coverage ratio		0.15	0.09	0.09	0.12	0.13	0.10	0.09	0.16	0.12

Volatility is a part of profitability. Net profit margin, ROA, and ROE all exhibit steep drops and sporadic negative values, indicating instability and possible impairments, even though operating margins improved after 2020. Long-term investors are particularly concerned about financial predictability, which is compromised by this volatility. From a TBL standpoint, BP has made public pledges to invest in renewable energy to achieve net-zero goals, but its performance falls behind that of competitors like Equinor and TotalEnergies. Trust among stakeholders has also been affected by social and environmental issues. Even though BP has operational effectiveness and the ability to recover, its high leverage, erratic profitability, and

poor sustainability execution result in a low investment attractiveness profile that requires substantial strategic and ESG improvement. Table 47 shows BP coding scheme:

Table 47
BP Coding Scheme

	Last	Present	Future	Mean
Current ratio	0	1	0	0.50
Quick ratio	0	1	0	0.50
Cash ratio	1	1	1	1.00
Financial leverage	1	1	1	1.00
Debt-to-Equity ratio	1	1	1	1.00
Debt ratio	1	0	1	0.50
Working capital turnover	2	2	2	2.00
Total assets turnover	0	0	0	0.00
Fixed assets turnover	0	2	0	1.00
Inventory turnover	1	1	0	0.70
Receivables turnover	2	1	2	1.50
Payables turnover	1	1	0	0.70
Operating profit margin	2	2	2	2.00
Net profit margin	0	0	0	0.00
Return on assets	0	2	0	1.00
Return on equity	0	2	0	1.00
Gross profit margin	0	1	2	1.10
Pretax margin	0	2	1	1.30
Operating return on assets	1	2	2	1.80
Taffler's Model (UK)	2	2	2	2.00
Liss's Model (UK)	1	1	1	1.00
Altman's Model (USA)	2	2	2	2.00
Springate's Model (USA)	1	2	2	1.80
Cash to income	1	1	1	1.00
Cash return on equity ratio	1	1	1	1.00
Cash flow to revenue ratio	2	1	0	0.90
Cash return on assets ratio	1	2	2	1.80
Dividend payment ratio	1	2	1	1.50
Reinvestment ratio	0	1	1	0.80
Interest Coverage ratio	1	1	1	1.00
Debt coverage ratio	1	2	1	1.50
Total				34.90

For the company BP, the research will assign a code to the average value for the previous period from 2014 to 2021, for the current year 2022, and for the forecasted year 2023. The total score for the analysed period is 34.90.

Fortum

Fortum's financial data from 2014 to 2023 reflects a company in transition, with fluctuating performance and a complex investment profile when integrated with TBL considerations. Table 48 shows the financial analysis of Fortum. Initially demonstrating strong liquidity (a current ratio of 4.71 in 2015), Fortum's short-term financial health declined significantly by 2023, with its current and quick ratios falling to 0.44 and 0.40, respectively, well below safe thresholds. This signals short-term liquidity stress.

Table 48
Financial Analysis of Fortum

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Current ratio	2.08	4.71	3.76	2.85	1.12	2.09	1.11	1.00	1.08	0.44
Quick ratio	1.96	4.60	3.63	2.74	1.05	1.96	1.01	0.98	1.04	0.40
Cash ratio	0.97	1.61	0.89	1.53	2.23	4.97	0.11	0.08	0.39	1.00
Financial leverage	1.95	1.64	1.62	1.64	1.86	1.77	3.71	10.95	3.06	6.19
Debt-to-Equity ratio	0.95	0.64	0.62	0.64	0.86	0.77	2.71	9.95	2.06	5.19
Debt ratio	0.49	0.39	0.38	0.39	0.46	0.43	0.73	0.91	0.67	0.79
Working capital turnover		0.28	0.27	0.34	0.41	0.43	3.40	0.44	0.82	1.54
Total assets turnover		0.19	0.02	0.04	0.04	0.07	0.05	0.04	0.01	0.00
Fixed assets turnover		0.27	0.04	0.05	0.05	0.08	0.07	0.10	0.03	0.02
Inventory turnover		10.89	12.88	16.52	18.95	5.14	1.24	2.37	5.06	0.94
Receivables turnover		4.19	4.36	4.91	4.01	3.90	9.72	0.54	1.08	2.67
Payables turnover		3.92	4.22	4.63	4.83	5.44	9.36	0.49	0.97	2.93
Operating cycle		120.69	112.05	96.43	110.37	164.63	331.66	829.18	410.88	613.61
Cash conversion cycle		27.46	25.63	17.57	34.82	97.58	292.68	90.26	34.98	145.33
Operating profit margin		-4.34	17.43	25.62	21.71	20.38	3.26	67.35	14.50	37.51
Net profit margin		119.75	13.88	18.19	16.37	27.67	3.78	62.41	11.48	4.88
Return on assets		18.77	2.25	3.76	3.89	6.58	4.57	3.86	1.17	-0.29
Return on equity		33.41	3.68	6.13	6.77	11.91	12.88	27.41	9.45	12.69
Gross profit margin		23.36	17.73	17.94	18.83	78.13	97.26	22.25	21.25	53.44
Pretax margin		-8.82	16.38	24.58	19.84	31.72	4.49	67.46	5.17	36.43
Operating return on assets		-0.68	2.83	5.30	5.15	4.85	3.94	4.17	1.47	4.31
Taffler's Model (UK)		0.10	0.34	0.46	0.36	0.35	0.38	0.24	0.24	0.32
Liss's Model (UK)		0.04	0.05	0.05	0.04	0.04	0.04	0.05	0.05	0.04
Altman's Model (USA)		-4.00	-4.93	-3.89	-2.33	-1.96	-1.63	-1.43	-1.42	-0.41
Springate's Model (USA)		0.27	0.74	0.92	0.74	0.88	1.07	0.81	0.75	1.01
Cash to income		-10.48	1.58	0.70	0.79	1.27	1.43	0.42	1.26	3.86
Cash return on equity ratio		0.13	0.07	0.06	0.07	0.11	0.16	0.13	0.15	0.15
Cash flow to revenue ratio		0.38	1.99	0.98	1.05	0.94	1.23	0.46	1.59	1.16

Cash return on assets ratio		0.07	0.04	0.04	0.04	0.06	0.06	0.02	0.02	0.02
Dividend payment ratio		1.46	0.93	0.81	0.91	1.42	2.14	1.71	1.58	1.87
Reinvestment ratio		0.21	0.15	0.12	0.13	0.18	0.15	0.06	0.08	0.07
Interest Coverage ratio		6.75	5.79	5.77	6.71	9.84	13.81	12.89	11.54	14.30
Debt coverage ratio		0.16	0.12	0.10	0.10	0.14	0.09	0.02	0.02	0.01

Indicating aggressive debt-financed expansion or restructuring, the debt-to-equity ratio increased from 2.71 in 2020 to 9.95 in 2021 and then to 5.19 in 2023, raising long-term financial risk. In particular 2020, ROA became negative by 2023, indicating inefficient use of capital. From a TBL perspective, Fortum's environmental profile is enhanced by its compliance with decarbonisation and clean energy initiatives, particularly in the context of European regulations. Its ability to support significant green investments, however, may be constrained by erratic financials and diminished liquidity. Social performance is steady, and there aren't any significant public disputes. Fortum’s investment attractiveness is mixed, strong on environmental commitment but currently challenged by financial instability and capital structure risk, requiring close investor scrutiny. Table 49 shows Fortum coding scheme:

Table 49
Fortum Coding Scheme

	Last	Present	Future	Mean
Current ratio	2	1	1	1.20
Quick ratio	2	1	0	0.90
Cash ratio	1	1	1	1.00
Financial leverage	1	1	2	1.30
Debt-to-Equity ratio	2	1	2	1.50
Debt ratio	0	0	1	0.30
Working capital turnover	0	2	2	1.60
Total assets turnover	0	0	0	0.00
Fixed assets turnover	2	2	1	1.70
Inventory turnover	1	1	0	0.70
Receivables turnover	1	0	0	0.20
Payables turnover	0	1	0	0.50
Operating profit margin	2	2	2	2.00
Net profit margin	2	2	1	1.70
Return on assets	2	2	0	1.40
Return on equity	2	2	2	2.00
Gross profit margin	2	1	2	1.50
Pretax margin	2	2	2	2.00
Operating return on assets	0	2	0	1.00
Taffler’s Model (UK)	2	1	2	1.50
Liss’s Model (UK)	2	2	1	1.70
Altman’s Model (USA)	2	2	2	2.00
Springate’s Model (USA)	1	1	1	1.00

Cash to income	0	1	1	0.80
Cash return on equity ratio	0	1	0	0.50
Cash flow to revenue ratio	1	1	1	1.00
Cash return on assets ratio	0	2	0	1.00
Dividend payment ratio	0	2	0	1.00
Reinvestment ratio	0	1	0	0.50
Interest Coverage ratio	0	1	1	0.80
Debt coverage ratio	0	2	0	1.00
Total				35.30

For the company Fortum, the research will assign a code to the average value for the previous period from 2014 to 2021, for the current year 2022, and for the forecasted year 2023. The total score for the analysed period is 35.30.

Enel

Enel's financial ratios from 2014 to 2023 show moderate investment attractiveness. The financial data presented in Table 50 demonstrates Enel's performance. The company maintains low liquidity ratios throughout the period because its current ratio stays below 1.0 and its cash ratio decreases to 0.10 in 2023. The low figures suggest the company faces difficulties in meeting its short-term payment responsibilities which could be concerning for risk-averse investors. The financial leverage and debt-to-equity ratios have grown continuously since 2014 until they reached their highest points at 5.22 and 4.22 in 2022 which indicates the company depends heavily on debt financing, but this must be balanced with stable earnings to mitigate the risk.

Table 50
Financial Analysis of Enel

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Current ratio	1.06	0.98	0.86	0.90	0.90	0.91	0.83	0.87	0.95	0.85
Quick ratio	0.99	0.92	0.80	0.84	0.83	0.85	0.77	0.82	0.89	0.79
Cash ratio	0.28	0.24	0.20	0.17	0.16	0.22	0.14	0.12	0.15	0.10
Financial leverage	3.26	3.11	2.96	3.00	3.46	3.65	3.86	4.89	5.22	5.01
Debt-to-Equity ratio	2.26	2.11	1.96	2.00	2.46	2.65	2.86	3.89	4.22	4.01
Debt ratio	0.69	0.68	0.66	0.67	0.71	0.73	0.74	0.80	0.81	0.81
Working capital turnover		1.47	1.35	1.43	1.51	1.69	1.48	2.02	3.33	2.68
Total assets turnover		0.02	0.02	0.03	0.04	0.02	0.02	0.02	0.01	0.02
Fixed assets turnover		0.03	0.03	0.04	0.05	0.03	0.03	0.03	0.02	0.02
Inventory turnover		21.85	22.51	24.75	23.90	27.19	23.30	29.29	33.08	31.70
Receivables turnover		6.10	5.37	5.32	5.38	6.02	5.25	6.10	8.60	7.17
Payables turnover		6.01	5.77	5.89	5.80	6.10	5.11	5.75	8.12	6.75
Operating cycle		76.57	84.22	83.29	83.17	74.02	85.15	72.34	53.48	64.49
Cash conversion cycle		15.80	20.97	21.29	20.24	14.16	13.76	8.85	8.54	7.95

Operating profit margin		10.16	12.64	13.12	13.10	8.56	12.81	8.81	7.97	8.75
Net profit margin		4.46	5.36	7.14	8.40	4.33	5.49	4.50	2.08	3.61
Return on assets		2.06	2.39	3.41	3.94	2.06	2.16	2.08	1.37	1.79
Return on equity		6.55	7.26	10.18	12.70	7.33	8.11	9.11	6.92	8.53
Gross profit margin		9.94	12.83	12.34	12.40	9.48	12.96	5.87	6.28	6.97
Pretax margin		6.98	8.19	9.66	10.85	5.37	8.28	6.27	6.22	6.41
Operating return on assets		4.69	5.63	6.27	6.15	4.08	5.05	4.08	5.25	4.64
Taffler's Model (UK)		0.27	0.28	0.30	0.29	0.25	0.25	0.25	0.30	0.27
Liss's Model (UK)		0.03	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03
Altman's Model (USA)		-1.45	-1.34	-1.30	-1.31	-1.32	-1.28	-1.26	-1.32	-1.25
Springate's Model (USA)		0.70	0.70	0.74	0.74	0.61	0.62	0.65	0.84	0.71
Cash to income		1.28	1.09	1.02	1.07	1.62	1.35	1.42	0.83	1.21
Cash return on equity ratio		0.19	0.19	0.19	0.21	0.24	0.25	0.25	0.22	0.26
Cash flow to revenue ratio		2.91	2.56	1.87	1.67	3.21	3.14	2.78	3.18	3.11
Cash return on assets ratio		0.06	0.06	0.06	0.07	0.07	0.07	0.06	0.04	0.05
Dividend payment ratio		4.03	4.04	3.71	3.36	3.02	2.62	2.21	1.88	1.62
Reinvestment ratio		0.15	0.15	0.16	0.15	0.14	0.14	0.13	0.10	0.11
Interest Coverage ratio		3.69	3.64	3.59	3.70	4.02	4.30	4.12	3.41	3.96
Debt coverage ratio		0.09	0.09	0.10	0.10	0.09	0.09	0.07	0.05	0.07

The company achieves positive net profit margins of up to 8.4% and return on equity of 12.7% and stable operating margins which demonstrate its ability to control costs and generate revenue effectively. The company achieved better efficiency through its inventory turnover and working capital turnover metrics starting from 2020. Enel demonstrates exceptional environmental leadership through its strong sustainability initiatives which focus on renewable energy development and grid decarbonization to meet EU sustainability targets. The company maintains good social and governance practices which support its non-financial attractiveness. The investment profile of Enel combines financial stability with environmental leadership, yet debt management needs continuous assessment. Table 51 shows Enel coding scheme:

Table 51
Enel Coding Scheme

	Last	Present	Future	Mean
Current ratio	0	1	0	0.50
Quick ratio	0	1	0	0.50
Cash ratio	0	1	0	0.50
Financial leverage	1	0	2	0.80
Debt-to-Equity ratio	1	0	2	0.80
Debt ratio	1	0	2	0.80
Working capital turnover	1	2	2	1.80
Total assets turnover	0	0	0	0.00
Fixed assets turnover	1	2	1	1.50

Inventory turnover	2	1	2	1.50
Receivables turnover	0	1	1	0.80
Payables turnover	1	1	1	1.00
Operating profit margin	1	2	0	1.20
Net profit margin	1	2	1	1.50
Return on assets	1	2	1	1.50
Return on equity	1	2	1	1.50
Gross profit margin	0	1	0	0.50
Pretax margin	1	2	1	1.50
Operating return on assets	1	2	0	1.20
Taffler's Model (UK)	1	2	1	1.50
Liss's Model (UK)	2	2	1	1.70
Altman's Model (USA)	1	1	1	1.00
Springate's Model (USA)	1	1	1	1.00
Cash to income	1	1	1	1.00
Cash return on equity ratio	1	2	2	1.80
Cash flow to revenue ratio	1	1	1	1.00
Cash return on assets ratio	0	2	0	1.00
Dividend payment ratio	1	2	0	1.20
Reinvestment ratio	1	2	0	1.20
Interest Coverage ratio	0	0	0	0.00
Debt coverage ratio	0	1	0	0.50
Total				32.30

For the company Enel, the research will assign a code to the average value for the previous period from 2014 to 2021, for the current year 2022, and for the forecasted year 2023. The total score for the analysed period is 32.30.

Equinor

Due to its great alignment with TBL principles, strategic capital deployment, and robust financial recovery, Equinor offers an attractive investment profile. Equinor's financial analysis is displayed in Table 52. With a continuously healthy current ratio (average >1.5) and improving quick ratios, Equinor's financial performance from 2014 to 2023 demonstrates good liquidity and strong short-term solvency. The company maintains high interest coverage (peaking at 81.55 in 2021) and solid debt coverage, reducing worries about financial risk even in the face of increased financial leverage and rising debt-to-equity ratios after 2020.

Table 52
Financial Analysis of Equinor

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Current ratio	1.42	1.83	1.51	1.43	1.57	1.27	1.62	1.60	1.78	1.63
Quick ratio	1.29	1.67	1.32	1.25	1.44	1.09	1.47	1.51	1.67	1.51

Cash ratio	0.46	0.56	0.30	0.23	0.46	0.26	0.34	0.36	0.36	0.29
Financial leverage	2.59	2.72	2.98	2.79	2.62	2.91	3.68	3.77	2.93	3.50
Debt-to-Equity ratio	1.59	1.72	1.98	1.79	1.62	1.91	2.68	2.77	1.93	2.50
Debt ratio	0.61	0.63	0.66	0.64	0.62	0.66	0.73	0.73	0.66	0.71
Working capital turnover		1.30	1.22	1.63	1.92	2.16	1.22	2.49	3.24	2.92
Total assets turnover		-0.04	-0.03	0.04	0.07	0.02	-0.04	0.06	0.19	0.13
Fixed assets turnover		-0.06	-0.04	0.06	0.09	0.02	-0.06	0.10	0.35	0.22
Inventory turnover		9.17	7.51	8.52	13.90	12.77	9.16	6.48	12.51	11.02
Receivables turnover		6.67	6.32	7.09	8.64	10.55	5.57	6.95	7.47	7.73
Payables turnover		5.21	4.83	6.31	8.79	9.66	4.37	7.33	10.90	9.71
Operating cycle		94.54	106.34	94.35	68.50	63.17	105.42	108.85	78.03	85.88
Cash conversion cycle		24.54	30.76	36.48	26.99	25.40	21.94	59.03	44.56	46.37
Operating profit margin		2.29	0.17	22.51	25.30	-60.55	-7.47	37.02	52.26	28.13
Net profit margin		-8.67	-6.33	7.51	9.47	2.04	-12.00	9.43	19.06	13.65
Return on assets		-4.26	-2.71	4.26	6.74	1.59	-4.49	6.31	18.84	12.68
Return on equity		-11.29	-7.70	12.26	18.19	4.40	-14.65	23.52	61.81	41.53
Gross profit margin		55.98	53.12	53.89	51.61	61.33	35.54	76.92	64.32	63.66
Pretax margin		0.09	-0.39	21.93	23.71	10.23	-9.30	34.74	52.12	39.82
Operating return on assets		1.13	0.07	12.77	18.01	-47.39	-2.80	24.76	51.66	26.83
Taffler's Model (UK)		0.20	0.15	0.58	0.79	-1.42	0.04	0.81	1.30	0.69
Liss's Model (UK)		0.04	0.04	0.05	0.05	-0.01	0.03	0.06	0.09	0.06
Altman's Model (USA)		-2.05	-2.14	-1.93	-1.96	-1.86	-1.90	-2.07	-2.17	-2.03
Springate's Model (USA)		0.50	0.42	1.36	1.78	-0.58	0.16	2.09	3.71	2.51
Cash to income		12.38	141.64	0.87	0.86	-0.30	-3.53	0.58	0.41	-23.93
Cash return on equity ratio		0.37	0.30	0.32	0.42	0.40	0.32	0.54	0.69	0.60
Cash flow to revenue ratio		-3.27	-3.90	2.59	2.29	9.03	-2.20	2.29	1.11	3.89
Cash return on assets ratio		0.14	0.11	0.11	0.15	0.14	0.10	0.14	0.21	0.17
Dividend payment ratio		4.06	4.81	7.08	8.29	5.56	4.26	9.50	8.91	9.03
Reinvestment ratio		0.30	0.21	0.23	0.33	0.30	0.19	0.28	0.50	0.37
Interest Coverage ratio		58.56	36.45	30.05	47.35	44.59	25.47	36.66	81.55	52.88
Debt coverage ratio		0.22	0.16	0.17	0.25	0.23	0.14	0.20	0.30	0.24

The company achieved better profitability results after 2020. The company achieved 52.26% operating profit margin and 19.06% net profit margin in 2021 while its return on equity (ROE) reached 61.81% which demonstrates effective capital management. The company demonstrates strong earnings quality through its gross profit margins exceeding 50% and its improving cash return ratios. The company stands out as a leader in sustainability among O&G majors through its commitment to the TBL framework. The company stands out as an investment opportunity because it offers financial stability and high profitability together with

environmental sustainability leadership to both conventional and sustainability-oriented investors. Table 53 Equinor coding scheme:

Table 53
Equinor Coding Scheme

	Last	Present	Future	Mean
Current ratio	2	1	2	1.50
Quick ratio	2	1	2	1.50
Cash ratio	1	1	0	0.70
Financial leverage	1	1	1	1.00
Debt-to-Equity ratio	1	0	1	0.50
Debt ratio	1	1	2	1.30
Working capital turnover	1	2	2	1.80
Total assets turnover	0	0	0	0.00
Fixed assets turnover	1	2	2	1.80
Inventory turnover	1	1	1	1.00
Receivables turnover	1	1	2	1.30
Payables turnover	1	1	2	1.30
Operating profit margin	0	2	2	1.60
Net profit margin	0	2	2	1.60
Return on assets	0	2	2	1.60
Return on equity	0	2	2	1.60
Gross profit margin	2	1	2	1.50
Pretax margin	2	2	2	2.00
Operating return on assets	0	2	2	1.60
Taffler's Model (UK)	1	2	2	1.80
Liss's Model (UK)	1	2	2	1.80
Altman's Model (USA)	2	2	2	2.00
Springate's Model (USA)	1	2	2	1.80
Cash to income	2	1	0	0.90
Cash return on equity ratio	1	2	2	1.80
Cash flow to revenue ratio	1	1	1	1.00
Cash return on assets ratio	2	2	2	2.00
Dividend payment ratio	2	2	2	2.00
Reinvestment ratio	2	2	2	2.00
Interest Coverage ratio	2	1	2	1.50
Debt coverage ratio	2	2	2	2.00
Total				45.80

For the company Equinor, the research will assign a code to the average value for the previous period from 2014 to 2021, for the current year 2022, and for the forecasted year 2023. The total score for the analysed period is 45.80.

Engie

Engie's investment attractiveness profile is a complex blend of financial stability and mixed performance, contextualised within a moderate alignment to the TBL framework. Table 54 shows the financial analysis of Engie. From a financial perspective, Engie demonstrates liquidity with current and quick ratios consistently above 1.0, signalling short-term solvency. However, cash ratios are low (~0.15–0.24), reflecting immediate liquidity. Leverage is a notable risk factor; debt-to-equity and financial leverage ratios have sharply increased over the years (D/E rising from 1.95 in 2014 to 4.88 in 2023), paired with a high debt ratio of 0.85. While working capital turnover and cash conversion cycles improved by 2023, profitability remains volatile. Return on equity peaked at 9.91% in 2020 but fell back to 6.90% in 2023. Margins remain modest, though gross margins are healthy, averaging ~33%.

Table 54
Financial Analysis of Engie

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Current ratio	1.07	1.12	1.03	1.06	1.07	1.05	1.11	1.14	1.11	1.11
Quick ratio	0.99	1.02	0.97	0.99	1.00	0.98	1.04	1.07	1.02	1.04
Cash ratio	0.18	0.16	0.17	0.16	0.15	0.18	0.24	0.15	0.17	0.18
Financial leverage	2.95	3.30	3.49	3.53	3.75	4.20	4.52	5.37	5.99	5.88
Debt-to-Equity ratio	1.95	2.30	2.49	2.53	2.75	3.20	3.52	4.37	4.99	4.88
Debt ratio	0.66	0.70	0.71	0.72	0.73	0.76	0.78	0.81	0.83	0.85
Working capital turnover		1.33	1.38	1.48	1.36	1.52	1.23	1.53	2.31	1.89
Total assets turnover		-0.03	0.00	0.01	0.01	0.01	-0.01	0.02	0.00	0.02
Fixed assets turnover		-0.05	0.00	0.02	0.02	0.02	-0.01	0.04	0.00	0.03
Inventory turnover		8.64	8.57	9.41	9.30	10.28	7.24	7.53	10.41	9.01
Receivables turnover		3.42	3.23	3.16	3.17	3.90	3.01	2.47	2.94	2.79
Payables turnover		3.89	3.79	3.88	3.15	3.09	2.43	2.31	2.58	2.02
Operating cycle		149.07	155.70	154.27	154.33	129.09	171.81	196.20	159.23	174.84
Cash conversion cycle		55.32	59.51	60.24	38.39	10.98	21.81	38.10	18.03	10.44
Operating profit margin		-4.64	3.28	4.33	4.64	6.12	3.52	11.62	1.20	8.13
Net profit margin		-7.32	0.25	3.44	2.86	2.75	-2.02	6.49	0.42	4.55
Return on assets		-3.14	0.10	1.45	1.07	1.05	-0.57	1.99	0.17	1.68
Return on equity		-9.76	0.35	5.08	3.90	4.18	-2.48	9.91	0.96	6.90
Gross profit margin		43.75	43.52	43.50	32.14	33.48	36.60	32.84	20.59	23.22
Pretax margin		-2.21	-2.04	-1.99	-2.42	-2.31	-3.69	-2.33	-3.20	-3.24
Operating return on assets		-1.99	1.33	1.83	1.74	2.35	1.00	3.55	0.49	2.71
Taffler's Model (UK)		0.16	0.22	0.23	0.22	0.23	0.19	0.24	0.22	0.23

Liss's Model (UK)		0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Altman's Model (USA)		-1.52	-1.50	-1.47	-1.49	-1.48	-1.50	-1.55	-1.54	-1.53
Springate's Model (USA)		0.45	0.57	0.60	0.59	0.61	0.52	0.68	0.63	0.67
Cash to income		-2.95	4.84	3.46	3.25	2.18	5.06	1.11	7.05	5.95
Cash return on equity ratio		0.18	0.22	0.22	0.21	0.20	0.22	0.20	0.20	0.20
Cash flow to revenue ratio		-1.87	63.06	4.35	5.27	4.87	-8.83	1.98	20.38	1.00
Cash return on assets ratio		0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.03	0.03
Dividend payment ratio		-2.80	-3.28	-3.23	-3.11	-3.10	-5.02	-6.01	-3.51	-5.04
Reinvestment ratio		0.16	0.18	0.18	0.16	0.14	0.12	0.10	0.08	0.08
Interest Coverage ratio		-6.82	-39.86	316.95	-12.48	-8.77	-9.29	-9.10	-7.95	-16.58
Debt coverage ratio		0.09	0.09	0.09	0.08	0.07	0.07	0.05	0.04	0.04

The company demonstrates strong environmental responsibility through its renewable energy expansion and decarbonization goals which align with TBL integration principles. The company practices stakeholder-oriented governance but its financial struggles limit its ability to make extensive ESG investments. The company stands as a medium-attractiveness investment because it maintains financial stability while showing promising TBL prospects yet faces challenges from high debt and unstable profitability. The company needs to reduce its debt burden and speed up its clean energy investments to attract more sustainability-oriented investors in the future. Table 55 Engie coding scheme:

Table 55
Engie Coding Scheme

	Last	Present	Future	Mean
Current ratio	0	1	0	0.50
Quick ratio	1	1	1	1.00
Cash ratio	0	1	0	0.50
Financial leverage	2	0	2	1.00
Debt-to-Equity ratio	2	0	2	1.00
Debt ratio	2	0	2	1.00
Working capital turnover	0	2	1	1.30
Total assets turnover	0	0	0	0.00
Fixed assets turnover	0	2	1	1.30
Inventory turnover	0	1	0	0.50
Receivables turnover	0	1	0	0.50
Payables turnover	0	1	0	0.50
Operating profit margin	0	2	0	1.00
Net profit margin	0	2	1	1.30
Return on assets	0	2	1	1.30
Return on equity	1	2	1	1.50
Gross profit margin	2	2	0	1.40
Pretax margin	0	2	0	1.00

Operating return on assets	0	2	0	1.00
Taffler's Model (UK)	1	1	1	1.00
Liss's Model (UK)	1	1	1	1.00
Altman's Model (USA)	2	2	2	2.00
Springate's Model (USA)	1	1	1	1.00
Cash to income	1	1	2	1.30
Cash return on equity ratio	1	2	1	1.50
Cash flow to revenue ratio	2	1	1	1.20
Cash return on assets ratio	0	2	1	1.30
Dividend payment ratio	0	2	0	1.00
Reinvestment ratio	0	2	0	1.00
Interest Coverage ratio	2	1	0	0.90
Debt coverage ratio	0	2	0	1.00
Total				31.80

For the company Engie, the research will assign a code to the average value for the previous period from 2014 to 2021, for the current year 2022, and for the forecasted year 2023. The total score for the analysed period is 31.80.

Repsol

The financial and TBL assessment of Repsol reveals a combination of positive and negative investment factors. The financial assessment of Repsol appears in Table 56. The company demonstrates average liquidity through its current ratio exceeding 1.0 in most years, yet its cash ratio stays under 0.5 because it depends on illiquid assets. The debt-to-equity ratio at Repsol has increased from 0.84 in 2014 to 1.47 in 2023 while the debt ratio maintains a stable level of approximately 0.60. The company improved its cash flow performance during this time, yet it continues to distribute negative dividends which suggest either financial losses or capital reinvestment. The company achieved its highest return on equity of 17.82% in 2021 while maintaining a steady net profit margin recovery after 2020.

Table 56
Financial Analysis of Repsol

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Current ratio	1.66	0.88	1.08	1.23	1.35	1.09	1.29	1.30	1.55	1.36
Quick ratio	1.28	0.68	0.84	0.91	1.01	0.79	0.97	0.99	1.12	0.99
Cash ratio	0.45	0.17	0.32	0.38	0.37	0.20	0.41	0.32	0.38	0.35
Financial leverage	1.84	2.20	2.08	1.99	1.97	2.30	2.40	2.47	2.31	2.47
Debt-to-Equity ratio	0.84	1.20	1.08	0.99	0.97	1.30	1.40	1.47	1.31	1.47
Debt ratio	0.46	0.55	0.52	0.50	0.49	0.56	0.58	0.59	0.57	0.60
Working capital turnover		1.47	1.25	1.42	1.68	1.78	1.47	2.41	3.11	2.76
Total assets turnover		-0.02	0.03	0.03	0.04	-0.06	-0.06	0.05	0.07	0.03
Fixed assets turnover		-0.03	0.04	0.05	0.05	-0.09	-0.09	0.07	0.13	0.06

Inventory turnover		8.50	7.31	8.17	9.30	8.19	6.23	8.70	8.97	8.35
Receivables turnover		7.35	6.47	7.37	8.50	8.33	6.75	8.49	8.77	8.72
Payables turnover		6.99	5.84	6.15	6.75	6.46	4.95	6.09	6.58	5.93
Operating cycle		92.63	106.29	94.21	82.20	88.37	112.68	84.95	82.27	86.65
Cash conversion cycle		40.44	43.75	34.90	28.12	31.84	39.01	25.05	26.82	24.48
Operating profit margin		-5.85	5.11	6.42	4.80	-6.49	-7.59	7.20	7.74	4.21
Net profit margin		-2.84	4.75	4.97	4.62	-7.57	-9.87	4.85	5.74	0.78
Return on assets		-2.06	2.78	3.47	3.91	-6.39	-6.19	4.79	7.48	2.98
Return on equity		-4.17	5.95	7.07	7.74	-13.50	-14.51	11.67	17.82	7.43
Gross profit margin		30.92	36.91	30.37	25.49	26.49	26.18	28.22	25.84	23.95
Pretax margin		-4.99	5.00	7.78	6.53	-6.39	-9.82	8.30	9.48	4.77
Operating ROA		-4.24	2.99	4.47	4.07	-5.48	-4.77	7.12	10.08	6.26
Taffler's Model (UK)		0.12	0.26	0.32	0.35	0.12	0.10	0.42	0.54	0.43
Liss's Model (UK)		0.03	0.03	0.04	0.04	0.03	0.03	0.04	0.05	0.05
Altman's Model (USA)		-1.65	-1.41	-1.59	-1.74	-1.66	-1.62	-1.74	-1.88	-1.83
Springate's Model		0.32	0.64	0.84	0.91	0.31	0.22	1.17	1.54	1.21
Cash to income		-1.65	2.29	1.61	1.98	-1.45	-1.49	0.99	1.07	0.41
Cash ROE ratio		0.14	0.15	0.15	0.16	0.17	0.17	0.17	0.26	0.22
Cash flow to revenue ratio		-3.39	2.46	2.08	2.05	-1.24	-1.14	1.47	1.44	1.32
Cash ROA ratio		0.07	0.07	0.07	0.08	0.08	0.07	0.07	0.11	0.09
Dividend payment ratio		-3.65	-9.63	-8.21	-7.61	-9.22	-12.08	-15.84	-12.30	-15.43
Reinvestment ratio		0.24	0.22	0.24	0.28	0.27	0.21	0.22	0.38	0.30
Interest Coverage ratio		-4.65	-5.56	-6.46	-7.69	-7.35	-6.59	-7.53	-11.75	-10.39
Debt coverage ratio		0.14	0.13	0.14	0.16	0.15	0.12	0.12	0.19	0.16

The company Repsol has strengthened its sustainability commitment through investments in green hydrogen and renewable energy projects and biofuels to decrease its environmental impact according to TBL principles. The company supports its environmental goals through its social initiatives which focus on community development and workforce growth in compliance with worldwide ESG requirements. The company operates under financial recovery while it works to implement TBL principles. The company's energy transition strategy and rising profit margins make it more attractive to investors who focus on impact while its high debt levels and past market volatility remain potential risks. Table 57 Repsol coding scheme:

Table 57
Repsol Coding Scheme

	Last	Present	Future	Mean
Current ratio	1	1	1	1.00
Quick ratio	0	1	0	0.50
Cash ratio	1	1	1	1.00

Financial leverage	1	1	1	1.00
Debt-to-Equity ratio	0	0	0	0.00
Debt ratio	0	0	0	0.00
Working capital turnover	1	2	2	1.80
Total assets turnover	0	0	0	0.00
Fixed assets turnover	0	2	2	1.60
Inventory turnover	0	1	0	0.50
Receivables turnover	1	2	2	1.80
Payables turnover	1	1	1	1.00
Operating profit margin	0	2	0	1.00
Net profit margin	0	2	0	1.00
Return on assets	0	2	1	1.30
Return on equity	0	2	1	1.30
Gross profit margin	1	1	0	0.70
Pretax margin	0	2	0	1.00
Operating return on assets	0	2	1	1.30
Taffler's Model (UK)	1	2	2	1.80
Liss's Model (UK)	1	2	2	1.80
Altman's Model (USA)	2	2	2	2.00
Springate's Model (USA)	0	0	2	0.60
Cash to income	1	1	1	1.00
Cash return on equity ratio	0	2	1	1.30
Cash flow to revenue ratio	0	1	1	0.80
Cash return on assets ratio	1	2	2	1.80
Dividend payment ratio	0	0	0	0.00
Reinvestment ratio	1	2	2	1.80
Interest Coverage ratio	0	1	0	0.50
Debt coverage ratio	1	2	2	1.80
Total				33.00

For the company Repsol, the research will assign a code to the average value for the previous period from 2014 to 2021, for the current year 2022, and for the forecasted year 2023. The total score for the analysed period is 33.00.

Iberdrola

Iberdrola offers investors a solid investment opportunity because of its stable financial results and its strong commitment to TBL principles through environmental and social responsibility initiatives. The financial data of Iberdrola appears in Table 58. The company maintains stable financial performance through ROE levels between 7-8% and ROA levels between 3% during the period from 2014 to 2023. The company achieved substantial growth in its operating profit margin from 12.19% in 2014 to 22.73% in 2023 which demonstrates better operational performance. The Altman and Springate models indicate average financial

stability while the cash flow to revenue ratio exceeds 2% in every year to show strong cash production. The liquidity ratios show below-average values, but their stable performance minimizes concerns about the company's ability to pay debts. The leverage ratios demonstrate a stable debt-to-equity ratio of approximately 1.6 which indicates a balanced capital structure.

Table 58
Financial Analysis of Iberdrola

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Current ratio	0.83	0.74	0.77	0.83	0.83	0.71	0.83	0.92	0.81	0.85
Quick ratio	0.68	0.61	0.65	0.71	0.69	0.58	0.70	0.81	0.74	0.75
Cash ratio	0.09	0.12	0.10	0.19	0.17	0.11	0.19	0.17	0.16	0.19
Financial leverage	2.63	2.56	2.62	2.59	2.57	2.59	2.59	2.53	2.66	2.59
Debt-to-Equity ratio	1.62	1.55	1.62	1.59	1.57	1.59	1.59	1.53	1.66	1.60
Debt ratio	0.62	0.61	0.62	0.61	0.61	0.61	0.61	0.60	0.62	0.62
Working capital turnover		0.82	0.70	0.75	0.81	0.80	0.70	0.76	0.94	0.84
Total assets turnover		0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Fixed assets turnover		0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.04
Inventory turnover		9.69	9.22	10.22	9.71	8.56	6.82	8.68	14.07	10.51
Receivables turnover		5.43	5.05	4.97	5.17	5.08	4.37	4.20	4.87	4.35
Payables turnover		3.74	3.38	3.71	5.13	7.04	6.48	7.05	9.07	9.23
Operating cycle		104.87	111.79	109.18	108.21	114.55	137.00	128.94	100.96	122.38
Cash conversion cycle		7.19	3.80	10.78	37.03	62.68	80.64	77.14	60.74	94.82
Operating profit margin		12.19	16.29	8.68	15.51	16.13	16.79	18.77	24.52	22.73
Net profit margin		7.83	10.24	10.95	8.59	9.35	10.89	9.93	8.04	9.51
Return on assets		2.48	2.79	3.15	2.69	2.89	2.95	2.94	2.93	3.04
Return on equity		6.42	7.21	8.21	6.95	7.47	7.65	7.52	7.60	7.84
Gross profit margin		40.88	44.98	42.75	44.00	44.63	48.71	43.62	37.44	42.72
Pretax margin		9.51	13.49	6.48	12.40	13.16	15.25	16.11	11.66	15.22
Operating return on assets		3.86	4.43	2.50	4.86	4.99	4.54	5.56	8.93	7.50
Taffler’s Model (UK)		0.24	0.26	0.19	0.28	0.28	0.25	0.29	0.39	0.34
Liss’s Model (UK)		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02
Altman’s Model (USA)		-1.19	-1.16	-1.21	-1.24	-1.17	-1.18	-1.30	-1.28	-1.28
Springate’s Model (USA)		0.50	0.53	0.40	0.57	0.57	0.55	0.63	0.73	0.70
Cash to income		1.71	1.38	2.29	1.22	1.23	1.37	1.12	0.70	0.78
Cash return on equity ratio		0.17	0.16	0.15	0.15	0.16	0.16	0.16	0.16	0.16
Cash flow to revenue ratio		2.65	2.20	1.81	2.20	2.13	2.11	2.12	2.14	2.00
Cash return on assets ratio		0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Dividend payment ratio		34.92	34.71	33.17	40.22	30.66	17.11	14.53	12.70	10.43
Reinvestment ratio		0.14	0.13	0.12	0.13	0.13	0.13	0.14	0.14	0.14
Interest Coverage ratio		7.36	7.67	8.29	17.06	203.61	169.72	116.46	78.70	167.94

Debt coverage ratio		0.11	0.10	0.09	0.10	0.10	0.10	0.10	0.10	0.10

As a global pioneer in clean energy, Iberdrola distinguishes out from a TBL standpoint for its aggressive renewable energy strategy and dedication to decarbonisation. The business places a strong emphasis on diversity, community involvement, and ethical labour methods. Proactive climate risk reduction and transparent ESG reporting are characteristics of governance. Iberdrola is a top choice for long-term, ESG-conscious investors looking for steady profits and minimal reputational risk since it provides balanced investment attractiveness, high sustainability integration, and sound financial foundations. Table 59 shows Iberdrola coding scheme:

Table 59
Iberdrola Coding Scheme

	Last	Present	Future	Mean
Current ratio	0	1	0	0.50
Quick ratio	0	1	0	0.50
Cash ratio	0	1	0	0.50
Financial leverage	1	1	1	1.00
Debt-to-Equity ratio	0	0	0	0.00
Debt ratio	1	0	1	0.50
Working capital turnover	0	2	0	1.00
Total assets turnover	0	0	0	0.00
Fixed assets turnover	1	2	1	1.50
Inventory turnover	0	1	1	0.80
Receivables turnover	0	1	0	0.50
Payables turnover	1	1	2	1.30
Operating profit margin	1	2	2	1.80
Net profit margin	1	2	1	1.50
Return on assets	1	2	1	1.50
Return on equity	1	2	1	1.50
Gross profit margin	2	1	2	1.50
Pretax margin	2	2	2	2.00
Operating return on assets	0	2	1	1.30
Taffler's Model (UK)	1	2	2	1.80
Liss's Model (UK)	1	2	2	1.80
Altman's Model (USA)	2	2	2	2.00
Springate's Model (USA)	1	1	1	1.00
Cash to income	1	1	1	1.00
Cash return on equity ratio	1	2	1	1.50
Cash flow to revenue ratio	1	1	1	1.00
Cash return on assets ratio	0	2	1	1.30

Dividend payment ratio	2	2	2	2.00
Reinvestment ratio	0	2	0	1.00
Interest Coverage ratio	2	2	2	2.00
Debt coverage ratio	0	2	0	1.00
Total				36.60

For the company Iberdrola, the research will assign a code to the average value for the previous period from 2014 to 2021, for the current year 2022, and for the forecasted year 2023. The total score for the analysed period is 36.60.

Anglo American

The financial performance of Anglo American has shown significant improvement since 2015 which makes it a more appealing investment opportunity when combined with its sustainability initiatives based on the TBL framework. The financial data presented in Table 60 demonstrates Anglo American's performance. The company achieved financial recovery from its 2014-2015 period of substantial losses by reaching high profitability during 2016. The ROA and ROE metrics both rose from their 2014 levels of -21.83% to reach 32.78% in 2023.

The company demonstrates effective operational management through its high profit margins which reached 47.84% for operating profit and 32.55% for net profit in 2023. The company maintains excellent liquidity through its 1.9 average current ratio and decreasing debt-to-equity ratio which indicates a safe debt management approach. The company demonstrates improved long-term strategic ability and financial stability through its increasing reinvestment ratios and cash flow indicators.

Table 60
Financial Analysis of Anglo American

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Current ratio	2.13	2.36	1.91	2.00	1.95	1.95	1.93	1.79	1.90	1.77
Quick ratio	1.43	1.67	1.34	1.40	1.29	1.26	1.27	1.30	1.27	1.19
Cash ratio	1.00	1.18	0.93	1.06	0.96	0.88	0.83	0.86	0.80	0.76
Financial leverage	2.05	2.44	2.06	1.89	1.75	1.79	1.91	1.90	1.98	1.78
Debt-to-Equity ratio	1.05	1.44	1.06	0.89	0.75	0.79	0.91	0.90	0.98	0.78
Debt ratio	0.51	0.59	0.51	0.47	0.43	0.44	0.48	0.47	0.50	0.45
Working capital turnover		0.76	0.94	0.99	0.94	0.98	0.79	1.23	1.02	1.10
Total assets turnover		-0.10	0.04	0.08	0.08	0.08	0.06	0.18	0.09	0.17
Fixed assets turnover		-0.13	0.05	0.10	0.11	0.11	0.08	0.25	0.13	0.24
Inventory turnover		4.20	4.64	5.14	5.03	4.99	3.43	4.37	4.38	4.24
Receivables turnover		8.99	10.14	12.02	13.27	13.54	8.11	10.14	7.99	9.54
Payables turnover		6.53	6.97	6.66	5.98	5.91	4.22	5.68	4.59	4.35
Operating cycle		127.52	114.64	101.36	100.15	100.04	151.33	119.56	129.10	127.90
Cash conversion cycle		71.60	62.25	46.52	39.10	38.29	64.80	55.34	49.54	46.20
Operating profit margin		-20.10	7.79	21.07	21.98	20.68	22.13	42.34	32.93	47.84

Net profit margin		-28.56	9.01	15.47	15.84	15.34	13.08	28.15	17.15	32.55
Return on assets		-9.90	3.77	7.75	8.19	8.46	5.61	18.21	9.03	17.03
Return on equity		-21.83	8.43	15.26	14.90	14.97	10.38	34.65	17.51	32.78
Gross profit margin		9.96	15.58	19.97	18.95	21.18	26.28	41.15	26.32	36.54
Pretax margin		-26.66	12.27	20.98	22.42	20.58	21.47	42.42	26.99	45.74
Operating return on assets		-6.97	3.26	10.56	11.37	11.40	9.49	27.38	17.34	25.88
Taffler's Model (UK)		-0.22	0.29	0.60	0.64	0.65	0.53	1.16	0.77	1.15
Liss's Model (UK)		0.04	0.05	0.06	0.06	0.07	0.06	0.08	0.07	0.08
Altman's Model (USA)		-2.76	-2.63	-2.46	-2.48	-2.45	-2.44	-2.35	-2.34	-2.25
Springate's Model (USA)		-0.40	0.81	1.32	1.40	1.41	1.18	2.57	1.64	2.46
Cash to income		-1.23	2.81	1.22	1.25	1.20	1.27	0.66	1.15	1.36
Cash return on equity ratio		0.19	0.21	0.25	0.26	0.24	0.22	0.35	0.39	0.37
Cash flow to revenue ratio		-0.86	2.43	1.66	1.74	1.61	2.15	1.00	2.20	2.33
Cash return on assets ratio		0.09	0.09	0.13	0.14	0.14	0.12	0.18	0.20	0.20
Dividend payment ratio		4.63	0.86	0.64	1.21	5.45	6.14	4.71	3.49	5.11
Reinvestment ratio		0.19	0.21	0.36	0.45	0.45	0.37	0.56	0.61	0.65
Interest Coverage ratio		8.29	14.07	25.11	16.89	21.49	21.32	33.40	40.34	39.45
Debt coverage ratio		0.16	0.17	0.26	0.32	0.31	0.26	0.38	0.41	0.44

Anglo American's ESG performance has advanced significantly in terms of TBL alignment. Low-carbon technologies, water conservation, and community involvement have been given top priority by the corporation, particularly in its mining operations. Climate risk disclosures and open ESG reporting have also enhanced governance. All things considered, Anglo American is positioned as a competitive and ethical investment thanks to the combination of a robust financial recovery, improved operational efficiency, and an expanded sustainability program. Both conventional investors and ESG-aware stakeholders looking for value with accountability will find it appealing. Table 61 shows Anglo American coding scheme:

Table 61
Anglo American Coding Scheme

	Last	Present	Future	Mean
Current ratio	2	1	2	1.50
Quick ratio	2	1	1	1.20
Cash ratio	2	2	2	2.00
Financial leverage	1	1	1	1.00
Debt-to-Equity ratio	0	0	0	0.00
Debt ratio	0	0	0	0.00
Working capital turnover	0	0	0	0.00
Total assets turnover	0	0	1	0.30
Fixed assets turnover	2	2	2	2.00
Inventory turnover	0	1	0	0.50

Receivables turnover	2	1	2	1.50
Payables turnover	1	1	0	0.70
Operating profit margin	2	2	2	2.00
Net profit margin	1	2	2	1.80
Return on assets	2	2	2	2.00
Return on equity	2	2	2	2.00
Gross profit margin	0	1	2	1.10
Pretax margin	2	2	2	2.00
Operating return on assets	2	2	2	2.00
Taffler's Model (UK)	1	2	2	1.80
Liss's Model (UK)	2	2	2	2.00
Altman's Model (USA)	2	2	2	2.00
Springate's Model (USA)	2	2	2	2.00
Cash to income	2	2	2	2.00
Cash return on equity ratio	1	1	1	1.00
Cash flow to revenue ratio	2	2	2	2.00
Cash return on assets ratio	2	2	2	2.00
Dividend payment ratio	1	2	1	1.50
Reinvestment ratio	2	2	2	2.00
Interest Coverage ratio	1	1	2	1.30
Debt coverage ratio	2	2	2	2.00
Total				45.20

For the company Anglo American, the research will assign a code to the average value for the previous period from 2014 to 2021, for the current year 2022, and for the forecasted year 2023. The total score for the analysed period is 45.20.

Energie Baden-Württemberg

EnBW demonstrates a combination of stable financial performance and sustainability metrics which align with the TBL framework. The financial evaluation of EnBW appears in Table 62. The business achieved better profitability and operational efficiency since 2016. The return on equity (ROE) at EnBW reached 19.74% in 2023 after starting at -40.27% in 2015 which demonstrates strong shareholder wealth creation. The operating profit margin reached 10.72% and return on assets (ROA) reached 2.89% in 2023 which demonstrates strong core operational performance. The debt-to-equity ratio of 4.53 and debt ratio of 0.82 in 2023 indicate EnBW uses debt financing as its primary funding method. The company maintains stable liquidity through its current ratio of 1.05 although its cash reserves remain at a low level with a cash ratio of 0.11. The positive results from Springate's and Taffler's models indicate that the company shows better financial stability and reduced bankruptcy risk.

Table 62
Financial Analysis of EnBW

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Current ratio	1.14	1.36	1.00	1.09	1.14	1.05	1.08	1.05	1.13	1.05
Quick ratio	1.02	1.26	0.94	1.01	1.03	0.95	0.98	0.99	1.00	0.95
Cash ratio	0.33	0.38	0.30	0.29	0.20	0.12	0.11	0.19	0.23	0.11
Financial leverage	8.43	7.50	11.98	6.62	6.31	5.81	5.92	8.39	5.44	5.53
Debt-to-Equity ratio	7.43	6.50	10.98	5.62	5.31	4.81	4.92	7.39	4.44	4.53
Debt ratio	0.88	0.87	0.92	0.85	0.84	0.83	0.83	0.88	0.82	0.82
Working capital turnover		4.39	4.66	4.84	3.43	2.74	2.59	3.95	5.27	3.72
Total assets turnover		0.01	-0.04	0.06	0.01	0.02	0.02	0.01	0.03	0.03
Fixed assets turnover		0.01	-0.07	0.08	0.02	0.03	0.02	0.01	0.05	0.05
Inventory turnover		17.25	19.81	20.61	15.66	13.14	12.88	15.08	16.70	13.54
Receivables turnover		7.08	6.55	5.83	4.66	4.42	4.47	5.96	9.70	6.68
Payables turnover		5.76	5.77	5.47	4.21	4.13	4.86	6.11	7.51	6.12
Operating cycle		72.72	74.17	80.31	101.55	110.36	110.01	85.45	59.48	90.06
Cash conversion cycle		9.32	10.89	13.61	14.94	21.91	34.87	25.68	10.86	26.09
Operating profit margin		9.06	3.77	17.08	10.04	11.96	13.52	8.72	7.99	10.72
Net profit margin		0.95	-8.64	9.90	2.25	4.82	4.10	1.37	3.29	5.02
Return on assets		0.52	-4.36	5.63	1.19	2.18	1.81	0.75	2.62	2.89
Return on equity		4.16	-40.27	47.94	7.71	13.18	10.62	5.42	17.34	19.74
Gross profit margin		17.96	13.87	17.22	19.11	20.91	27.49	19.28	8.67	17.77
Pretax margin		1.30	-14.05	25.05	2.86	4.81	5.09	1.60	4.28	6.07
Operating return on assets		5.02	1.91	9.71	5.33	5.42	5.97	4.78	6.36	6.24
Taffler’s Model (UK)		0.29	0.22	0.36	0.28	0.27	0.28	0.29	0.36	0.33
Liss’s Model (UK)		0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04
Altman’s Model (USA)		-1.67	-1.57	-1.45	-1.54	-1.51	-1.48	-1.48	-1.51	-1.44
Springate’s Model (USA)		0.71	0.45	1.16	0.74	0.71	0.70	0.81	1.07	0.95
Cash to income		0.96	1.64	-0.16	-0.21	0.34	0.35	1.56	1.05	0.82
Cash return on equity ratio		0.38	0.29	-0.13	-0.07	0.11	0.12	0.54	0.44	0.35
Cash flow to revenue ratio		9.21	-0.72	-0.28	-0.93	0.85	1.15	9.92	2.55	3.40
Cash return on assets ratio		0.05	0.03	-0.02	-0.01	0.02	0.02	0.07	0.07	0.06
Dividend payment ratio		6.95	4.82	-3.93	-2.18	2.44	2.64	9.35	9.93	7.39
Reinvestment ratio		0.08	0.05	-0.03	-0.02	0.03	0.04	0.16	0.17	0.13
Interest Coverage ratio		6.69	4.78	-0.16	0.23	5.79	6.50	17.64	16.52	15.75
Debt coverage ratio		0.06	0.03	-0.02	-0.01	0.02	0.03	0.09	0.08	0.07

The company demonstrates superior TBL performance through its social and environmental initiatives which include leading Germany's renewable infrastructure development and energy transition efforts. The company maintains long-term ESG sustainability through its continuous investments in community programs and grid development and renewable energy systems. EnBW stands out as an attractive investment for

impact-driven investors who seek reliable environmentally friendly utilities because of its strong financial recovery and ESG leadership despite its high borrowing levels. Table 63 shows EnBW coding scheme:

Table 63
EnBW Coding Scheme

	Last	Present	Future	Mean
Current ratio	0	1	0	0.50
Quick ratio	1	1	0	0.70
Cash ratio	0	1	0	0.50
Financial leverage	2	1	2	1.50
Debt-to-Equity ratio	2	0	2	1.00
Debt ratio	2	0	2	1.00
Working capital turnover	2	2	2	2.00
Total assets turnover	0	0	0	0.00
Fixed assets turnover	1	2	2	1.80
Inventory turnover	2	1	2	1.50
Receivables turnover	0	1	1	0.80
Payables turnover	1	1	1	1.00
Operating profit margin	1	2	1	1.50
Net profit margin	0	2	1	1.30
Return on assets	1	2	1	1.50
Return on equity	1	2	2	1.80
Gross profit margin	0	1	0	0.50
Pretax margin	0	2	1	1.30
Operating return on assets	1	2	1	1.50
Taffler's Model (UK)	1	2	2	1.80
Liss's Model (UK)	1	1	1	1.00
Altman's Model (USA)	2	2	2	2.00
Springate's Model (USA)	1	1	1	1.00
Cash to income	1	1	1	1.00
Cash return on equity ratio	1	2	2	1.80
Cash flow to revenue ratio	1	1	2	1.30
Cash return on assets ratio	0	2	1	1.30
Dividend payment ratio	1	2	2	1.80
Reinvestment ratio	0	1	0	0.50
Interest Coverage ratio	0	1	1	0.80
Debt coverage ratio	1	2	1	1.50
Total				37.50

For the company EnBW, the research will assign a code to the average value for the previous period from 2014 to 2021, for the current year 2022, and for the forecasted year 2023. The total score for the analysed period is 37.50. The application of the TBL framework within the O&G sector reveals that while financial performance remains the dominant pillar (carrying 50% weight), it alone does not offer a complete picture of investment attractiveness. A more resilient and balanced profile of businesses is produced by integrating the analysis of the financial, environmental, and social aspects.

Strong liquidity and good returns on equity support the financial robustness of firms like Equinor and Fortum, which also exhibit advancements in non-financial domains like reinvestment ratios and governance linked to sustainability. On the other hand, firms like Engie and EnBW show financial instability, but their higher governance metrics and environmental pledges help to offset lower earnings. The integration of financial metrics using CIs adds statistical robustness by quantifying uncertainty in financial projections.

The IAM framework which combines financial, and sustainability elements reveals both matching and conflicting results regarding corporate performance. The firms Shell, TotalEnergies and Anglo American demonstrate exceptional performance because they maintain high scores in financial stability and social responsibility and environmental management. The "Market Leaders" show that organizations can achieve financial success and sustainability through their dedication to employee development and operational transparency and resilience. The integrated assessment shows that specific TBL indicators create positive relationships with financial performance indicators.

Organizations that spend money on human capital development through diversity programs and training initiatives and labour practice improvements tend to achieve better financial results including equity returns and solvency and profitability. The implementation of waste reduction programs leads to better financial performance through increased profitability and operational stability because these environmental initiatives create quantifiable financial advantages.

The research confirms that ESG-based strategies create value for shareholders instead of reducing it. The evaluation process reveals multiple instances where organizations need to make sacrifices between different performance areas. The implementation of fast-paced carbon emission reduction programs leads to better environmental performance but creates short-term financial challenges because of the high costs associated with decarbonization projects.

The adoption of renewable energy systems produces future strategic benefits but produces no direct financial connection to net profit and liquidity ratios because of current operational inefficiencies in O&G activities. The process of obtaining ISO 14001 certification leads to better corporate reputation but requires financial expenses which negatively affect short-term profitability. The financial challenges of sustainability transformation emerge during transitional periods, yet balanced performers achieve better IAM rankings.

6.3 Comparative Analysis with the Fortune Global 500

The financial performance of O&G European firms in Table 64 shows wide-ranging results. The top performers show how European energy firms handle their traditional O&G operations while developing sustainable energy projects. The European O&G sector consisting of major global energy firms, displays interesting financial performance patterns when analysed through financial metrics. The ranking system based on financial outcomes shows how well the industry performs and its ability to withstand market fluctuations and execute strategic plans for the global energy transformation.

The evaluation of financial performance for these firms includes assessment of liquidity and solvency and examination of their turnover and profitability and bankruptcy status and

cash ratio performance. The financial indicators show both profit levels and cash generation capabilities and project funding potential and shareholder value distribution. The financial stability of these firms depends on worldwide petroleum prices and political events and new regulations, and the speed of energy transformation. The financial advantages of sustainable energy investments become more apparent to firms that lead the transition because of rising worldwide demand for clean energy and strengthening environmental regulations.

Table 64
The Ranking Table for O&G European Firms with Financial Scores for the 2022 year

Rank	Company	Revenues ($M)	Financial score
1 (15)	Shell	272,657	44.60
2 (27)	Total Energies	184,634	42.20
3 (35)	BP	164,195	34.90
4 (56)	Fortum	132,894	35.30
5 (90)	Enel	104,052	32.30
6 (114)	Equinor	90,924	**45.80**
7 (130)	Engie	83,622	31.80
8 (251)	Repsol	52,335	33.00
9 (304)	Iberdrola	46,246	36.60
10 (331)	Anglo American	41,554	45.20
11 (368)	EnBW	38,010	37.50

The financial evaluation of European O&G firms against Fortune Global 500 rankings demonstrates both similarities and differences between revenue-based assessments and those based on TBL criteria. The financial assessment results from Table 65 show Shell and TotalEnergies and Equinor achieving the highest scores at 44.6 and 42.2 and 45.8 respectively. Shell maintains its position as the 15th largest company in the Fortune Global 500 while achieving the top spot in the IAM framework because it demonstrates stable results between financial and sustainability metrics.

Equinor ranks 114th in Fortune Global 500 revenue but achieves a leading TBL financial score of 45.8 which surpasses bigger competitors when E/S metrics are included. The financial performance score of Anglo American reaches 45.2 while its IAM ranking remains high despite its position at 331 in the Global 500. The results demonstrate that revenue leadership does not guarantee better investment appeal for all firms. The financial performance of Engie and EnBW and Iberdrola ranges from 31.8 to 37.5 while their positions in the Global 500 remain low but their TBL outcomes demonstrate better sustainability alignment.

The exclusive use of revenue rankings hides important ESG-financial analysis findings which reveal both threats and possibilities. The assessment demonstrates that Fortune Global 500 rankings demonstrate business size and financial strength, but the IAM framework evaluates a wider range of value generation methods. The firms Shell and TotalEnergies and Equinor and Anglo American lead the market because they maintain equilibrium between financial performance and sustainability outcomes, yet revenue dominance fails to protect firms with poor environmental and social records.

6.4 Discussion

The IAM results show that leaders such as Shell, TotalEnergies, Equinor and Anglo American maintain both financial stability and social and environmental commitments which results in balanced attractiveness scores. Leaders achieve this distinction through their ability to sustain financial excellence while making sustainability core to their business strategy. The financial stability of laggards remains at risk because they focus on either financial performance or sustainability initiatives without proper financial backing.

The observed pattern creates specific requirements for public policy development. The findings from this study enable EU and national authorities to support businesses which link financial stability to proven emission reductions and social and environmental performance. The model shows that transition-aligned policies including carbon pricing and renewable incentives and reporting standards do not harm corporate financial performance because they reveal which firms have successfully integrated sustainability into their business model.

The results show that revenue-based rankings such as Fortune Global 500 do not effectively measure long-term business value. The IAM results show that financial sustainability assessments which combine both financial and sustainability metrics better predict how firms will perform under transition-related shocks and stricter regulations. The leaders present investment opportunities with lower risks and future readiness but the laggards generate short-term profits that become increasingly vulnerable to policy changes and reputation damage and operational challenges.

The IAM results provide two useful guidelines for investors who want to construct diverse energy sector investments. The rankings between firms show more variation based on their E/S than their absolute financial size. Firms that demonstrate strong sustainability disclosure practices and implement trustworthy transition plans experience significant improvements in their composite IAM rankings regardless of their revenue size.

The practice of giving more weight to large firms in portfolio allocation leads investors to miss out on transition leaders who demonstrate better stability and lower risk. Investors who want stability should choose TBL performers with balanced performance instead of selecting the biggest market-share firms. The introduction of higher carbon prices through policy changes would produce significant changes in how firms rank according to IAM assessments.

The introduction of higher carbon prices would negatively affect firms with high carbon emissions and restricted renewable energy assets, but transition-focused businesses would either keep their current position or advance in the rankings. The integration of scenario analysis for carbon pricing during portfolio construction helps investors build more resilient investments that protect against stranded asset risks. The IAM framework serves two purposes by evaluating corporate performance and helping investors create portfolios which match transition requirements and generate lasting value.

Chapter 7: Evaluation of TBL in the Context of Global Performance Ratings

7.1 Non-Financial Performance in the TBL Context

The TBL framework assesses corporate sustainability by examining three core elements which include economic performance and environmental impact and social responsibility. The traditional emphasis on financial performance in investment evaluations has shifted toward non-financial aspects especially E/S during the rise of Environmental and Social investing. The environmental section of TBL assessment tracks carbon emissions together with energy efficiency metrics and renewable energy adoption and resource consumption levels.

The established indicators for these metrics follow standardised formats which receive increasing regulatory oversight thus becoming more objective and easier to compare between different firms. The process of verifying data faces ongoing difficulties because firms tend to choose specific information for disclosure to boost their corporate image. Social Performance evaluation faces major obstacles when compared to Environmental Performance evaluation.

The assessment of employee satisfaction and community involvement and diversity and inclusion and health and safety performance depends on individual perspectives and specific Organisational settings. The absence of standardized evaluation criteria and independent verification processes creates obstacles for Firms to evaluate each other's performance. The ability of large corporations to create advanced sustainability reports leads to performance inflation which makes it difficult for TBL assessments to detect genuine ESG achievements in smaller firms that lack reporting capabilities.

Shell plc

The TBL framework analysis of Shell plc shows a strong sustainability focus in social and environmental areas which results in a total score of 49.55. The evaluation shows both positive results and important performance shortcomings throughout the assessment process. The company demonstrates outstanding performance in labour practices through its high scores for health and safety initiatives and diversity initiatives and employee development programs which approach maximum levels in most assessment categories. The company demonstrates its commitment to workforce development through its perfect scores (2.00) in "Health and Safety programs" and "Employee education and training" (2.60) which show its dedication to workforce development.

The company demonstrates strong internal labour practices but its supplier code of conduct and anti-corruption training need improvement because they score 1.10 and 1.00 respectively. The human rights subdimension receives average scores from Shell. The company demonstrates acceptable employee welfare support through its "Commit to employees" rating of 1.85 yet its community support rating stands at 1.00 which indicates a need to enhance social acceptance and community-focused initiatives. The environmental practices at Shell exhibit conflicting results.

The company demonstrates excellent performance in sustainable supply chain management through its work with suppliers (2.00) and ISO 14001 certification (2.00) and waste recycling (2.00) because it has established formal environmental management systems. The company receives a score of 0.00 for "sustainable procurement" which indicates a major deficiency in environmental factors during purchasing operations. The company demonstrates different performance levels regarding its emissions and energy usage. The company demonstrates steady progress in lowering its GHG and other gas emissions through its average scores of 1.75 and 1.90 yet its "reducing carbon footprint" rating stands at 0.35 which indicates insufficient climate change mitigation plans or inadequate reporting. The company demonstrates positive

results in renewable energy usage (2.00) but its performance in alternative fuel transportation (0.75) and resource reuse (1.10) remains subpar. Table 65 shows non-financial analysis of Shell plc:

Table 65
Non-financial Analysis of Shell plc

			2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean
Social	Labour practices	1. Employ Health and Safety programs	2	2	2	2	2	2	2	2	2	2.00
		2. Encourage employee diversity	2	2	2	2	2	2	1	2	2	1.95
		3. Establish supplier code of conduct	0	0	1	2	2	2	2	1	1	1.10
		4. Source responsibly - ethically	2	1	1	1	2	2	2	2	2	1.85
		5. Train on anti-corruption	1	1	1	1	1	1	1	1	1	1.00
		6. Train and educate employees	2	2	2	2	2	2	2	2	2	2.00
	Human rights	7. Engage employees	1	1	1	1	2	1	1	2	2	1.70
		8. Conduct community support activities	1	1	1	1	1	1	1	1	1	1.00
		9. Commit to employees	0	1	2	2	2	2	2	2	2	1.85
Environmental	Emissions	1. Reduce carbon footprint	1	1	1	1	1	1	1	0	0	0.35
		2. Reduce fuel consumption	2	2	2	2	2	2	2	2	2	2.00
		3. Reduce GHG emissions	1	1	1	2	2	1	1	2	2	1.75
		4. Reduce other gases emissions	2	2	2	2	2	1	2	1	2	1.90
		5. Response to oil Spills	2	2	2	2	2	2	1	2	1	1.35
	Supply Chain	6. Assess/evaluate suppliers	2	2	2	2	2	2	1	2	2	1.95
		7. Collaborate with suppliers	2	2	2	2	2	2	2	2	2	2.00
		8. Procure sustainably (environmental purchasing)	0	0	0	0	0	0	0	0	0	0.00
		9. Source locally	2	1	1	1	2	2	2	2	2	1.85
	Materials Consumptio	10. Reduce waste production	1	2	2	1	1	1	2	1	2	1.75
		11. Reduce water consumption	0	0	0	0	1	2	2	2	2	1.55

		12. Reduce packaging	2	2	2	1	1	1	1	1	1	1.15
		13. Reduce consumption of resources	2	2	2	1	2	2	2	1	1	1.30
		14. Reduce energy consumption	2	2	1	1	1	1	1	1	1	1.10
		15. Use Renewable energy	2	2	2	2	2	2	2	2	2	2.00
		16. Account for biodiversity	1	1	1	2	2	2	2	2	2	1.85
		17. Recycle waste	2	2	2	2	2	2	2	2	2	2.00
		18. Recycle water	1	1	1	2	1	1	2	2	1	1.15
		19. Reuse resources	1	1	1	1	1	1	2	2	1	1.10
		20. Use recyclable	1	1	1	1	2	2	2	1	2	1.75
		21. Make product LCA (Life Cycle Assessment)	1	1	2	2	2	2	2	2	2	1.90
		22. Use alternative modes of transportation (fuel)	1	0	1	0	0	0	0	1	1	0.75
		23. Certify to ISO 14001 standard	2	2	2	2	2	2	2	2	2	2.00
Total												49.55

The non-financial performance of Shell matches what one would expect from a company of its size and public exposure. The TBL analysis demonstrates that Shell operates with a structured approach to sustainability through its focus on operational safety and employee training and systems certification. The company demonstrates weak strategic integration through its inadequate management of upstream supply chain ethics and responsible sourcing practices and carbon footprint reduction strategies.

The 49.55 score indicates competitive performance, yet it shows potential for superficial compliance because Shell excels at formal programs and certifications yet lacks transformative sustainability practices. The company faces investment challenges from ESG-focused investors who need to see genuine environmental transformation. The TBL-aligned investment appeal of Shell depends on its ability to develop deeper sustainable sourcing practices and biodiversity integration and carbon accountability systems in a global economy that is transitioning to decarbonisation.

TotalEnergies

TotalEnergies demonstrates solid alignment with essential sustainability and ESG principles through its non-financial performance evaluation under the TBL framework. TotalEnergies demonstrates solid social responsibility practices and acceptable environmental performance but needs to enhance its supply chain management and circular economy initiatives according to its 47.85 total mean score. The social and human rights dimensions of Table 66 demonstrate high scores throughout all employee-related practice indicators. The company maintains stable performance through time for its health and safety programs (1.75) and employee diversity (2.00) and supplier code of conduct (2.00) and employee engagement (2.00) indicators.

The company demonstrates exceptional dedication to employee training (1.95) and education and human rights through its consistent high scores in these areas. The company shows limited success in community engagement (1.00) and anti-corruption training (1.35) which indicates possible shortcomings in stakeholder inclusion and transparency training for local communities.

Environmental metrics show inconsistent results throughout the assessment. TotalEnergies achieves high scores for GHG reduction (1.80) and biodiversity accounting (2.05) and renewable energy use (1.90) yet performs poorly in oil spill response (0.05) and fuel consumption reduction (0.60) and ISO 14001 certification (0.30). The company demonstrates either insufficient environmental action or insufficient disclosure in essential risk areas which focus on environmental emergencies and worldwide standard compliance.

Table 66
Non-financial Analysis of TotalEnergies

			2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean
Social	Labour practices	1. Employ Health and Safety programs	1	1	1	1	2	1	2	2	2	1.75
		2. Encourage employee diversity	2	2	2	2	2	2	2	2	2	2.00
		3. Establish supplier code of conduct	2	2	2	2	2	2	2	2	2	2.00
		4. Source responsibly - ethically	2	2	2	2	2	1	1	1	2	1.85
		5. Train on anti-corruption	2	2	2	2	2	2	2	1	1	1.35
		6. Train and educate employees	2	2	2	1	2	2	2	2	2	1.95
	Human rights	7. Engage employees	2	2	2	2	2	2	2	2	2	2.00
		8. Conduct community support activities	2	2	1	1	0	0	1	1	1	1.00
		9. Commit to employees	1	1	1	2	2	2	2	2	2	1.85
Environmental	Emissions	1. Reduce carbon footprint	1	1	1	1	1	1	1	1	2	1.60
		2. Reduce fuel consumption	0	0	0	0	0	0	0	0	1	0.60
		3. Reduce GHG emissions	1	2	1	2	2	2	1	1	2	1.80
		4. Reduce other gases emissions	1	1	2	2	2	2	2	2	2	1.90
		5. Response to oil Spills	0	0	0	1	0	0	0	0	0	0.05
	Supply Chain	6. Assess/evaluate suppliers	1	1	0	0	2	1	0	2	2	1.55
		7. Collaborate with suppliers	1	1	0	2	2	2	1	2	2	1.75
		8. Procure sustainably	0	2	0	1	2	1	1	1	1	1.00

		(environmental purchasing)										
		9. Source locally	0	1	1	2	1	0	0	0	0	0.25
	Materials Consumption	10. Reduce waste production	1	2	0	0	2	2	2	2	2	2.35
		11. Reduce water consumption	2	2	2	2	2	2	2	2	2	2.00
		12. Reduce packaging	0	1	1	2	2	2	2	2	2	1.80
		13. Reduce consumption of resources	1	1	2	2	2	2	2	2	2	1.90
		14. Reduce energy consumption	1	2	2	2	2	2	2	2	2	1.95
		15. Use Renewable energy	2	2	2	0	2	2	2	2	2	1.90
		16. Account for biodiversity	1	2	2	2	2	2	2	2	2	2.05
		17. Recycle waste	1	2	0	0	1	2	2	2	2	1.70
		18. Recycle water	0	0	0	1	2	2	2	2	2	1.65
		19. Reuse resources	1	0	0	0	0	1	1	1	0	0.20
		20. Use recyclable	0	0	0	0	0	0	1	1	0	0.10
		21. Make product LCA (Life Cycle Assessment)	0	1	1	2	2	2	2	2	2	1.80
		22. Use alternative modes of transportation (fuel)	1	2	1	2	2	2	2	2	2	1.90
		23. Certify to ISO 14001 standard	1	1	2	2	0	0	0	0	0	0.30
Total												47.85

TotalEnergies shows inconsistent performance regarding supply chain sustainability through its evaluation of suppliers and collaboration efforts but struggles with local sourcing and sustainable procurement practices. The company shows average performance in supplier evaluation (1.55) and collaboration (1.75) yet scores poorly in local sourcing (0.25) and sustainable procurement (1.00). The company's ESG principal integration in procurement strategies remains limited which prevents it from supporting local economies and reducing carbon emissions through regional sourcing.

The company shows strong performance in materials consumption and resource efficiency but needs improvement in this area. The company excels in waste reduction (2.35) and water conservation (2.00) and energy efficiency (1.95) but shows weak performance in resource reuse (0.20) and use of recyclable materials (0.10) and product life cycle assessments (1.80). The company demonstrates weak circular economy practices through its low scores in resource reuse and use of recyclable materials and product life cycle assessments despite its strong performance in waste reduction and water conservation, and energy efficiency. TotalEnergies shows excellent performance in social responsibility and specific environmental priorities which match the criteria for ESG-focused investors.

The company maintains a wide sustainability strategy but its performance in circularity and local sourcing and environmental certification remains weak which indicates inconsistent

implementation. The company faces challenges in its non-financial investment appeal because sustainability-focused investors want to see quantifiable environmental leadership.

British Petroleum

The non-financial analysis of BP demonstrates a robust structured sustainability approach which focuses on the social and environmental elements of the TBL framework. BP stands out as one of the top performers in this evaluation with a total mean score of 53.11 because it demonstrates wide-ranging ESG commitment, although it needs improvement in circular economy and resource management practices. The social indicators in Table 68 show exceptional performance because BP received perfect scores (2.00) in every labour and human rights category from 2014 to 2022.

The company maintains a consistent corporate culture which demonstrates its dedication to responsible employment practices and effective stakeholder relations. The review period from 2014 - 2022 shows that BP maintains a complete and enduring system for employee rights protection and training programs. The environmental performance of BP shows excellent results in GHG emissions reduction (2.00) and energy consumption (2.00) and renewable energy use (2.00) and biodiversity protection (2.00).

The company shows both dedication and operational ability in these essential areas, which support worldwide climate targets and investor requirements. The company shows weak performance in its oil spill response (1.15) and waste recycling (0.30) and water recycling (0.10), and product lifecycle assessments (0.55). BP maintains excellent top-level policies yet its circular practice execution and environmental innovation performance remains unstable throughout the organisation.

Table 67
Non-financial Analysis of BP

			2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean
Social	Labour practices	1. Employ Health and Safety programs	2	2	2	2	2	2	2	2	2	2.00
		2. Encourage employee diversity	2	2	2	2	2	2	2	2	2	2.00
		3. Establish supplier code of conduct	2	2	2	2	2	2	2	2	2	2.00
		4. Source responsibly - ethically	2	2	2	2	2	2	2	1	1	1.35
		5. Train on anti-corruption	2	2	2	2	2	2	2	2	2	2.00
		6. Train and educate employees	2	2	2	2	2	2	2	2	2	2.00
	Human rights	7. Engage employees	2	2	2	2	2	2	2	2	2	2.00
		8. Conduct community support activities	2	2	2	2	2	2	2	2	2	2.00
		9. Commit to employees	2	2	2	2	2	2	2	2	2	2.00
Envir	Emis	1. Reduce carbon footprint	1	2	2	2	2	2	2	2	2	1.95

		2. Reduce fuel consumption	2	2	2	1	1	1	2	2	2	1.85
		3. Reduce GHG emissions	2	2	2	2	2	2	2	2	2	2.00
		4. Reduce other gases emissions	2	2	1	1	2	1	2	1	2	1.80
		5. Response to oil Spills	2	2	2	1	1	1	1	1	1	1.15
	Supply Chain	6. Assess/evaluate suppliers	1	2	2	2	2	2	1	2	2	1.90
		7. Collaborate with suppliers	2	2	2	2	2	2	2	2	2	2.00
		8. Procure sustainably (environmental purchasing)	1	1	1	0	0	1	2	1	2	1.60
		9. Source locally	1	1	1	1	1	1	1	1	1	1.00
	Materials Consumption	10. Reduce waste production	2	1	1	1	1	2	2	1	1	1.15
		11. Reduce water consumption	2	2	2	2	2	2	2	2	2	2.00
		12. Reduce packaging	1	1	1	1	1	1	1	2	2	1.65
		13. Reduce consumption of resources	1	2	1	1	1	1	1	1	1	1.05
		14. Reduce energy consumption	2	2	2	2	2	2	2	2	2	2.00
		15. Use Renewable energy	2	2	2	2	2	2	2	2	2	2.00
		16. Account for biodiversity	2	2	2	2	2	2	2	2	2	2.00
		17. Recycle waste	0	1	1	0	0	2	2	0	0	0.30
		18. Recycle water	1	1	0	0	0	0	0	0	0	0.10
		19. Reuse resources	1	1	1	2	2	2	0	0	1	1.05
		20. Use recyclable	0	0	0	1	1	2	2	2	1	1.00
		21. Make product LCA (Life Cycle Assessment)	2	2	2	2	0	1	2	0	0	0.55
		22. Use alternative modes of transportation (fuel)	1	1	1	0	0	0	0	1	1	0.80
		23. Certify to ISO 14001 standard	2	2	2	0	1	2	2	2	1	1.25
Total												53.11

BP demonstrates excellent performance in supplier collaboration (2.00) and supplier evaluation (1.90) because it maintains strong relationships with its value chain partners. The company scores 1.00 in local sourcing, which indicates it does not effectively use its supply chain to benefit the local economy. The company needs to improve its sustainable procurement practices (1.60) to achieve better environmental and social results. The company demonstrates different performance levels between its material management and social and emissions results.

The company achieves top scores in water conservation (2.00) and energy efficiency (2.00) and renewable energy adoption, but its waste recycling (0.30) and water recycling (0.10) and resource reuse (1.05) scores demonstrate an underdeveloped circular economy system. The company directs its strategy toward energy transformation instead of implementing material reduction methods or closed-loop production systems. The non-financial performance of BP demonstrates outstanding results in social and governance aspects and good results in essential environmental metrics.

The company stands out as a suitable investment option for investors who focus on environmental, social and governance criteria. The company needs to enhance its circular economy practices and disclose resource recovery and environmental certification information (such as ISO 14001) to strengthen its position in sustainable investment portfolios. The company needs to address these gaps because the global market now demands complete environmental responsibility across the entire product lifecycle.

Fortum

The non-financial analysis of Fortum illustrates a strong commitment to labour practices, environmental responsibility, and stakeholder engagement, albeit with certain limitations in circular economy practices and supply chain integration. With a total mean score of 44.75, Fortum demonstrates consistent performance across several key ESG categories within the TBL framework.

Table 68 shows scores particularly well in employee-focused practices, achieving perfect scores (2.00) in health and safety, employee diversity, and employee education. Furthermore, consistent results in employee engagement (1.95) and community support activities (2.00) highlight the importance of community involvement. Its less strong stance on responsible sourcing (1.00) and anti-corruption training (1.05), however, suggests that ethics-related initiatives and supplier responsibility could use some work. Although it still lags behind rivals like BP, commitment to employees has increased to 1.70 in recent years, indicating increasing policy adoption.

Fortum performs strongly on emission management, with full scores (2.00) in reducing GHGs, other emissions, and fuel consumption. Its use of renewable energy receives a moderate average (1.25), suggesting a partial transition, potentially constrained by energy mix realities in its regional operations. In contrast, its response to oil spills (0.45) is notably weak, an important concern for stakeholders assessing environmental risk mitigation.

Table 68
Non-financial Analysis of Fortum

			2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean
Social	Labour practices	1. Employ Health and Safety programs	2	2	2	2	2	2	2	2	2	2.00
		2. Encourage employee diversity	2	2	2	2	2	2	2	2	2	2.00
		3. Establish supplier code of conduct	2	2	2	2	2	2	2	2	2	2.25
		4. Source responsibly - ethically	1	1	1	1	1	1	1	1	1	1.00
		5. Train on anti-corruption	2	1	1	1	1	1	1	1	1	1.05

		6. Train and educate employees	2	2	2	2	2	2	2	2	2	2.00
	Human rights	7. Engage employees	1	2	2	2	2	2	2	2	2	1.95
		8. Conduct community support activities	2	2	2	2	2	2	2	2	2	2.00
		9. Commit to employees	1	1	1	1	1	1	2	2	2	1.70
Environmental	Emissions	1. Reduce carbon footprint	1	1	1	2	2	2	2	2	2	1.85
		2. Reduce fuel consumption	2	2	2	2	2	2	2	2	2	2.00
		3. Reduce GHG emissions	2	2	2	2	2	2	2	2	2	2.00
		4. Reduce other gases emissions	2	2	2	2	2	2	2	2	2	2.00
		5. Response to oil Spills	1	2	1	1	1	1	1	1	0	0.45
	Supply Chain	6. Assess/evaluate suppliers	2	2	2	1	1	1	1	1	1	1.15
		7. Collaborate with suppliers	1	1	1	1	1	1	1	1	1	1.00
		8. Procure sustainably (environmental purchasing)	1	2	2	2	2	2	2	2	2	1.95
		9. Source locally	0	0	0	0	0	0	0	0	0	0.00
	Materials Consumption	10. Reduce waste production	2	2	2	2	2	2	2	2	2	2.00
		11. Reduce water consumption	2	2	2	2	2	2	2	2	2	2.00
		12. Reduce packaging	0	0	0	0	0	0	0	0	0	0.00
		13. Reduce consumption of resources	1	1	1	1	1	1	1	1	1	1.00
		14. Reduce energy consumption	2	2	1	1	1	1	1	1	1	1.10
		15. Use Renewable energy	2	2	2	2	2	1	1	1	1	1.25
		16. Account for biodiversity	2	2	2	2	2	2	2	2	2	2.00
		17. Recycle waste	2	1	2	2	1	1	1	1	1	1.15
		18. Recycle water	1	1	1	1	1	1	1	1	1	1.00
		19. Reuse resources	2	2	2	2	2	2	1	1	1	1.30
		20. Use recyclable	1	1	1	1	1	1	1	1	2	1.60
		21. Make product LCA (Life Cycle Assessment)	0	0	0	0	0	0	0	0	0	0.00
		22. Use alternative modes of transportation (fuel)	1	1	1	1	1	1	1	1	1	1.00

		23. Certify to ISO 14001 standard	1	1	1	1	1	1	1	1	1	1.00
Total												44.75

The company demonstrates strong commitment to sustainable procurement through its 1.95 score but shows weak performance in supplier collaboration at 1.00 and supplier evaluation at 1.15. The company's limited upstream ESG influence together with its reactive supply chain governance stems from these signals. The company lacks local sourcing practices which stands in opposition to established methods for regional economic development. The company demonstrates high performance in waste reduction and water use efficiency and biodiversity protection at 2.00 which meets sustainability requirements. The company demonstrates less maturity in its resource reuse practices at 1.30 and its recyclable material usage at 1.60 and recycling practices at 1.15.

The company fails to conduct product life cycle assessments which indicates its lack of transparency about environmental effects throughout product value chain operations. The non-financial performance of Fortum demonstrates a controlled sustainability approach that delivers top results in emissions control and employee care. The company requires more systems thinking to improve its investment appeal under the TBL framework because its lower scores in circularity and value chain engagement and environmental certification. Fortum should develop its environmental innovation and supply chain integration to boost its investment attractiveness under the TBL framework because ESG metrics now affect capital allocation decisions.

Enel

Enel demonstrates a solid yet inconsistent dedication to sustainability through its non-financial performance analysis which focuses on the TBL dimensions with strong environmental practices and employee-oriented initiatives. Enel achieves a total mean score of 50.10 in non-financial ESG metrics but shows weaknesses in supply chain transparency and circular economy practices. The company demonstrates outstanding labour practices through its perfect and near-perfect scores in health and safety programs (2.00) and employee diversity (2.05) and anti-corruption training (1.95) and employee training and education (1.95) metrics.

The organisation demonstrates a fully developed human resource system which follows international best practices through these performance indicators. The company shows weak performance in supplier code of conduct (0.75) and commitment to employees (1.10) because it lacks clear policies about external and long-term employee relations. The company performs well in community support activities with a score of 1.85 but shows lower results in employee engagement at 1.05 which indicates possible communication and an underdeveloped internal communication and participatory culture compared to industry peers. Table 69 shows non-financial analysis of Enel:

Table 69
Non-financial analysis of Enel

			2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean
Social	Labour practices	1. Employ Health and Safety programs	2	2	2	2	2	2	2	2	2	2.00
		2. Encourage employee diversity	2	2	2	2	2	2	3	2	2	2.05

		3. Establish supplier code of conduct	0	0	1	0	0	1	1	0	1	0.75
		4. Source responsibly - ethically	2	2	1	2	2	2	2	2	1	1.40
		5. Train on anti-corruption	2	2	1	2	2	2	2	2	2	1.95
		6. Train and educate employees	2	2	1	2	2	2	2	2	2	1.95
	Human rights	7. Engage employees	2	1	1	1	1	1	1	1	1	1.05
		8. Conduct community support activities	1	1	1	2	2	2	2	2	2	1.85
		9. Commit to employees	1	1	1	1	1	1	2	2	1	1.10
Environmental	Emissions	1. Reduce carbon footprint	1	1	1	1	1	2	2	2	2	1.75
		2. Reduce fuel consumption	2	2	2	2	2	2	2	2	1	1.40
		3. Reduce GHG emissions	2	2	2	2	2	2	2	2	2	2.00
		4. Reduce other gases emissions	2	2	2	2	2	2	2	2	2	2.60
		5. Response to oil Spills	1	1	2	0	0	1	0	0	0	0.25
	Supply Chain	6. Assess/evaluate suppliers	2	2	1	2	2	2	2	2	2	1.95
		7. Collaborate with suppliers	2	1	1	2	2	1	2	1	2	1.80
		8. Procure sustainably (environmental purchasing)	2	2	2	2	2	1	1	2	1	1.30
		9. Source locally	0	0	0	0	0	0	0	0	0	0.00
	Materials Consumption	10. Reduce waste production	2	2	2	2	2	2	2	2	2	2.65
		11. Reduce water consumption	1	2	2	2	2	2	2	2	2	1.95
		12. Reduce packaging	1	1	0	0	0	0	0	0	0	0.10
		13. Reduce consumption of resources	2	2	1	2	2	2	2	2	2	1.95
		14. Reduce energy consumption	2	2	2	2	2	2	2	2	2	2.00
		15. Use Renewable energy	2	1	1	2	1	2	1	1	1	1.15
		16. Account for biodiversity	2	2	2	1	2	2	2	2	2	1.95
		17. Recycle waste	1	2	2	1	1	2	1	2	2	1.80
		18. Recycle water	2	2	1	0	0	1	2	2	2	1.70
		19. Reuse resources	2	2	1	0	0	1	2	2	2	1.70

		20. Use recyclable	2	2	2	2	2	2	1	1	1	1.30
		21. Make product LCA (Life Cycle Assessment)	1	0	1	0	1	2	2	2	2	1.65
		22. Use alternative modes of transportation (fuel)	0	0	0	2	2	2	2	2	1	1.10
		23. Certify to ISO 14001 standard	2	1	1	2	2	1	2	1	2	1.80
Total												50.10

Enel demonstrates superior performance in emission management and resource utilization through its high scores for GHG reduction (2.00) and carbon footprint (1.75) and reduction of other gas emissions (2.60) which ranks as one of the highest among competitors. The company demonstrates outstanding performance in waste reduction (2.65) and energy consumption (2.00) and water conservation (1.95) while achieving high scores in GHG reduction (2.00) and carbon footprint (1.75) and reduction of other gas emissions (2.60). The company demonstrates poor performance in oil spill response (0.25) which indicates insufficient emergency preparedness or unclear environmental crisis management practices that affect stakeholder confidence in the energy industry.

The company demonstrates slow adoption of energy transition technologies through its underdeveloped renewable energy (1.15) and alternative transportation (1.10) initiatives despite its public commitment to green initiatives. Enel demonstrates inconsistent performance in its supply chain governance practices. The company achieves high marks for supplier evaluation (1.95) and collaboration (1.80) yet its sustainable procurement (1.30) and local sourcing (0.00) scores indicate a worldwide supply chain with minimal domestic sourcing. The company faces potential risks because of its global supply chain structure which affects both operational stability and visibility and stakeholder support.

The company excels in waste and water recycling (1.80 and 1.70) and resource reuse (1.70) within its materials management and circularity framework. The company shows poor performance in packaging reduction (0.10) and product life cycle assessment (1.65) and recyclable material usage (1.30) which indicates weaknesses in product sustainability and end-of-life product planning. The non-financial performance of Enel indicates a solid ESG base which supports its internal operations and environmental management systems. The company needs to improve its external practices by enhancing supply chain openness and renewable energy implementation and circular product development. The company needs to address these weaknesses to boost its investment appeal and match ESG-oriented capital markets and sustainable finance standards.

Equinor

The ESG profile of Equinor shows a stable yet unbalanced performance through non-financial analysis. The ESG performance of Equinor reaches 42.45 which shows strong governance and social commitment but reveals major environmental circularity and supply chain localization weaknesses. The internal compliance and development culture of Table 71 stands out through its high scores in labour practices and governance where anti-corruption training (1.95) and responsible sourcing (2.00) and employee training and education (2.55) demonstrate excellence. The company demonstrates high performance in employee engagement (2).

The company demonstrates strong social responsibility through its 2.00 scores for employee engagement and diversity and its 1.95 score for employee commitment. The company shows weak performance in community support activities through its 1.30 score which indicates reduced social involvement or unclear external stakeholder relations. The social dimension stands as a vital element for O&G firms that operate in critical areas while facing public watchdogs.

The company demonstrates average performance in emissions management through its 1.90 score for GHG emissions reduction and its 1.80 scores for carbon footprint and response to oil spills. The company demonstrates excellent performance in other gases emissions reduction at 1.95 which shows its ability to manage environmental risks effectively. The company demonstrates poor performance in fuel consumption reduction through its 0.80 score which indicates limited progress in operational energy efficiency. The company demonstrates no circularity practices because it received zero scores in all essential categories including recycling waste and water and recyclable materials and ISO 14001 certification. The company demonstrates poor circular economy investment and insufficient disclosure about sustainable resource handling practices.

Table 70
Non-financial Analysis of Equinor

			2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean
Social	Labour practices	1. Employ Health and Safety programs	1	2	2	2	2	2	2	2	1	1.35
		2. Encourage employee diversity	1	2	2	2	2	2	2	2	2	2.00
		3. Establish supplier code of conduct	2	2	2	0	2	2	2	2	2	1.90
		4. Source responsibly - ethically	2	2	2	2	2	2	2	2	2	2.00
		5. Train on anti-corruption	2	2	2	2	2	2	2	1	2	1.95
		6. Train and educate employees	1	2	2	2	2	2	2	2	2	2.55
	Human rights	7. Engage employees	2	2	2	2	2	2	2	2	2	2.00
		8. Conduct community support activities	2	2	2	2	2	2	1	1	1	1.30
		9. Commit to employees	1	2	2	2	2	2	2	2	2	1.95
Environmental	Emissions	1. Reduce carbon footprint	2	1	2	1	1	2	1	2	2	1.80
		2. Reduce fuel consumption	1	0	2	0	0	0	1	0	1	0.80
		3. Reduce GHG emissions	2	2	2	2	1	1	2	2	2	1.90
		4. Reduce other gases emissions	2	1	2	2	2	2	2	2	2	1.95
		5. Response to oil Spills	2	0	2	2	1	1	2	2	2	1.80

	Supply Chain	6. Assess/evaluate suppliers	2	1	2	1	1	1	1	2	2	1.75
		7. Collaborate with suppliers	1	2	2	2	2	2	2	2	2	1.95
		8. Procure sustainably (environmental purchasing)	2	2	2	2	2	0	2	2	2	1.90
		9. Source locally	0	0	0	0	0	0	0	0	0	0.00
	Materials Consumption	10. Reduce waste production	2	1	1	2	1	1	2	2	2	1.80
		11. Reduce water consumption	2	2	2	0	0	1	0	1	1	1.00
		12. Reduce packaging	0	0	0	0	0	0	0	0	0	0.00
		13. Reduce consumption of resources	2	2	2	0	1	2	3	3	2	1.95
		14. Reduce energy consumption	2	0	2	2	0	1	1	0	2	1.60
		15. Use Renewable energy	2	1	2	2	2	2	2	2	2	1.95
		16. Account for biodiversity	2	2	2	1	1	2	2	2	2	1.90
		17. Recycle waste	0	0	0	0	0	0	0	0	0	0.00
		18. Recycle water	0	0	0	0	0	0	0	0	0	0.00
		19. Reuse resources	0	1	1	1	1	1	1	1	1	0.95
		20. Use recyclable	0	0	0	0	0	0	0	0	0	0.00
		21. Make product LCA (Life Cycle Assessment)	1	0	0	0	0	0	0	1	0	0.10
		22. Use alternative modes of transportation (fuel)	0	0	2	0	2	0	1	2	0	0.35
		23. Certify to ISO 14001 standard	0	0	0	0	0	0	0	0	0	0.00
Total												42.45

The company demonstrates strong performance in supplier collaboration (1.95) and sustainable procurement (1.90) through its active supply chain sustainability engagement. The company lacks local sourcing practices (0.00) which creates exposure to geopolitical and logistical threats while missing chances to generate socio-economic value in its host communities. The company shows inconsistent results in its materials consumption data. The company achieves average results in its energy consumption (1.60) and resource reduction (1.95) metrics but shows no progress in packaging reduction (0.00) or product life cycle assessments (0.10) which are essential for supply chain transparency and carbon accounting.

Equinor demonstrates exceptional performance in internal governance and emissions control through its strong leadership of employee training and ethics programs and risk management systems. The company demonstrates weak performance in environmental sustainability and circular economy aspects through its inadequate management of waste and water resources and materials. Equinor needs to fix its circularity system and develop local supplier relationships and sustainable product development to enhance its non-financial

investment appeal. The company should focus on these strategic areas to build better resilience and regulatory compliance and ESG-focused investment criteria alignment.

Engie

The non-financial performance evaluation of Engie reveals both positive aspects in employee development and emissions reduction yet reveals substantial weaknesses in governance transparency and environmental circularity. The company achieves a total mean score of 39.10 which positions it in the lower-middle segment relative to its peers in the O&G and energy sectors. The company demonstrates average performance in employee-related practices through its health and safety programs (1.95) and employee diversity (2.00) and training and education (1.90) scores. The Organisation demonstrates strong internal practices for inclusion and safety through these assessment results.

The Organisation maintains stable performance in its dedication to workers (1.90) and employee involvement (1.85). The governance-related practices at Engie demonstrate weak performance. The company demonstrates poor performance through its extremely low scores for supplier code of conduct establishment (0.20) and anti-corruption training (0.20) which might indicate insufficient disclosure or underreporting of essential governance metrics. The company faces risks for investors who prioritize ethical compliance and supply chain integrity because of these weak governance indicators.

The company demonstrates minimal social license to operate through its low community support activities score of 0.30 which also indicates insufficient external stakeholder engagement. The emissions management performance of Engie demonstrates steady progress. The company achieves average results in GHG reduction (1.15) and carbon footprint (0.80) but demonstrates strong performance in other gas emission reduction (2.10). The company has made steady progress in tracking GHG emissions and monitoring fuel usage (1.20) yet its oil spill response rating remains at 0.00 which indicates either non-disclosure or non-functional response systems.

The company demonstrates strong performance in supply chain collaboration and supplier evaluation through its 1.90 and 1.85 scores which indicate effective procurement governance. The company achieves average scores in sustainable procurement (1.60) and local sourcing (1.50) yet its inconsistent local engagement prevents it from maximizing social impact and ESG value generation. Table 71 shows non-financial analysis of Engie:

Table 71
Non-financial Analysis of Engie

			2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean
Social	Labour practices	1. Employ Health and Safety programs	0	2	2	2	2	2	2	2	2	1.95
		2. Encourage employee diversity	0	2	2	2	2	2	2	2	2	2.00
		3. Establish supplier code of conduct	0	1	0	2	1	0	0	0	0	0.20
		4. Source responsibly - ethically	0	2	2	2	1	2	1	1	1	1.15
		5. Train on anti-corruption	0	1	2	1	0	0	0	0	0	0.20

		6. Train and educate employees	0	2	2	2	2	2	2	2	2	1.90
	Human rights	7. Engage employees	0	2	2	2	2	1	2	2	2	1.85
		8. Conduct community support activities	0	1	1	1	1	1	1	0	0	0.30
		9. Commit to employees	0	2	2	2	2	2	2	2	2	1.90
Environmental	Emissions	1. Reduce carbon footprint	0	0	0	1	0	1	1	1	1	0.80
		2. Reduce fuel consumption	0	2	2	2	1	1	1	2	1	1.20
		3. Reduce GHG emissions	0	2	2	2	1	1	1	2	1	1.15
		4. Reduce other gases emissions	0	2	2	2	2	2	2	2	2	2.10
		5. Response to oil Spills	0	0	0	0	0	0	0	0	0	0.00
	Supply Chain	6. Assess/evaluate suppliers	0	2	2	2	2	2	2	1	2	1.85
		7. Collaborate with suppliers	0	2	2	2	2	2	2	2	2	1.90
		8. Procure sustainably (environmental purchasing)	0	2	0	2	0	1	2	0	2	1.60
		9. Source locally	0	2	2	2	0	0	0	0	2	1.50
	Materials Consumption	10. Reduce waste production	0	2	2	2	2	2	2	2	2	1.90
		11. Reduce water consumption	0	2	2	2	2	2	2	1	1	1.25
		12. Reduce packaging	0	1	0	1	0	0	0	1	1	0.75
		13. Reduce consumption of resources	0	2	2	2	0	2	2	2	2	1.80
		14. Reduce energy consumption	0	2	2	2	2	2	2	2	2	1.90
		15. Use Renewable energy	0	2	2	2	2	2	2	2	2	1.90
		16. Account for biodiversity	0	2	2	2	2	2	2	2	2	1.90
		17. Recycle waste	0	0	0	2	2	2	2	2	2	1.70
		18. Recycle water	0	0	0	0	1	0	0	0	0	0.05
		19. Reuse resources	0	0	1	0	0	1	0	0	1	0.70
		20. Use recyclable	0	0	0	0	0	1	0	0	0	0.05
		21. Make product LCA (Life Cycle Assessment)	0	0	1	1	0	0	0	0	1	0.70
		22. Use alternative modes of transportation (fuel)	0	1	0	1	0	1	1	1	1	0.85

		23. Certify to ISO 14001 standard	0	0	0	0	0	1	1	0	0	0.10
Total												39.10

The main weaknesses of Engie stem from its limited circularity and resource efficiency capabilities. The company shows limited investment in environmental certifications and recycling systems through its recycling water (0.05) and use of recyclable materials (0.05) and ISO 14001 certification (0.10) indicators. The company faces challenges in its resource reuse (0.70) and product life cycle assessment (0.70) development which obstructs its ability to shift toward low-carbon and circular business operations. The company demonstrates strong performance in waste reduction (1.90) and energy use (1.90) and renewable energy deployment (1.90) but lacks the recycling and environmental reporting systems needed to support these achievements.

The non-financial performance of Engie shows progress in employee development and emission reduction yet the company needs to enhance its governance transparency and circularity practices. The company stands as a transitional performer according to ESG maturity standards because it needs to enhance its governance systems and environmental management practices to achieve sustainable investment alignment and long-term value creation.

Repsol

The non-financial performance analysis of Repsol shows the company maintains solid social and labour practices yet shows moderate environmental progress but lacks substantial circular economy and environmental certification achievements. The total average score of 50.85 places Repsol among top performers in its industry sector yet the company needs to address specific weaknesses.

The data in Table 72 shows Repsol maintains a strong dedication to labour practices and human rights. The company achieves maximum scores (2.00) for its programs that involve employees and their commitment to staff members and training initiatives and diversity initiatives. The company maintains steady performance in its community support activities (1.95) and health and safety protocols (1.95) throughout different time periods.

The company achieved substantial advancement in anti-corruption training starting from 2014 because its average score reached 1.90 which demonstrates improved governance systems. The supplier code of conduct (1.75) demonstrates fair supply chain ethics accountability although it shows occasional irregularities during 2016 and 2019. The company demonstrates weak performance in responsible sourcing and ethical practices through its low mean score of 1.10 which indicates insufficient supplier screening and responsible procurement criteria development.

Table 72
Non-financial Analysis of Repsol

			2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean
Social	Labour practices	1. Employ Health and Safety programs	2	1	2	2	2	2	2	2	2	1.95
		2. Encourage employee diversity	2	2	2	2	2	2	2	2	2	2.00

		3. Establish supplier code of conduct	2	2	0	2	2	0	2	1	2	1.75
		4. Source responsibly - ethically	1	2	0	2	2	1	1	1	1	1.10
		5. Train on anti-corruption	0	2	2	2	2	2	2	2	2	1.90
		6. Train and educate employees	2	2	2	2	2	2	2	2	2	2.00
	Human rights	7. Engage employees	2	2	2	2	2	2	2	2	2	2.00
		8. Conduct community support activities	2	2	2	2	2	2	1	2	2	1.95
		9. Commit to employees	2	2	2	2	2	2	2	2	2	2.00
Environmental	Emissions	1. Reduce carbon footprint	2	2	2	2	2	2	2	2	2	2.05
		2. Reduce fuel consumption	2	2	2	1	2	2	2	2	2	1.95
		3. Reduce GHG emissions	2	2	2	2	2	2	2	2	2	2.05
		4. Reduce other gases emissions	2	2	2	1	2	0	1	2	2	1.80
		5. Response to oil Spills	1	1	0	0	0	1	1	1	1	0.85
	Supply Chain	6. Assess/evaluate suppliers	2	2	2	2	2	2	2	2	2	2.00
		7. Collaborate with suppliers	2	2	2	2	2	2	2	2	2	2.00
		8. Procure sustainably (environmental purchasing)	0	0	0	1	0	1	0	0	0	0.10
		9. Source locally	0	0	0	0	0	0	0	0	0	0.00
	Materials Consumption	10. Reduce waste production	2	2	2	2	2	2	2	2	2	2.00
		11. Reduce water consumption	2	2	2	2	2	2	2	2	2	2.00
		12. Reduce packaging	0	2	2	1	0	1	2	2	2	1.75
		13. Reduce consumption of resources	2	0	2	1	2	2	2	2	2	1.85
		14. Reduce energy consumption	2	2	2	2	2	2	2	2	2	2.00
		15. Use Renewable energy	2	2	2	2	2	2	2	2	2	2.05
		16. Account for biodiversity	2	2	2	2	2	2	2	2	2	2.00
		17. Recycle waste	0	1	2	1	1	0	0	0	2	1.45
		18. Recycle water	2	0	1	1	0	0	0	0	0	0.20
		19. Reuse resources	2	2	2	2	1	2	2	2	2	1.95
		20. Use recyclable	1	1	0	1	1	2	2	2	2	1.70

		21. Make product LCA (Life Cycle Assessment)	0	0	1	0	0	0	2	2	2	1.45
		22. Use alternative modes of transportation (fuel)	0	1	1	1	1	1	1	1	1	0.95
		23. Certify to ISO 14001 standard	0	0	0	0	0	0	1	0	0	0.05
Total												50.85

The sourcing (0.00) because it lacks environmental purchasing investments or disclosure practices. The company demonstrates poor-developed procurement strategy. The company demonstrates poor performance in sustainable procurement (0.10) and local company achieves top scores of 2.00 in supplier evaluation and supplier collaboration because it has a well alignment between its supply chain operational excellence and its declared environmental and social sustainability targets.

Materials Management and Circular Economy The company demonstrates inconsistent performance when it comes to circular economy initiatives. The company achieves high scores of 2.00 or better in waste reduction and water reduction and resource use of resources and energy consumption and biodiversity protection. The company demonstrates weak performance in multiple circularity indicators. The company shows poor results in four key circular economy metrics: Recycle water (0.20), reuse resources (1.95), recycle waste (1.45) and LCA (Life Cycle Assessment) (1.45). The company has not adopted international environmental management standards because its ISO 14001 certification rating stands at 0.05. The company made progress in sustainable packaging (1.75) and recyclable materials (1.70) but these initiatives remain below optimal standards.

The non-financial profile of Repsol demonstrates an advanced social and governance structure which prioritizes employee welfare and training and human rights protection. The company demonstrates clear progress in its environmental initiatives through its work on emissions reduction and renewable energy development. The company demonstrates its greatest weaknesses through its inadequate circular economy practices and insufficient environmental certification standards which need immediate improvement to meet worldwide sustainability requirements. Repsol needs to establish certified environmental management systems.

Iberdrola

The non-financial performance of Iberdola stands at 40.30 which indicates a combination of strong environmental and resource efficiency practices and weak social governance and supply chain responsibility and circular economy strategies. Iberdrola demonstrates average performance in social aspects, yet it does not lead the way in this area. The company maintains strong dedication to responsible sourcing (2.00) and employee commitment (1.95) and employee training (1.85). The company maintains inconsistent health and safety programs throughout the years with an average score of 1.75. The company operates without a supplier code of conduct throughout its nine-year span which results in a 0.00 score and represents an unusual and concerning deficiency for a business of its size.

The company demonstrates weak performance in anti-corruption training (0.20) and employee engagement (1.00) which indicates insufficient focus on governance and internal culture development. The company supports community activities, but these programs remain underdeveloped (1.00) which may indicate restricted social outreach or unreported CSR activities. The environmental performance of Iberdrola shows two distinct patterns in its

operations. The company demonstrates exceptional performance in emission control through its consistent 2.00 scores for GHG emissions and other gases emissions which indicates its ability to manage pollution and maintain high air quality standards.

The company achieves maximum scores (2.00) for all categories including waste and water consumption reduction and energy efficiency and renewable energy use and biodiversity protection and resource consumption. The company demonstrates clear dedication to climate action and energy transition through its strong performance. The carbon footprint score drops to 0.45 because of a downward trend starting from 2018, which might stem from reporting inaccuracies or genuine deterioration of climate impact reduction efforts. The company receives a 0.00 score for oil spill response because it may not apply but this rating remains significant for the energy sector as a whole. Table 73 shows non-financial analysis of Iberdrola:

Table 73
Non-financial Analysis of Iberdrola

			2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean
Social	Labour practices	1. Employ Health and Safety programs	1	1	1	1	2	1	2	2	2	1.75
		2. Encourage employee diversity	1	1	1	2	2	1	2	2	2	1.80
		3. Establish supplier code of conduct	0	0	0	0	0	0	0	0	0	0.00
		4. Source responsibly - ethically	2	2	2	2	2	2	2	2	2	2.00
		5. Train on anti-corruption	0	0	0	1	1	1	1	0	0	0.20
		6. Train and educate employees	1	1	1	2	2	2	2	2	2	1.85
	Human rights	7. Engage employees	1	1	1	1	1	1	1	1	1	1.00
		8. Conduct community support activities	1	1	1	1	1	1	1	1	1	1.00
		9. Commit to employees	1	2	2	2	2	2	2	2	2	1.95
Environmental	Emissions	1. Reduce carbon footprint	2	2	2	2	1	0	0	0	0	0.45
		2. Reduce fuel consumption	1	1	1	1	2	2	2	2	2	1.80
		3. Reduce GHG emissions	2	2	2	2	2	2	2	2	2	2.00
		4. Reduce other gases emissions	2	2	2	2	2	2	2	2	2	2.00
		5. Response to oil Spills	0	0	0	0	0	0	0	0	0	0.00
	Supply Chain	6. Assess/evaluate suppliers	2	2	2	2	2	1	2	1	2	1.90
		7. Collaborate with suppliers	2	2	2	2	2	1	2	2	2	1.95
		8. Procure sustainably	1	1	1	1	1	1	1	0	0	0.35

		(environmental purchasing)										
		9. Source locally	1	1	2	2	0	0	0	0	0	0.30
	Materials Consumption	10. Reduce waste production	2	2	2	2	2	2	2	2	2	2.00
		11. Reduce water consumption	2	2	2	2	2	2	2	2	2	2.00
		12. Reduce packaging	0	0	0	2	2	0	0	0	0	0.20
		13. Reduce consumption of resources	2	2	2	2	2	2	2	2	2	2.00
		14. Reduce energy consumption	2	2	2	2	2	2	2	2	2	2.00
		15. Use Renewable energy	2	2	2	2	2	2	2	2	2	2.00
		16. Account for biodiversity	2	2	2	2	2	2	2	2	2	2.00
		17. Recycle waste	0	0	2	2	2	1	2	1	0	0.50
		18. Recycle water	1	1	1	1	0	0	0	0	0	0.20
		19. Reuse resources	0	0	0	0	1	1	1	1	1	0.80
		20. Use recyclable	0	0	2	2	1	0	0	2	2	1.55
		21. Make product LCA (Life Cycle Assessment)	0	2	2	2	0	0	0	2	2	1.60
		22. Use alternative modes of transportation (fuel)	2	0	1	1	0	1	2	0	0	0.35
		23. Certify to ISO 14001 standard	1	1	1	0	0	0	0	1	1	0.80
Total												40.30

The data presented in Table 74 demonstrates irregular development in supply chain sustainability. The company demonstrates strong performance in supplier assessment (1.90) and collaboration (1.95) yet shows poor results in sustainable procurement (0.35) and local sourcing (0.30). The poor performance in these areas indicates that ESG elements do not properly integrate into procurement operations. The Organisation shows poor adoption of circular economy indicators through its reduce, reuse, recycle practices. The company performs below optimal levels in all four circular economy indicators which include recycling waste (0.50) and recycling water (0.20) and reuse resources (0.80) and use of recyclable materials (1.55).

The company has made little progress in reducing packaging (0.20) and has only achieved 0.80 in ISO 14001 certification. The company implements Life Cycle Assessment (LCA) (1.60) and alternative transport (0.35) but these initiatives lack consistent execution. Iberdrola positions itself as an environmentally focused utility company because it achieves high scores for emissions control and energy conservation and biodiversity protection. The company's ESG performance suffers from its non-existent supplier code of conduct and restricted anti-corruption training and insufficient circularity practices. The company needs to enhance its social governance framework and establish formal supply chain ethics and increase transparency about recycling and waste reduction programs to achieve sustainable leadership status under the TBL framework.

Anglo American

The non-financial performance of Anglo American reaches 45.25 points because the company excels in core ESG areas but demonstrates poor performance in transparency and carbon management and sustainability innovation. Anglo American demonstrates an advanced and stable governance system through its social domain which focuses on labour and employee welfare practices. The company demonstrates exceptional internal operational standards and workforce stability through its perfect average scores (2.00) in Health and Safety and Employee Training and Commitment to Employees. The company has made steady progress in employee diversity (1.80) although its scores remain below optimal levels during previous assessment periods.

The Supplier Code of Conduct (1.75) shows delayed implementation because it received near-zero scores from 2016 until the company fully adopted it in subsequent years. The Responsible sourcing indicator shows no improvement at 1.00 while Anti-corruption training scores 0.30 which indicates a severe governance problem. The Human rights indicators including Engagement and Community Support and Employee Commitment achieved 2.00 scores which demonstrate excellent social sustainability performance. Anglo American demonstrates excellent performance in emissions management, yet its environmental record shows significant weaknesses in carbon reduction and climate change adaptation strategies. The company achieves perfect scores (2.00) for GHG emissions and other gas emissions because it operates sophisticated pollution control systems.

The company receives a 0.30 score for carbon footprint reduction which indicates insufficient reporting of its carbon strategy and insufficient scope in its carbon management approach. The company has no response to oil spills which results in a 0.00 score. The company achieves perfect scores (2.00) in all resource efficiency metrics including waste and water reduction and energy use and biodiversity preservation. The company demonstrates limited progress in clean energy adoption because its renewable energy usage stands at 0.55. The company demonstrates effective circular practices through its high scores for recycling waste (1.40) and water (1.85). The company shows poor adoption of Life Cycle Assessment (0.85) and alternative transport (0.25) and renewable packaging (1.15) practices.

Table 74
Non-financial Analysis of Anglo American

			2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean
Social	Labour practices	1. Employ Health and Safety programs	2	2	2	2	2	2	2	2	2	2.00
		2. Encourage employee diversity	2	1	0	1	2	2	2	2	2	1.80
		3. Establish supplier code of conduct	0	0	1	2	2	2	2	2	2	1.75
		4. Source responsibly - ethically	1	1	1	1	1	1	1	1	1	1.00
		5. Train on anti-corruption	1	0	0	0	0	1	2	2	0	0.30
		6. Train and educate employees	2	2	2	2	2	2	2	2	2	2.00

	Human rights	7. Engage employees	2	2	2	2	2	2	2	2	2	2.00
		8. Conduct community support activities	2	2	2	2	2	2	2	2	2	2.00
		9. Commit to employees	2	2	2	2	2	2	2	2	2	2.00
Environmental	Emissions	1. Reduce carbon footprint	0	1	1	0	1	1	1	1	0	0.30
		2. Reduce fuel consumption	1	1	1	1	1	1	1	1	1	1.00
		3. Reduce GHG emissions	2	2	2	2	2	2	2	2	2	2.00
		4. Reduce other gases emissions	2	2	2	2	2	2	2	2	2	2.00
		5. Response to oil Spills	0	0	0	0	0	0	0	0	0	0.00
	Supply Chain	6. Assess/evaluate suppliers	2	2	2	2	2	2	2	2	2	2.00
		7. Collaborate with suppliers	2	2	2	2	2	2	2	2	2	2.00
		8. Procure sustainably (environmental purchasing)	2	2	2	2	2	2	2	2	2	2.00
		9. Source locally	0	0	0	0	0	0	0	0	0	0.00
	Materials Consumption	10. Reduce waste production	2	2	2	2	2	2	2	2	2	2.00
		11. Reduce water consumption	2	2	2	2	2	2	2	2	2	2.00
		12. Reduce packaging	0	0	0	0	0	0	0	0	2	1.20
		13. Reduce consumption of resources	0	1	2	0	2	2	0	1	2	1.60
		14. Reduce energy consumption	2	2	2	2	2	2	2	2	2	2.00
		15. Use Renewable energy	2	2	0	0	2	2	2	0	0	0.55
		16. Account for biodiversity	2	2	2	2	2	2	2	2	2	2.00
		17. Recycle waste	2	2	2	2	2	2	2	2	1	1.40
		18. Recycle water	1	2	2	2	2	2	2	0	2	1.85
		19. Reuse resources	2	2	2	2	1	1	1	2	1	1.25
		20. Use recyclable	2	1	2	2	1	1	1	1	1	1.15
		21. Make product LCA (Life Cycle Assessment)	1	1	1	1	1	0	0	0	1	0.85
		22. Use alternative modes of transportation (fuel)	1	1	1	1	0	0	0	1	0	0.25
		23. Certify to ISO 14001 standard	1	1	1	1	1	1	1	1	1	1.00
Total												45.25

The data presented in Table 74 demonstrates the highest level of sustainable supply chain practice execution. The evaluation of suppliers together with their collaboration and sustainable procurement methods achieve 2.00 scores which demonstrate robust ESG controls and supply chain integration in the upstream operations. The company does not practice local sourcing at all (0.00) which matches the behaviour of multiple peer firms. The company's global sourcing and centralized operations seem to explain this absence of local economic involvement.

The company demonstrates weak and inconsistent performance in material usage because waste reduction and energy consumption and renewable energy utilization indicators reach 1.00–2.00 scores that match its position as a clean energy supplier. The company demonstrates no progress in water conservation and packaging and recyclability and reuse and circular design because these indicators receive scores between 0.00 and 0.75. The non-financial data shows EnBW excels at energy transition and supply chain ESG governance yet demonstrates poor performance in environmental circularity and social governance and community engagement.

The company's focus on emission reduction demonstrates a compliance-based sustainability approach instead of innovation-based strategies. EnBW needs to expand its ESG focus to include ethical sourcing and biodiversity protection and circular economy practices and community involvement to boost its investment appeal according to the TBL framework. The TBL framework faces challenges because it attempts to distribute equal weight between its three pillars, but real-world applications tend to emphasise environmental and financial aspects due to their quantifiable nature and investor interest. Social indicators face challenges in measurement and face higher risks of greenwashing and performative policy implementation.

The evaluation process under TBL tends to prioritize environmental data while undervaluing social risks and contributions. The investment attractiveness scoring system under TBL favours firms with established ESG integration systems which tend to exist in larger firms operating in specific geographic areas and industrial sectors. The combination of strict regulations and strong corporate reputation in developed markets leads multinational O&G firms to implement TBL-compatible practices. The system creates an unfair competitive environment which might harm businesses operating in developing markets or facing capital restrictions.

The TBL framework provides investors with expanded evaluation criteria but it contains inherent biases in its assessment process. The system places excessive emphasis on prominent environmental projects but fails to address fundamental Organisational problems that affect supply chain workers. The relationship between ESG performance and financial performance does not apply universally because some industries experience delayed financial benefits that do not match their short-term monetary gains.

The TBL framework provides essential depth to performance assessment through non-financial metrics yet these metrics struggle with inconsistent measurements and objective evaluation and fair treatment of all stakeholders. The TBL model requires standardization of social metrics and improved third-party verification systems and unbiased assessment methods that prevent scale and geographic bias for it to serve as a complete investment attractiveness assessment tool. The lack of protective measures makes TBL vulnerable to becoming a tool for corporate communication instead of a genuine sustainability value creation metric.

EnBW

With a total score of 32.20, EnBW's non-financial performance study shows that while the company performs well in some key environmental and operational parameters. The lack

of depth across environmental and human capital indicators indicates a limited application of the TBL principles, even though some social and supply chain measures are praiseworthy. In the social domain, EnBW displays a mixed approach. Employee commitment (2.00), diversity (1.95), and training (2.00) are all strong points that show the organisation is making investments in internal staff stability and capacity building. The Supplier Code of Conduct (1.15) shows modest implementation, but improvement is needed for full ESG alignment. Community and human rights indicators such as engagement (1.00) and community support (0.95) are implemented at minimal levels, which could reflect a lack of social outreach strategy.

EnBW's environmental performance is highly polarized, showing leadership in some emission areas and complete inaction in others. Perfect scores (2.00) across carbon footprint reduction, fuel and GHG emissions control highlight a strong decarbonization strategy, reflecting effective implementation of clean energy technologies and operational efficiencies. However, the company completely neglects other crucial environmental areas. Other gases emissions and oil spill response both sit at 0.00, even though these are industry-relevant indicators. The absence of actions on recycling, water management, reuse, and biodiversity is concerning and reduces the holistic environmental profile expected under TBL. These gaps suggest that while the company addresses headline environmental targets, it lacks comprehensive environmental stewardship.

Table 75
Non-financial Analysis of EnBW

			2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean
Social	Labour practices	1. Employ Health and Safety programs	1	1	1	1	1	1	1	1	1	1.00
		2. Encourage employee diversity	1	2	2	2	2	2	2	2	2	1.95
		3. Establish supplier code of conduct	0	2	2	2	2	1	1	1	1	1.15
		4. Source responsibly - ethically	0	0	0	0	0	0	0	0	0	0.00
		5. Train on anti-corruption	0	0	0	0	0	0	0	0	0	0.00
		6. Train and educate employees	2	2	2	2	2	2	2	2	2	2.00
	Human rights	7. Engage employees	1	1	1	1	1	1	1	1	1	1.00
		8. Conduct community support activities	1	1	1	1	1	0	1	1	1	0.95
		9. Commit to employees	2	2	2	2	2	2	2	2	2	2.00
Environmental	Emissions	1. Reduce carbon footprint	2	2	2	2	2	2	2	2	2	2.00
		2. Reduce fuel consumption	2	2	2	2	2	2	2	2	2	2.00
		3. Reduce GHG emissions	2	2	2	2	2	2	2	2	2	2.00
		4. Reduce other gases emissions	0	0	0	0	0	0	0	0	0	0.00
		5. Response to oil Spills	0	0	0	0	0	0	0	0	0	0.00
	Supply Chain	6. Assess/evaluate suppliers	2	2	2	2	2	2	2	2	2	2.00
		7. Collaborate with suppliers	2	2	2	2	2	2	2	2	2	2.00

		8. Procure sustainably (environmental purchasing)	2	2	2	2	2	2	2	2	2	2.00
		9. Source locally	0	0	0	0	0	0	0	0	0	0.00
	Materials Consumption	10. Reduce waste production	1	1	1	1	1	1	1	1	1	1.00
		11. Reduce water consumption	0	0	0	0	0	0	0	0	0	0.00
		12. Reduce packaging	1	1	2	1	1	1	1	1	1	1.05
		13. Reduce consumption of resources	1	1	1	1	1	1	1	1	1	1.00
		14. Reduce energy consumption	2	2	2	2	2	2	2	2	2	2.00
		15. Use Renewable energy	2	2	2	2	2	2	2	2	2	2.00
		16. Account for biodiversity	0	0	0	0	0	0	1	1	1	0.70
		17. Recycle waste	0	0	0	0	0	0	0	1	1	0.65
		18. Recycle water	0	0	0	0	0	0	0	0	0	0.00
		19. Reuse resources	0	0	0	0	0	0	0	0	0	0.00
		20. Use recyclable	0	0	0	0	0	0	0	0	0	0.00
		21. Make product LCA (Life Cycle Assessment)	0	0	0	0	1	0	1	1	1	0.75
		22. Use alternative modes of transportation (fuel)	0	0	0	0	0	0	0	0	0	0.00
		23. Certify to ISO 14001 standard	1	1	1	1	1	1	1	1	1	1.00
Total												32.20

The data presented in Table 76 demonstrates the highest level of sustainable supply chain practice execution. The evaluation of suppliers together with their collaboration and sustainable procurement methods, achieves 2.00 scores, which demonstrate robust ESG controls and supply chain integration in the upstream operations. The company does not practice local sourcing at all (0.00), which matches the behaviour of multiple peer firms. The company's global sourcing and centralised operations seem to explain this absence of local economic involvement.

The company demonstrates weak and inconsistent performance in material usage because waste reduction and energy consumption and renewable energy utilisation indicators reach 1.00–2.00 scores that match its position as a clean energy supplier. The company demonstrates no progress in water conservation and packaging and recyclability and reuse and circular design because these indicators receive scores between 0.00 and 0.75. The non-financial data shows EnBW excels at energy transition and supply chain ESG governance yet demonstrates poor performance in environmental circularity and social governance and community engagement.

The company's focus on emission reduction demonstrates a compliance-based sustainability approach instead of innovation-based strategies. EnBW needs to expand its ESG focus to include ethical sourcing and biodiversity protection and circular economy practices and community involvement to boost its investment appeal according to the TBL framework. The TBL framework faces challenges because it attempts to distribute equal weight between its three pillars, but real-world applications tend to emphasize environmental and financial aspects due to their quantifiable nature and investor interest.

Social indicators face challenges in measurement and face higher risks of greenwashing and performative policy implementation. The evaluation process under TBL tends to prioritize environmental data while undervaluing social risks and contributions. The investment attractiveness scoring system under TBL favours firms with established ESG integration systems which tend to exist in larger firms operating in specific geographic areas and industrial sectors. The combination of strict regulations and strong corporate reputation in developed markets leads multinational O&G firms to implement TBL-compatible practices. The system creates an unfair competitive environment, which might harm businesses operating in developing markets or facing capital restrictions.

The coding framework established two categories of disclosure which included assured statements and unaudited information to reduce verification differences between them. The evaluation of GRI 200/300/400 category indicators used a three-point scoring system which assessed disclosure depth from absent (0) to keyword (1) to full paragraph (2) while third-party assured and ISO certified items received higher scores than unverified statements. The scoring system prevented large firms from boosting their ratings through extensive unverified reports. The intra-coder reliability checks together with GRI standard concordance ensured social disclosure evaluation consistency because social disclosures show the least comparability. The methodological approach specifically tackles the problems of report inflation and verification inequality which were identified in the previous section.

The TBL framework provides investors with expanded evaluation criteria, but it contains inherent biases in its assessment process. The system places excessive emphasis on prominent environmental projects but fails to address fundamental organisational problems that affect supply chain workers. The relationship between ESG performance and financial performance does not apply universally because some industries experience delayed financial benefits that do not match their short-term monetary gains.

The TBL framework provides essential depth to performance assessment through non-financial metrics yet these metrics struggle with inconsistent measurements and objective evaluation and fair treatment of all stakeholders. The TBL model requires standardization of social metrics and improved third-party verification systems and unbiased assessment methods that prevent scale and geographic bias for it to serve as a complete investment attractiveness assessment tool. The lack of protective measures makes TBL vulnerable to becoming a tool for corporate communication instead of a genuine sustainability value creation metric.

7.2 TBL vs. Fortune Global 500 Ratings: A Critical Assessment

This section presents a comparative evaluation of the TBL approach against the traditional metrics used by the Fortune Global 500, focusing on the top 11 firms in the energy and utilities sectors. By integrating financial, social, and environmental scores into a unified TBL score, the research provides a holistic view of corporate performance beyond revenues alone. The research included qualitative data from 42 industry managers and policymakers and investors and consultants and NGO representatives to support the IAM results.

The NVivo 12 coding system processed 12 interview transcripts and survey inputs to create a structured thematic matrix (Appendix IV). Three main themes emerged from the analysis. The majority of participants supported TBL integration because it matches investor preferences and creates better long-term business stability. The stakeholders pointed out that environmental disclosure verification is simpler than social disclosure verification which leads to potential social and labour issues unless proper assurance checks are implemented.

Multiple participants pointed out that reporting volume does not guarantee meaningful content, so the thesis used GRI concordance and third-party assurance weighting to reduce bias in the analysis. The combination of qualitative findings from NVivo with IAM ranking results

enhances research validity because stakeholders both endorse the TBL framework and identify its weaknesses which the research methodology addressed through scoring assurance and normalisation and coder checks.

Table 76 shows the TBL score here is calculated by summing the financial, social, and environmental components, treating them as equally weighted to emphasize balanced sustainability. The Fortune Global 500 evaluates firms through revenue data which makes financial performance its main evaluation criterion. The Fortune Global 500 now uses social and environmental scores as additional sustainability metrics because Firms face increasing demands for ESG transparency. The TBL framework used in this study creates a bottom-up assessment system through specific performance indicators for each ESG domain whereas the current metrics follow a top-down approach based on disclosed information.

Table 76
The Ranking Table for O&G European Firms with Financial, Non-financial and TBL Scores for 9 years (2015 to 2022)

Rank (Global 500)	Company	Revenues ($M)	Financial score	Social score	Environmental score	TBL score
1 (15)	**Shell**	**272,657**	44.60	15.20	34.35	**94.15**
2 (27)	Total Energies	184,634	42.20	15.75	32.10	90.05
3 (35)	BP	164,195	34.90	**17.35**	32.15	84.4
4 (56)	Fortum	132,894	35.30	15.95	28.80	80.05
5 (90)	Enel	104,052	32.30	14.10	**36.00**	82.4
6 (114)	Equinor	90,924	**45.80**	17.00	25.45	88.25
7 (130)	Engie	83,622	31.80	11.45	27.65	70.9
8 (251)	Repsol	52,335	33.00	16.65	34.20	83.85
9 (304)	Iberdrola	46,246	36.60	11.55	28.75	76.9
10 (331)	Anglo American	41,554	45.20	14.85	30.40	90.45
11 (368)	EnBW	38,010	37.50	10.05	22.15	69.7

The major European energy firms receive evaluation through two separate benchmarks in Table 76. The Fortune Global 500 (FG500) uses revenue data to evaluate firms but this method does not show their long-term investment potential. The TBL-based IAM score evaluates firms through financial and environmental and social factors which reveal transition risks and ESG externalities that revenue rankings fail to detect. Shell stands as the top company on the TBL index with a 94.15 composite score because it demonstrates excellent financial and environmental results, but its social performance falls short compared to competitors.

TotalEnergies (90.05) and Anglo American (90.45) achieve similar results in their TBL assessment because they demonstrate balanced performance across all three pillars. BP achieves the highest social performance rating (17.35) in the sample, but its financial indicators prevent it from reaching the top composite rankings. Equinor demonstrates exceptional decarbonization capabilities because it holds a top five TBL score (88.25) despite its position at 114th in the FG500 revenue rankings. The comparison shows that financial size and business appeal exist independently from each other.

The Spearman rank correlation between Fortune Global 500 (revenue ranks) and TBL ranks (from Table 76): Spearman correlation (ρ): 0.52, p-value: 0.10. This indicates a moderate

positive correlation: larger firms by revenue tend to perform better on your TBL scores, but the relationship is not statistically strong.

The environmental performance of Enel and Iberdrola remains strong, but their financial capabilities remain limited for transition investments while Engie and EnBW maintain poor social and environmental results that their revenue does not compensate for. Anglo American and Equinor achieve better results than their revenue position because they excel at ESG integration, yet certain high-revenue utility firms perform poorly when sustainability factors are included in the assessment. The evaluation demonstrates that while FG500 rankings show company size the TBL framework provides additional value by identifying hidden risks and transition readiness and ESG commitments which revenue metrics fail to expose. The IAM ranking system provides investors with a better understanding of future business sustainability because it goes beyond traditional revenue-based assessments.

Anglo American was included in the sample even though its core business lies in mining and extractives rather than oil and gas. The justification for its inclusion is that it is classified under the Energy sector in the Fortune Global 500 ranking. Accordingly, the analysis covers not only European oil and gas firms in the strict sense, but also one representative from the broader energy sector. This provides additional comparability across adjacent industries facing similar sustainability and low-carbon transition challenges of interest to investors.

The IAM distributed equal importance to each pillar through a one-third allocation. The research design established sustainability and profitability as equally important factors for long-term attractiveness because of this normative decision. The results of a sensitivity analysis that tested different pillar weight distributions between -20% and +20% showed that company rankings changed slightly but the leader–laggard relationship in Table 77 persisted. The IAM produces consistent results because no single factor controls the rankings, and the system shows resistance to different possible weight distributions.

Table 77
The Investment Attractiveness for O&G European Firms

Company	Financial score	Social score	Environmental score	Investment attractiveness
Shell	47%	16%	36%	Stable Investments
Total Energies	47%	17%	36%	Stable Investments
BP	41%	**21%**	38%	Stable Investments
Fortum	44%	20%	36%	Emerging Opportunities
Enel	39%	17%	**44%**	Emerging Opportunities
Equinor	52%	19%	29%	Stable Investments
Engie	45%	16%	39%	Emerging Opportunities
Repsol	39%	20%	41%	Emerging Opportunities
Iberdrola	48%	15%	37%	Emerging Opportunities
Anglo American	50%	16%	34%	Stable Investments
EnBW	**54%**	14%	32%	Emerging Opportunities

The division of businesses into "Emerging Opportunities" and "Stable Investments" emphasises how crucial financial stability is to the appeal of investments. While businesses with increasing sustainability growth potential may offer better returns but carry greater risk, firms with good financial scores and moderate sustainability commitments continue to be

excellent investment choices. Investors can evaluate businesses using this analysis's clear approach for evaluating their sustainability and financial resilience.

The IAM scores presented here combine equal weights from the three TBL pillars (financial, environmental and social) after normalizing each dimension to a 0–2 scale for comparison purposes. The study uses equal weighting because it follows the normative approach which treats sustainability and profitability as equally important factors for long-term attractiveness. The robustness check used different pillar weight distributions between ±20% to evaluate the results (e.g. E-heavy and S-heavy scenarios). The leader, laggard structure of company rankings showed minimal changes when the weight distribution was adjusted. The results in Table 78 demonstrate stability because the findings remain consistent when using different weighting schemes that follow reasonable alternatives.

The IAM framework requires a robustness check to validate its equal weighting system because it lacks a clear justification. The research evaluates how different weight assignments to financial performance and social responsibility, and environmental impact affect the ranking of organizations. The research evaluates three different weighting methods for assessment: (i) the baseline model with equal weights for all three dimensions and (ii) S-heavy and (iii) E-heavy specifications that focus on social responsibility and environmental performance respectively is showed in table 78 and table 79:

Table 78
The Investment Attractiveness for O&G European Firms with S-heavy

Rank (Global 500)	Company	Financial score 25%	Social score 50%	Environmental score 25%	TBL score
1 (15)	**Shell**	44.60	15.20	34.35	**82.01**
2 (27)	Total Energies	42.20	15.75	32.10	79.35
3 (35)	BP	34.90	**17.35**	32.15	76.31
4 (56)	Fortum	35.30	15.95	28.80	72.00
5 (90)	Enel	32.30	14.10	**36.00**	72.38
6 (114)	Equinor	**45.80**	17.00	25.45	78.94
7 (130)	Engie	31.80	11.45	27.65	61.76
8 (251)	Repsol	33.00	16.65	34.20	75.38
9 (304)	Iberdrola	36.60	11.55	28.75	66.34
10 (331)	Anglo American	45.20	14.85	30.40	78.98
11 (368)	EnBW	37.50	10.05	22.15	59.81

The IAM rankings underwent a robustness test to determine their resistance against different weight distribution methods. The analysis included three scenarios which used equal weights for all pillars (F=33%, S=33%, E=33%) and two additional scenarios with S-heavy (F=25%, S=50%, E=25%) and E-heavy (F=25%, S=25%, E=50%) weight distributions.

The baseline model identifies leaders through their equal performance in all three assessment areas. The top positions in the rankings belong to Shell (94.15) and Total Energies (90.05) and Anglo American (90.45) and Equinor (88.25) while BP (84.40) and Repsol (83.85) show strong performance. The lowest performing firms are Engie with 70.90 and EnBW with 69.70. The equal weighting of all pillars in the assessment confirms that Shell and Total Energies stay at the top of the rankings.

The S-heavy scenario shows Shell (82.01) and Total Energies (79.35) and BP (76.31) at the top while Equinor (78.94) and Anglo American (78.98) approach the leaders because of their solid social performance. The bottom positions in this ranking continue to be held by Engie and EnBW. The increased focus on social performance benefits firms with strong CSR practices and community engagement but it does not change which firms lead the rankings.

Table 79
The Investment Attractiveness for O&G European Firms with E-heavy

Rank (Global 500)	Company	Financial score 25%	Social score 25%	Environmental score 50%	TBL score
1 (15)	**Shell**	44.60	15.20	34.35	**96.38**
2 (27)	Total Energies	42.20	15.75	32.10	91.61
3 (35)	BP	34.90	**17.35**	32.15	87.41
4 (56)	Fortum	35.30	15.95	28.80	81.64
5 (90)	Enel	32.30	14.10	**36.00**	88.80
6 (114)	Equinor	**45.80**	17.00	25.45	85.28
7 (130)	Engie	31.80	11.45	27.65	73.91
8 (251)	Repsol	33.00	16.65	34.20	88.54
9 (304)	Iberdrola	36.60	11.55	28.75	79.24
10 (331)	Anglo American	45.20	14.85	30.40	90.64
11 (368)	EnBW	37.50	10.05	22.15	68.89

The E-heavy scenario leads to noticeable changes in the ranking positions of firms. Shell (96.38) keeps its position as number one while Anglo American (90. The environmental performance of Enel (88.80) and Repsol (88.54) and Anglo American (90.64) leads to their significant ranking improvements. The environmental performance of BP (87.41) shows less strength than its social performance which results in its decreased ranking position. The two firms Engie and EnBW continue to demonstrate the worst performance in this evaluation.

The results show that the leader laggard structure remains constant between different weighting schemes yet the emphasis on social or environmental performance causes specific firms to move up or down in the rankings. The IAM framework shows Shell and Total Energies as consistent leaders while BP performs best under social weighting but worse under environmental weighting and Enel and Repsol gain advantages when environmental performance gets more emphasis. The robustness test validates the IAM framework's weight independence while revealing which performance pillars generate the most ranking differences.

7.3 Strengths and Weaknesses of TBL for Investment Decisions

The TBL framework provides investors with a complete assessment system that evaluates corporate performance through financial and social and environmental factors when making sustainable investment choices. The TBL framework delivers a complete understanding of long-term value creation through its combination of financial and social and environmental performance indicators which surpasses traditional financial metrics. The implementation of TBL for investment choices brings substantial advantages yet it also presents various important constraints. John Elkington developed the TBL model to overcome

the shortcomings of conventional financial metrics because they fail to consider essential non-financial elements such as human rights and biodiversity and societal welfare.

Strengths

The TBL framework stands out because it successfully identifies external factors which standard financial assessments tend to miss. The framework helps investors evaluate social and environmental effects which leads to risk reduction from social disturbances and environmental damage and regulatory challenges. The framework promotes extended business planning which matches current investment approaches that combine ESG integration with impact investing. The TBL framework enables Firms to handle stakeholder relationships through clear disclosure of profit and people and planet relationships.

John Elkington established that the TBL framework exists to generate combined positive results across all three dimensions instead of forcing Firms to choose between them. The business approach of stakeholder capitalism now leads firms to focus on stakeholder value rather than maximising shareholder profits. The TBL framework functions as a directional tool which helps firms navigate through the unstable business environment caused by climate change and social divisions and technological transformation. The measurement of TBL beyond financial performance helps firms demonstrate their ability to withstand environmental and social threats which now pose as fundamental economic risks. The TBL framework enables Firms to evaluate their sustainability and long-term success through its comprehensive assessment system.

Weaknesses

TBL faces major drawbacks despite its numerous benefits. The main drawback of TBL stems from its inability to provide standardized non-financial performance metrics that allow for effective comparison between different firms. Social and environmental indicators show subjectivity and inconsistent reporting and remain vulnerable to greenwashing practices. The unreliable nature of these indicators makes them unsuitable for investment evaluation purposes.

The non-financial assessment of firms in this research demonstrates how different firms and time periods evaluate similar actions through different assessment methods and data availability standards. The process of reporting sustainability data requires substantial resources from large firms which leads to an investment preference toward these firms instead of sustainable smaller businesses. The adoption of TBL in investment decisions faces obstacles because financial return metrics currently dominate investment decisions due to their quantifiable and immediate nature.

Elkington warns that firms frequently mistake TBL for a trade-off model instead of using it as an integrative strategy. Many firms perform minimal sustainability efforts by checking boxes for each dimension yet fail to integrate sustainability into their fundamental business operations. The integration of TBL into financial systems creates a risk that essential elements will be diluted. The financial industry has adopted TBL in ways that make it acceptable yet remove its original transformative power.

The Harvard Business Review published Elkington's 2018 article "Product Recall" of TBL to prevent superficial adoption and promote systems-level implementation of the concept. The process of converting non-financial data into numerical values presents a major difficulty. The Value Balancing Alliance works to establish monetary values for social and environmental results. Still, Elkington cautions about the dangers of converting intangible assets such as human dignity and biodiversity into financial terms.

The process of assigning monetary values to life and privacy and historical heritage can sometimes diminish their worth, which results in poor business choices. The absence of regulatory oversight and standardised reporting systems diminishes the effectiveness of TBL as an investment tool. Firms can choose to report only their positive impacts through selective disclosure when there is no external verification or mandatory reporting requirement, which reduces their accountability.

Practical Insights

The practical application of TBL provides useful direction yet it needs to be used in combination with other methods. The TBL framework serves as a starting point for Firms to develop systemic thinking and long-term investment strategies. The framework requires complete integration into governance systems along with strong data support and regulatory compliance to achieve its full potential. The research involved 42 experts who specialize in finance and sustainability and corporate governance to create practical recommendations. The research conducted an exclusive interview with John Elkington who founded TBL theory to understand how the framework operates in practice and how it has evolved.

Table 80
Professional Role and Experience of Participants

Organisation	%	Professional Role	%	Experience	%
Investment company	40	Managers / Directors	22	Less than 3 years	5
Oil and gas company	10	Head of department	21	3–5 years	10
Consulting firm	26	Financial department	33	6–10 years	40
Others	24	Others	24	More than 10 years	45

The survey data shows that 42 participants were distributed across the following categories according to Table 80. The survey data shows that investment firms represent the largest group at 40% while consulting firms make up 26% and other sectors account for 24% and O&G firms make up 10%. The survey participants work in financial departments at 33% while directors and managers make up 22% and department heads comprise 21% and the remaining 24% work in different roles. The survey participants bring extensive experience to the table because 45% have worked for more than ten years and 40% have experience between six and ten years while 10% have three to five years of experience and 5% have less than three years of experience. The sample population demonstrates both extensive experience and wide-ranging professional backgrounds.

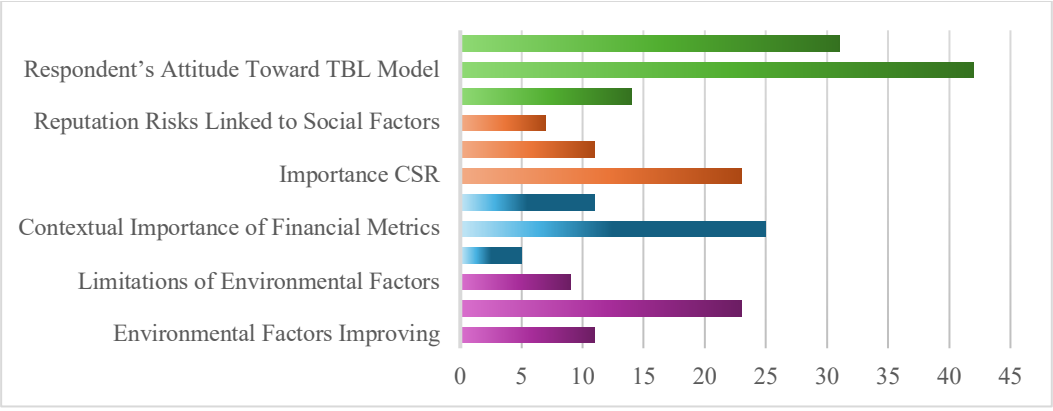


Fig. 21. NVivo Coded Matrix: Thematic Frequencies on TBL Model Evaluation

The TBL framework evaluation of investment attractiveness receives its frequency analysis from NVivo-coded responses in Figure 21. The TBL model evaluation receives the most attention from participants because they provided 42 references about their opinions regarding the model's value and appropriateness for investment analysis. The model receives strong support from respondents who want to enhance its performance through sector-specific and ESG-related modifications.

The model receives widespread criticism for its insufficient capabilities, as outlined in the "Criticism or Limitations of the TBL Model" theme. The themes "Importance of CSR," "Importance of Financial Metrics," and "Environmental Sustainability" demonstrate a strong interest in non-financial evaluation criteria. The data shows investors now demand sustainable performance metrics in their investment decisions. The data shows that investors have different opinions about TBL's effectiveness in specific sectors and its dependence on non-financial data. The research data shows that TBL faces multiple evaluation challenges in contemporary investment decision-making processes.

The analysis shows that investors maintain positive views about TBL, but they express doubts about its effectiveness in particular business sectors and its dependence on non-financial data. The chart demonstrates that TBL receives widespread approval from investors. The application of TBL as an investment framework enhances decision-making through financial analysis by integrating sustainability metrics. The framework should function as an addition to existing financial evaluation methods instead of replacing them.

The assessment of TBL requires investors to understand its weaknesses because environmental and social factors in O&G sectors present measurement challenges. A combination of TBL with traditional financial metrics produces investment portfolios that are both sustainable and resilient. Elkington believes TBL offers its best potential during the present economic and environmental emergency. The rising ESG "greenwashing" concerns and strengthening sustainability rules across EU territories create opportunities for TBL to establish itself as a trustworthy integrated framework.

To mitigate the risk of greenwashing highlighted in the literature, the coding scheme in this study explicitly differentiates between assured and unaudited disclosures. Claims supported by third-party assurance receive higher weight, with “reasonable assurance” treated as the strongest form of verification, while unassured or self-reported disclosures are down weighted. Where Global Reporting Initiative (GRI) concordance or equivalent external validation was present, the coding reflected this as a quality marker. This approach ensures that firms cannot achieve artificially high scores on the basis of unverified sustainability claims, thereby strengthening the reliability of the composite TBL index.

TBL continues to play an essential role in investment transformation because of the current economic and environmental disruptions. The TBL framework extends investment analysis by adding environmental and social responsibility elements to financial performance assessment. The financial industry's structural barriers and subjective nature along with measurement challenges, restrict the practical application of TBL. The complete implementation of TBL for investment decision guidance requires financial institutions to develop standardised non-financial metrics and integrate them into reporting systems and regulatory frameworks.

Chapter 8: Conclusion and Implications for Future Research

8.1 Summary of Findings

The research adds value to sustainability and investment evaluation studies through its combination of TBL framework and Stakeholder Theory with CSR and BSC. The research creates a specific framework which enables multiple assessments of European O&G sector investment potential. The research extends TBL conceptual limits through its method which connects sustainability dimensions to specific stakeholder indicators and performance metrics.

The research model enables sustainability assessment through financial frameworks by showing how E/S affects market-based valuation tools including cost of capital and credit spreads and equity multiples. The research creates a unified measurement system which combines financial elements with non-financial factors that affect investment attractiveness. The research reveals how economic factors relate to environmental and social elements and evaluates their collective ability to explain investment decisions through a mixed-methods approach.

The study achieves better results through multiple verification methods which include content analysis and regression modelling and external ESG dataset validation. The research provides a practical method to merge sustainability assessment with financial choice processes which advances both academic knowledge and business operations by uniting performance assessment with stakeholder needs and market value determination.

The research examined how the TBL framework functions for evaluating investment potential in the oil, gas and energy industries. The research aimed to assess the TBL framework's ability to function as a complete evaluation system or additional tool for financial metrics which Fortune Global 500 rankings utilise. The research Analysed 11 multinational firms through financial data comparison with non-financial performance indicators from 2014 to 2022 while conducting expert interviews with John Elkington (Yaremchuk, 2025) who founded TBL (Appendix V).

The research examined how the TBL framework functions as a tool for evaluating investment opportunities in the oil, gas and energy sectors. The research combined financial performance data with social and environmental performance indicators from 11 multinational corporations through stakeholder interviews and survey responses and NVivo-coded thematic evidence.

The research reveals three fundamental patterns in its results. The financial performance of Shell and Anglo American and Equinor demonstrates that organizations with high TBL scores achieve better financial outcomes while firms with poor performance struggle to link their clean energy initiatives to balanced financial and social results. The TBL framework reveals sustainability externalities and risk factors which standard size-based rankings fail to detect yet shows limited agreement between the two assessment methods.

The framework receives support from investors and practitioners yet faces three main obstacles which include verifying data accuracy and making sector comparisons and depending on unverified non-financial information from firms. The TBL framework provides additional explanatory power than financial indicators alone, but its effectiveness requires solutions for data consistency and sector-specific implementation requirements.

8.2 Contributions to Theory and Practice

The research makes significant contributions to academic knowledge and practical investment assessment through its implementation of the TBL framework for corporate investment attractiveness evaluation which remains underdeveloped in standard financial

assessment methods. The research fulfils the introduction's stated goals by demonstrating how environmental and social metrics with financial data create a more complete and sustainable performance assessment than traditional financial indicators used in Fortune Global 500 evaluations. There is three-part contribution statement:

1. Theoretical contributions

The research introduces a new framework which combines sector-specific TBL assessment methods to evaluate investment opportunities in the oil, gas and extractives industries. The research builds upon John Elkington's original work by creating operational frameworks for the three pillars which match the capital requirements and lifecycle challenges and transition needs of the energy sector. The research proves that sustainability and profitability should be treated as equal factors for building long-term corporate resilience instead of being seen as opposing goals.

2. Methodological contributions.

The research contributes to methodological development through its creation of a standardized system for environmental and social and financial indicator measurement which follows GRI categories and includes assurance verification processes. The research develops a composite index (IAM) through normalisation and equal-weight aggregation methods which undergoes sensitivity tests for validation purposes. The research validates its findings through document coding and quantitative scoring and NVivo-based stakeholder thematic analysis which provides a replicable method for future studies.

3. Practical and policy contributions.

The IAM provides investors with a systematic framework to locate firms ready for transition while assessing portfolio stability under carbon pricing conditions and surpassing traditional Fortune Global 500 size-based evaluations. The research shows which TBL elements create differences in rankings, and which disclosure and assurance methods produce the most significant effects for O&G managers and policymakers. The research establishes connections between financial stability and social licence and environmental transition which guides both investment decisions and corporate governance improvements.

The research achieves its objectives to advance sustainability accounting theory and ethical investment evaluation practices. The research proves that TBL functions as a diagnostic and strategic instrument, linking business success to environmental and social well-being for long-term sustainability. The research results demonstrate the need for institutions to adopt TBL as their standard framework for corporate strategy development and capital distribution processes.

8.3 Recommendations for Oil and Gas Sector Practitioners

The research findings support these recommendations which aim to help European O&G stakeholders improve investment attractiveness through TBL framework implementation as described in Chapter 1 and demonstrated throughout this thesis.

1. Business operations should implement TBL as their fundamental integrated strategy. The O&G industry needs to stop treating environmental and social programs as secondary to core business operations. The TBL framework requires Firms to integrate economic performance with environmental and social aspects throughout their strategic planning and operational execution. Firms should unite their emissions reduction targets with community engagement programs and financial objectives through an integrated framework which drives lasting value creation. The business models of Equinor and Shell now include renewable energy projects and community development initiatives which need to become standard practice throughout the sector.

2. Sustainability reports need to include specific measurable performance indicators to boost investor confidence and enable better firm comparison. Investor trust grows when firms use standardised sustainability reports that include measurable data, which enables better comparison between different firms. The implementation of sustainability metrics by practitioners should focus on globally accepted standards including GRI and SASB and TCFD. The reporting system should focus on specific metrics which include greenhouse gas emissions and water usage efficiency and social investment percentages of revenue and employee welfare performance indicators. The reports need to become part of annual financial statements to demonstrate Firms' complete dedication to TBL principles.

3. The O&G industry should adopt a forward-thinking approach to follow ESG regulations instead of waiting for new laws to take effect. The O&G industry should take the lead in policy direction by making strategic decisions based on upcoming regulatory changes such as EU Green Deal and national climate laws. The implementation of green technologies like carbon capture and hydrogen and offshore wind requires early investment while firms should establish internal carbon pricing systems and develop scenarios for a carbon-neutral future.

4. The organisation should dedicate resources to develop strong relationships with stakeholders and fulfilits social obligations. The ability to operate depends on successful engagement with stakeholders because social acceptance has become a vital requirement. Firms need to create formal stakeholder engagement systems which enable them to hear and resolve issues from local communities and their employees and regulatory bodies. Firms should establish community development projects and establish grievance systems and set local employment targets to achieve these initiatives. Firms that excel in social performance gain better public relations while minimising operational problems and achieving better financial outcomes in the long run.

5. The evaluation of investment attractiveness needs to expand its assessment criteria to include metrics that go beyond traditional financial indicators. Investors who rely only on financial metrics when assessing O&G firms fail to recognise essential long-term sustainability factors and business prospects. Investors need to use the TBL framework during their evaluation process to evaluate E/S together with financial performance metrics. The valuation process should include ESG scores and TBL-aligned KPIs and risk-adjusted sustainability performance data. Asset managers together with institutional investors need to establish direct contact with their portfolio firms to promote better alignment between TBL principles.

6. Firms should develop sustainability teams that unite different business functions. The implementation of TBL framework requires O&G firms to build sustainability teams which unite finance with operations and legal and HR and external affairs departments. The teams must develop sustainability strategies and track performance while maintaining business unit-wide alignment throughout all business operations. Firms need established governance systems and executive-level responsibility to reach their TBL-based targets.

7. Firms should use TBL performance excellence to establish themselves as market leaders. Firms which prove their ability to deliver reliable TBL performance will establish themselves as market leaders. Firms that differentiate themselves through TBL performance gain better access to green funding and build stronger alliances and maintain better employee loyalty and market stability.

Firms that adopt TBL principles early such as BP through Lightsource and Shell through community programs gain first access to emerging sustainable market opportunities. The European O&G sector can move from compliance-based practices to strategic sustainability management through the implementation of these recommendations. The recommendations help Firms achieve better investment appeal while meeting modern social

and environmental and economic standards which were introduced in the beginning and repeated throughout the thesis.

8.4 Limitations and Suggestions for Future Research

The research contains multiple methodological and conceptual limitations which affect how researchers understand the study results. The analysis depends on corporate sustainability disclosures which present mainly positive outcomes while hiding their negative external effects. The study results might show higher scores for firms that excel at reporting rather than demonstrating superior environmental performance. The research needs to address this issue by combining company reports with independent assurance statements and third-party ESG databases and regulatory filings.

The sample data lacks complete reporting of Scope 3 emissions together with downstream value-chain effects. The exclusion of these emissions creates a bias in environmental assessments because integrated majors with limited upstream operations receive more favourable scores. The research would benefit from using modelled Scope 3 data from CDP and IEA initiatives to achieve better coverage in the analysis.

The dataset focuses on European multinationals with extensive reporting practices which results in a survivorship bias that excludes firms with weak sustainability practices and limited disclosure. The research would gain better representation by including firms from emerging markets and private sector firms through the use of substitute indicators when disclosure data is insufficient.

The framework lacks validation against future-oriented financial risk assessment methods. The TBL index shows internal consistency and robustness through different weighting schemes, but its predictive power has not been proven. Research should verify the predictive power of TBL rankings by analysing their relationship with future financial indicators including CDS spreads and equity cost of capital and market drawdown resilience. The research needs to prove that TBL performers who achieve high scores also receive better financing terms and market protection because this would validate investment decisions.

The proposed IAM together with its TBL-based framework provides empirical value to the European O&G sector while showing potential for use in multiple national and industrial settings. The model's design and measurement approach enables researchers to study different institutional frameworks and environmental conditions which affect energy-intensive and emerging industries. The framework's expansion to new regions and sectors will prove its versatility as a sustainability-focused investment assessment tool while increasing its universal applicability.

Research should implement this TBL – Stakeholder - CSR/BSC framework across different economic environments to study how governance quality and carbon regulation and stakeholder development affect investment attractiveness results. The model's external validity will increase through multiple country and industry studies which will make it more useful for policymakers and investors and corporate stakeholders who want to connect sustainability metrics to financial worth.

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Appendix I. Research Questionnaire

Blaikie (2007) describes how social inquiry involves both the steps and procedures for developing new knowledge and the philosophical and theoretical assumptions underlying what constitutes social reality. As such, the methods used to collect and analyse data are framed within a specific research approach. As Gill and Johnson (2010) explain, "philosophical commitments which are inevitably made in undertaking research always entail a commitment to various knowledge-constituting assumptions about the nature of truth, human behaviour, representation and the accessibility of social reality." These commitments shape the ontological, epistemological, and methodological foundations of research. Figure shows scheme for analysis assumptions on the nature of social science:

The subjectivist approach to social science				*The subjectivist approach to social science*
Nominalism	←	ontology	→	Realism
Anti-positivism	←	epistemology	→	Positivism
Voluntarism	←	human nature	→	Determinism
Ideographic	←	methodology	→	Nomothetic

Source: Burrell and Morgan, 1979

Fig. Scheme for Analysis Assumptions on the Nature of Social Science

Burrell and Morgan (1979) offer a framework for analysing these assumptions, identifying two broad perspectives in social science research: the subjectivist approach and the objectivist approach. The framework consists of four elements which include reality nature (ontology) and knowledge (epistemology) and human agency (human nature) and research methods (methodology). The subjectivist approach supports nominalism because it believes reality emerges from human perception, yet the objectivist approach supports realism because it believes reality exists beyond human mental constructs.

The study's epistemological framework spans from anti-positivism which prioritizes personal understanding to positivism which concentrates on measurable data collection for generalizable results. The research assumptions determine methodological approaches between ideographic case-specific studies and nomothetic quantitative research for general law discovery. The research bases its methodology on realist and positivist principles, which state that reality exists independently from human perception and systematic research methods can reveal and quantify this reality (Cherryholmes, 1992; Creswell, 2012).

The study employs a realist and positivist framework for its methodological and analytical procedures because it handles both qualitative and quantitative data in a way that matches these philosophical perspectives. Ontology represents the academic field which investigates the nature of existence and being. The researcher's beliefs about what makes up reality form the basis of their ontological perspective. The O&G sector would consider sustainability performance as a quantifiable characteristic that exists independently of human perception.

The study of epistemology focuses on understanding how the research acquire knowledge. The field of epistemology investigates methods for obtaining knowledge about

subjects and establishing their validity. The definition of knowledge acquisition between positivism and constructivism represents an epistemological stance which determines if knowledge emerges from measurable data or social interpretation.

The constructivist view states that social groups create reality instead of reality existing independently. Different stakeholders have unique perspectives about how a company demonstrates sustainability. Constructivist knowledge emerges from social interactions and personal experiences and interpretations instead of independent observation. In my thesis, this would support using qualitative methods (like stakeholder interviews or content analysis of sustainability reports) to understand how investment attractiveness is constructed through TBL narratives.

While value-neutrality is an aspiration in positivist research, this study recognises that choices in data selection and categorization may reflect certain priorities (e.g., focusing on investor-relevant sustainability indicators). However, the analytical approach remains empirically grounded and replicable, privileging evidence that can be observed and verified.

The study employs a convergent mixed methods design (Creswell & Plano Clark, 2018), but in a manner that reflects positivist logic. It begins with a quantitative content analysis of sustainability reports from European O&G firms. Here, language is treated as data, objective, countable, and reducible to frequencies. Key terms and categories were developed a priori based on sustainability reporting standards and counted systematically to reveal patterns in corporate disclosure practices. This approach mirrors a quasi-quantitative treatment of qualitative material, consistent with a positivist orientation (Denzin & Lincoln, 2011).

Subsequently, the study applies quantitative techniques, notably, financial ratio analysis and regression modelling, to assess how the frequency of specific sustainability disclosures (economic, environmental, and social) correlates with financial indicators of investment attractiveness. This phase aligns fully with the positivist goal of prediction and generalisation.

Unlike interpretivist approaches that explore meaning as emergent and context-bound, this study treats language in sustainability reports as relatively stable and comparable across firms and time. The method of analysis depends on the assumption that words and phrases maintain fixed meanings which enables researchers to quantify their occurrence through statistical methods. The method supports the idea that language choices reveal actual Organisational priorities which researchers can use to represent strategic orientations according to realist and positivist textual analysis (Johnson & Onwuegbuzie, 2004).

While the use of mixed methods is often associated with pragmatism, this study integrates methods in a positivist-compatible way: content analysis serves as a bridge between qualitative and quantitative logic, using text as structured data, and statistical analysis provides empirical validation and supports generalizable claims about investment attractiveness in the sector. Table shows philosophical foundations and research design alignment:

Philosophical Foundations and Research Design Alignment

Philosophical Dimension	Position Adopted	Description	Implications for Research Design
Ontology	Realism	Reality exists independently of perception; sustainability and performance are objectively measurable.	Assumes sustainability indicators and financial metrics represent real institutional characteristics.
Epistemology	Positivism	Knowledge is gained through observation, measurement, and generalization.	Emphasizes quantifiable data, systematic analysis, and objective validation of relationships (e.g., regression analysis).

Axiology	Value-neutral stance with critical reflexivity	Research strives for objectivity but acknowledges researcher choices influence design and focus.	Prioritizes replicability, minimizes interpretive bias through structured coding and statistical analysis.
Human Nature	Determinism	Human actions are shaped by observable, structural factors (e.g., regulation, reporting standards).	Assumes Organisational behaviour is influenced by external sustainability and financial pressures.
Methodology	Nomothetic (structured, comparative)	Seeks generalizable patterns and relationships using formal, systematic approaches.	Uses content analysis and statistical techniques to compare across firms and time.
Approach to Language	Text as Data	Treats language as stable, quantifiable, and consistent across contexts.	Codes sustainability disclosures based on frequency; words are indicators of Organisational behaviour.
Overall Paradigm	Realist / Positivist Mixed Methods	Mixed methods used not for philosophical pluralism but to enhance objective validation.	Content analysis → Quantitative modelling; data triangulation to increase robustness of findings.

The research bases its approach on realist ontology and positivist epistemology because it accepts that investment attractiveness and sustainability performance exist as observable objective facts which researchers can measure and generalize. The study maintains that language and disclosure practices function as reliable indicators of Organisational priorities despite recognizing contextual effects.

The research design follows these philosophical principles through its combination of content analysis with quantitative modelling techniques. The study uses a positivist-compatible mixed methods design to measure both sustainability efforts' textual expressions and their financial effects within European O&G operations. The study achieves methodological coherence and analytical rigour through its philosophical alignment which enables it to produce a strong contribution to sustainability theory and investment decision-making practice.

Appendix II. Research Questionnaire

Please indicate the type of your organisation:
☐ Investment company
☐ Oil and gas company
☐ Consulting firm
☐ Other: _____

What is your professional role?
☐ ESG analyst
☐ Financial analyst
☐ Head of department
☐ Other: _____

How many years of experience do you have?
☐ Less than 3 years
☐ 3–5 years
☐ 6–10 years
☐ More than 10 years

1. Do you consider the Triple Bottom Line Model suitable overall for the determination of Investment Attractiveness?

Rationale: This question evaluates the core hypothesis of the research, whether the Triple Bottom Line (TBL) framework is a suitable and comprehensive tool for assessing investment attractiveness beyond traditional financial models. It is based on the central objective of the thesis, which proposes TBL as a multidimensional and integrative approach, especially relevant for the O&G sector in transition. In O&G firms, financial indicators have the greatest influence (50%). Kaplan & Norton (1996) developed the BSC, proving that current financial and non-financial indicators directly correlate with future performance. Penman (2012) highlights that return on equity (ROE) and profitability are key drivers of a company's value. Financial forecasts can significantly influence company valuation (30-50%). Koller et al. (2020) show that future cash flows have a strong impact on a company's market capitalization.

2. In your opinion, are the financial dimensions as defined all relevant for the evaluation of Investment Attractiveness?

Rationale: This question addresses the validity and completeness of the economic indicators used within the TBL framework. The study incorporates 31 financial metrics, and this question ensures that these indicators are relevant from the viewpoint of financial practitioners or analysts. For this study, the selection of financial ratios was chosen by Kaplan's framework and four established bankruptcy prediction models (Kaplan, 2018).

Liquidity ratios	*Solvency ratios*
1. Current ratio 2. Quick ratio 3. Cash ratio	1. Financial leverage 2. Debt-to-equity ratio 3. Debt-to-capital ratio
Profitability ratios	*Activity ratios*

1. Net profit margin 2. Return on assets 3. Return on equity 4. Gross profit margin 5. Pretax margin 6. Operating return on assets 7. Operating profit margin	1. Working capital turnover 2. Total assets turnover 3. Fixed assets turnover 4. Inventory turnover 5. Receivables turnover 6. Payables turnover
Bankruptcy tests	*Cash ratios*
1. Taffler's Model (UK) 2. Liss's Model (UK) 3. Altman's Model (USA) 4. Springate's Model (USA)	1. Cash to income 2. Cash return on equity ratio 3. Cash flow to revenue ratio 4. Cash return on assets ratio 5. Dividend payment ratio 6. Reinvestment ratio 7. Interest Coverage ratio 8. Debt coverage ratio

3. In your opinion, are the Social dimensions as defined all relevant for the evaluation of Investment Attractiveness?

Rationale: This question examines whether the selected social indicators (e.g., labor practices, human rights, community engagement) are appropriate and significant in investment assessments. It reflects the increasing influence of the "People" dimension in sustainability reporting and investor decision-making. Social and environmental sustainability constructs were two multi-dimensional pre-established constructs that were studied by Papoutsi (2018).

Social	
Labour practices	*Human rights /society*
1. Employ Health and Safety programs 2. Encourage employee diversity 3. Establish supplier code of conduct 4. Source responsibly - ethically 5. Train on anti-corruption 6. Train and educate employees	7. Engage employees 8. Conduct community support activities 9. Commit to employees

4. In your opinion, are the Environmental dimensions as defined all relevant for the evaluation of Investment Attractiveness?

Rationale: This question evaluates the relevance of environmental metrics (e.g., carbon emissions, energy efficiency, biodiversity protection) in investment analysis. It is grounded in the thesis's argument that environmental performance is becoming a critical determinant of investor confidence and regulatory compliance.

Environmental	
Emissions	*Materials Consumption*
1. Reduce carbon footprint 2. Reduce fuel consumption 3. Reduce GHG emissions 4. Reduce other gases emissions 5. Response to oil Spills	10. Reduce waste production 11. Reduce water consumption 12. Reduce packaging 13. Reduce consumption of resources 14. Reduce energy consumption 15. Use Renewable energy

Supply Chain	16. Account for biodiversity 17. Recycle waste 18. Recycle water 19. Reuse resources 20. Use recyclable 21. Make product LCA (Life Cycle Assessment) 22. Use alternative modes of transportation (fuel) 23. Certify to ISO 14001 standard
6. Assess/evaluate suppliers 7. Collaborate with suppliers 8. Procure sustainably (environmental purchasing) 9. Source locally	

5. Do you feel that the criteria applied for each of the dimensions of Triple Bottom Line are relevant and adequately represent the dimension of Investment Attractiveness as defined?

Rationale: This question seeks validation for the methodology used in constructing the scoring system, assessing whether the selected criteria under each TBL dimension accurately reflect the concept of investment attractiveness. It helps confirm the internal coherence of the model. The impact of financial indicators from past, present, and future periods on the final result depends on multiple factors, including the industry, analytical methodology, forecasting horizons, and the company's strategic goals. Historical financial indicators are essential for understanding trends and assessing a company's stability. However, their predictive value is limited to 20-40%, as they do not account for current market conditions and strategic changes. Fama & French (1992) demonstrated that historical financial indicators influence future profitability, but their impact is constrained. Lev & Zarowin (1999) argued that traditional financial reporting is losing its predictive value, especially for high-growth firms.

6. Do you feel that any important criteria related to Investment Attractiveness have been omitted (e.g. governance, innovation, geopolitical risk)? (Optional)

Rationale: This question allows for the identification of missing indicators or dimensions that might be relevant in evaluating investment attractiveness, such as governance, innovation, or political/regulatory risks. It reflects the thesis's recognition of methodological gaps in current ESG/TBL applications.

7. Do you have any other comments? (Optional)

Rationale: This open-ended question provides opportunity to add perspectives, critiques, or recommendations that were not directly prompted by previous questions. It aligns with the qualitative nature of the study and supports the exploratory research design. This research will lead to important improvements to the final scoring index as well as ensuring that the overall construction of the tool was appropriate for the study to be undertaken.

Appendix III. Review of Responses

1. Do you consider the Triple Bottom Line Model suitable overall for the determination of Investment Attractiveness?

Respondent	Review of responses
1	Yes, I think the Triple Bottom Line model is suitable for the determination of Investment Attractiveness.
2	Yes , I agree.
3	From the perspective of a Strategic Business Analyst working within maritime sector, I consider the Triple Bottom Line (TBL) model not only suitable but increasingly essential in determining investment attractiveness particularly in the context of the industry's decarbonisation agenda. Investments in alternative fuel vessels such as LNG, methanol, ammonia, or hydrogen-powered ships are no longer evaluated purely on financial return metrics, but also on their long-term environmental and societal impact. The TBL framework enables a more comprehensive assessment of such investments, accounting not only for capital efficiency and lifecycle cost, but also for: - Environmental impact, such as emissions reduction and fuel lifecycle analysis; - Social considerations, including crew safety, training on new fuel technologies, and the broader contribution to green corridor development and community health. From maritime standpoint with its role in technical assurance, risk management, and supporting safe innovation the TBL model aligns well with how we assess new technologies and advise stakeholders on sustainable maritime investments. It helps investors and shipowners balance immediate costs with long-term resilience, regulatory compliance, and reputational value.
4	Can't provide a blanket answer. It may be suitable for certain firms/segments of the market, but can't be 100% universal
5	The value of the model depends on the investment objectives of the investors. It is much more common now to emphasise the importance of non-financial indicators and the ESG environment, but often that is in addition to expectations on financial returns.
6	Yes, the Triple Bottom Line (TBL) model is suitable for assessing investment attractiveness, especially in the transitioning O&G sector. While financial indicators remain dominant, TBL adds environmental and social dimensions, offering a broader, long-term view. This is critical as sustainability factors increasingly influence risk, regulation, and stakeholder expectations. TBL complements traditional financial models by capturing non-financial drivers of value, aligning with frameworks like the Balanced Scorecard.
7	Yes, energy company consider TBL for investment decisions making such as investing in projects to increase sustainability.
8	TBL can be a useful supplementary framework when assessing investment attractiveness, but it is not fully sufficient on its own. TBL is valuable as a lens but should be combined with traditional financial analysis.
9	No. I never thought about it.
10	I reserve judgment. I would like to see the R2 of these measures. since only small oil producers have gone bust, it is difficult to apply to the large, listed oil firms.

11	Yes, as long as it is put in context.
12	Absolutely, TBL model is no doubt very suitable in terms of evaluation, especially as sustainability becomes one of the main elements in decision making. The overall picture on economic, environmental and social characteristics can help with both short term financial goals and long-term sustainability objectives.
13	The Triple Bottom Line (TBL) model serves as an appropriate tool for evaluating investment potential, particularly in the evolving O&G sector. Even though financial measures continue to take precedence, TBL integrates environmental and social aspects to deliver a wider perspective over the long horizon. The growing impact of sustainability factors on risk assessment, regulatory requirements and stakeholder expectations makes this especially significant. The Triple Bottom Line model enhances traditional financial analysis methods through its ability to measure non-financial value components, and it integrates with structures such as the Balanced Scorecard.
14	TBL appears to be a suitable and comprehensive tool for assessing investor attractiveness. Its strengths and robustness are argued for well by Ekaterina. As with all models, using other tools to support decision making is conducive to a more rounded approach that relies on different, but often interconnected, indicators.
15	TBL model is a new tool for assessing Investment Attractiveness of the company, that provides very accurate results.
16	Yes, I agree.
17	Yes
18	yes
19	It is not suitable, unfortunately, unsustainable technology could be more profitable.
20	My investments are based on Social Arbitrage rather than Tripple Bottom Line model.
21	Yes, the Triple Bottom Line (TBL) model can be considered suitable for determining investment attractiveness, especially from a long-term perspective. Unlike traditional financial models that focus primarily on short-term profitability, the TBL framework evaluates a company across three dimensions: economic performance, social responsibility, and environmental sustainability. This broader approach allows investors to assess not only the current financial health of a business but also its resilience, ethical standards, and environmental impact — all of which are increasingly relevant to stakeholders. Firms that integrate TBL principles often build stronger reputations, attract responsible investors, and are better positioned to adapt to regulatory changes or shifting consumer expectations. In sectors like oil and gas, where environmental and social risks are high, the TBL model provides a more comprehensive view of future viability. Therefore, while it may not replace traditional valuation models, it serves as a valuable complement for assessing long-term investment potential and corporate reputation.
22	Yes, it certainly increases external investment attractiveness, boosts sales from ESG-interested customers, and gains long-term operational efficiencies.
23	Not used - no opinion
24	Yes
25	Yes
26	I consider this model to be suitable, as it defines the accounting structure that determines the effectiveness of the company's activities (directions).

27	I agree that the financial inficators named in the Rationale above are quite relevant for the determination of investment attractiveness. I am not familiar with the TBL model, but based on the provided rationale, it must be a promising candidate model for an investment attractiveness assessment.
28	differentiating institutional and individual investors we have two separate use-cases here: for the first one investing in ESG is increasing attractiveness, while the later may accept a lower quantitative return in favor of a positive impact on ESG
29	I think it depends on the type of investment; if one is considering purchasing a business I think using Triple Bottom Line model is appropriate; however if one is making an asset purchase or a minority passive investment the Triple Bottom Line model may not be as relevant.
30	I consider TBL model suitable as an overall and comprehensive tool for assessing investment attractiveness since it's using not only traditional financial criteria but 2 other important dimensions i.e. social and ecological, for assessing investment attractiveness
31	Yes, I consider the Triple Bottom Line model suitable for evaluating investment attractiveness.
32	I believe it is not only suitable but critical to a future where investors (and by inference firms) will be making decisions based on firms' ability to integrate sustainable practices.
33	I deem it a suitable model to be used in conjunction with a plethora of other analytical tools and methods. Investment attractiveness at a point in time from a macro perspective is often driven by asset allocation and the broad economic backdrop that propels growth. The triple bottom line provides a useful tool to benchmark performance when evaluating peer group performance but is of limited use on a prospective basis to ascertain superior cash flows generation.
34	Yes, I believe so, as in the current context, economic, environmental, and social factors are of paramount importance in all respects.
35	I believe that financial forecasts do not always have a significant impact on a company's valuation. It is also important to consider the reputation of the company's founder at the time of assessment. One example is Oleg Tinkov. Additionally, the political situation in the country where the company is based plays a crucial role — for instance, the sale of Western firms operating in Russia during the period of the Special Military Operation (SMO).
36	Yes, I consider
37	Yes, absolutely, if applied properly
38	yes
39	I consider it appropriate because this model defines the accounting structure that determines the efficiency of the company's activities.
40	Yes, I believe that the Triple Bottom Line (TBL) model is generally appropriate for assessing investment attractiveness. By integrating economic, environmental, and social dimensions, the TBL framework provides a more comprehensive and sustainable perspective on evaluating potential investments. This multidimensional approach allows investors to consider not only financial returns but also the broader impacts of their investments, thereby aligning with the principles of responsible and ethical investing
41	I am not directly involved in investment decisions and therefore not able to answer this question
42	Yes, I do. I consider the Triple Bottom Line (TBL) model to be a suitable and comprehensive tool for assessing investment attractiveness, as it goes beyond traditional financial models. This is particularly relevant for the oil and gas sector in the context of the ongoing energy transition.

2. In your opinion, are the financial dimensions as defined all relevant for the evaluation of Investment Attractiveness?

Respondent	Review of responses
1	The financial dimensions are relevant for the evaluation of investment Attractiveness.
2	Yes of course
3	Yes, the financial dimensions outlined are all relevant and valuable for evaluating investment attractiveness, particularly from a risk and performance analysis perspective. However, in today's investment landscape particularly in areas such as alternative fuel ship investments (as an example) financial indicators alone do not always offer a complete picture. While traditional metrics like ROE, Debt ratios, and Cash flow forecasts remain essential, they must be interpreted in context: - High CAPEX and longer payback periods for sustainable vessels may initially weaken short-term financial ratios, but may still be strategically and environmentally sound investments. - Conversely, short-term profitability may mask long-term exposure to carbon pricing, environmental regulation, or stranded asset risk. In conclusion, while the financial dimensions included in the study are highly relevant from a technical and analytical standpoint, their application must be contextualised within a broader strategic and sustainability-focused framework particularly in the maritime sector (as an example), where the investment landscape is shifting in response to decarbonisation and regulatory change.
4	At high level - yes
5	I am not qualified to comment on this.
6	Yes, the financial dimensions defined are relevant for evaluating investment attractiveness. Drawing from Kaplan's framework and established bankruptcy models ensures the inclusion of key indicators like profitability, liquidity, solvency, and efficiency, core to financial analysis. These 31 metrics provide a comprehensive view of a company's financial health and future performance, aligning with what practitioners use to assess risk and return.
7	All relevant
8	the financial dimensions selected are relevant and provide a strong foundation for evaluating investment attractiveness. However, for a complete picture, they should be complemented with forward-looking metrics, qualitative assessments, and market-based indicators (like P/E ratio, beta, or innovation indices), especially in sectors driven by intangible assets or rapid change.
9	Yes!
10	Too many.
11	Yes, however ratios are one of the many financial performance tools to determine attractiveness of a project to invest.
12	There are several financial aspects that need to be considered.Cost control and efficiency (how well the company manages cost).Cash flow(absolutely vital for company.Investors will be interested in strong support and future growth.Market position and risk factors.(financially healthy company will have procedures to manage any risks efficiently)

13	The selected financial dimensions prove important in evaluating how attractive an investment might be. According to the research, by applying Kaplan's framework with established bankruptcy models, businesses can incorporate essential financial analysis indicators such as profitability, liquidity, solvency, and efficiency in their operations. The 31 metrics give a complete overview of a business's financial standing and future performance, which matches the criteria professionals use to evaluate risk and return
14	yes
15	We analysed and applied these indicators for testing our company, including all the bankruptcy tests which were didn't test before. The results were impressive - closely aligning with our anticipated numbers and results (about risk, growth potential) from previous calculations.
16	yes, all.
17	Yes, including all indicators
18	Yes, I agree
19	Yes they are relevant
20	Although indicators are widely used within the investment industry, they often lag behind the market; therefore, I prefer to invest by considering the stock's price. If the stock is cheap and the company's fundamentals are good, I invest.
21	Yes, I believe the financial indicators selected in the study are generally relevant for evaluating investment attractiveness, especially when considering long-term financial stability, operational efficiency, and risk exposure. From the table provided, several key metrics stand out as particularly important for long-term investment evaluation: Return on Assets (ROA) and Return on Equity (ROE) reflect how effectively a company uses its resources and equity to generate profit. Debt-to-Equity and Debt-to-Capital ratios are essential for assessing financial leverage and long-term solvency — a critical concern in capital-intensive industries like oil and gas. Cash Flow to Revenue and Interest Coverage ratios help evaluate the company's ability to generate and manage cash, which is fundamental for sustainable operations. Altman's Z-Score is a validated tool for predicting bankruptcy risk and remains highly relevant in risk-sensitive sectors. By combining profitability, solvency, and cash-based indicators with established bankruptcy models, the study ensures a comprehensive and multidimensional view of investment potential. While no set of indicators is universally perfect, the selected 31 metrics are well-aligned with both academic theory and practical investment analysis.
22	Yes, all these financial dimensions are relevant.
23	All indicators seem valid, maybe use artificial intelligence to determine if from the data other indicators may be suitable
24	Definitely yes
25	Absolutely

26	Current liquidity. Monetary liquidity. Financial leverage. Net walrus profits. Turnover of working capital. The Taffler Model (UK). Cash flow to revenue ratio
27	Most of these financial dimensions are relevant. Some of them are not familiar to me and/or described in general words (current ratio, quick ratio, financial leverage etc.), thus a brief definition would help. Also the listed bankruptcy tests are not familiar to me. I find the profitability and solvency ratios most relevant.
28	depending on the industry some might not be applicable - e.g. Inventory in case of Software providers
29	I am not sure if all of these are relevant -it really depends on the type of the potential investment. For example if one is purchasing a car manufacturer vs an oil company there will be a different need for various ratios and some may not be relevant. Another example would be Berkshire Hathaway - the company does not pay dividend as a result some of these metrics would not be applicable.
30	Yes, I believe that all selected financial criteria is relevant for evaluation of Investment Attractiveness
31	Yes, the financial dimensions are relevant.
32	Yes to being relevant however the value of each metric will vary in importance
33	These are valid metrics but must be used with knowledge that management teams today are more aware of predictive analytical models that ever. Take the Benish indicator or Altman score, this can be gamed with a minor tweak to the financial statements. The addition of tools such as neural linguistic programming performed by machine learning models to analyse management transcripts, annual reports and trained to identify patterns that exemplify bullish or bearish tones. I would also add some return on capital measure to avoid disparity where capital structure causes problems with return on equity. Plus, the metrics exclude growth readings i.e. EPS or revenue growth that give a good insight into momentum which is a highly correlated factor to outperformance.
34	I agree that all the financial indicators mentioned above are relevant for assessing investment attractiveness.
35	I believe that yes, financial indicators play a major role in evaluating a company. Especially when we are talking about 31 financial metrics, rather than just a few traditional ones like revenue, EBITDA, and so on. However, as I mentioned earlier, there are also important non-financial factors that should be considered.
36	In my opinion, all financial dimensions are relevant for the evaluation of Investment Attractiveness
37	Yes
38	These are surely relevant regarding that financial metrics should be grouped by liquidity, security and rentability. Therefore I think that the importnace of the Cash ratios should be secondary to the classical liquidity ratios.
39	Current liquidity Quick liquidity Debt to Equity Ratio Net Profit Margin Working Capital Turnover Asset Turnover Taffler Model (UK) Cash Flow to Revenue Ratios

40	I believe that the following indicators are essential for assessing investment attractiveness: the Cash Ratio, Financial Leverage, Return on Equity (ROE), Fixed Asset Turnover, the Altman Z-Score Model (USA), and Cash Flow Return on Equity. These metrics provide a comprehensive evaluation of a company's liquidity, financial stability, operational efficiency, and overall profitability, which are critical for informed investment decision-making.
41	Most certainly
42	Yes, I agree. I believe that certain financial indicators are indeed relevant for assessing investment attractiveness.

3. In your opinion, are the Social dimensions as defined all relevant for the evaluation of Investment Attractiveness?

Respondent	Review of responses
1	The social dimensions are relevant for Investment Attractiveness.
2	I think yes
3	Yes, the social dimensions, including labour practices, human rights, and community engagement are increasingly relevant in evaluating investment attractiveness, particularly as ESG and sustainability considerations become embedded in maritime and wider infrastructure investment strategies. From the perspective of a maritime classification society, which works closely with shipowners, classification societies, and maritime regulators, social indicators are not only values-driven they are increasingly risk-driven. Poor labour standards, for example, can directly impact operational safety, reputation, and supply chain resilience. In alternative fuel shipping and innovation-driven projects, social readiness is also a factor including training needs, upskilling, and safe handling of new fuels like ammonia or hydrogen. These social considerations directly influence adoption speed, operational continuity, and regulatory acceptance, which in turn shape long-term investment performance. Therefore, I view the selected social dimensions as highly relevant. While they may not be as easily quantifiable as financial metrics, they play a crucial role in assessing long-term viability, resilience, and alignment with responsible investment principles all of which are critical in the maritime sector's decarbonisation journey.
4	In theory - yes, in practice - no. In pursuit of "diversity" firms are forced to seek artificial ratios by sacrificing real quality. Virtue signaling
5	These are all reasonable considerations that are expected outcomes of benign management in a well-governed stable enterprise investing in it's future development and growth.
6	Yes, the defined social dimensions are relevant for evaluating investment attractiveness. Factors like labor practices, human rights, and community engagement increasingly impact reputation, regulatory risk, and long-term viability—especially in sectors like O&G. As investor focus shifts toward ESG performance, these indicators play a growing role in shaping risk perception and stakeholder confidence, aligning with emerging sustainability frameworks and studies like Papoutsi (2018).
7	Yes, it is important specifically related to the reputation and how stakeholders precive the compnay and the investments.

8	the selected social dimensions are relevant and increasingly influential in investment attractiveness assessments, particularly in light of evolving stakeholder expectations and ESG integration. However, their effectiveness depends on sector relevance, quality of data, and integration into a broader analytical framework.
9	Yes!
10	Yes- generally firms that look after workforce seem to thrive; or is it the other way around?
11	No, not all as social dimension applicable in corporate world as some are considered as outdated concepts adding no value to monetary revenue generation - prime reason for a profit-making organisation. Employee diversity, suppliers code of conduct, source responsibly and community support activities are probably the dimensions which seem to be less priority if at all.
12	Overall, social dimensions play a significant role in investment as they both elaborate the operational success and a long term sustainability.
13	The established social dimensions serve as relevant criteria in determining the appeal of investments. Social-related aspects such as labour practices and human rights, together with community involvement, now heavily influence reputational standing and regulatory exposure while determining long-term survival prospects for businesses within the O&G industry. The transition of investor attention toward ESG performance results in these indicators having an increased influence on risk perception and stakeholder confidence, which matches new sustainability frameworks and research (Papoutsi, 2018).
14	yes
15	Social dimensions are increasingly relevant in evaluating Investment Attractiveness, especially in today's environment. While traditionally these decisions were mainly focused on financial metrics, social factors can significantly impact a company reputation, regulatory risk and long-term value. They add valuable insight for investors.
16	I think these indicators have a big impact.
17	Yes, I agree
18	Yes, all financial aspects are relevant to assessing investment attractiveness
19	Yes
20	It doesn't matter as much for the price of the stock, but it matters when it comes to regulation. If the company I am investing in is not socially responsible, then there may be some issues with Governmental Regulation, which can lead to a drop in the stock price.
21	Yes, all the listed social indicators are important for evaluating investment attractiveness, as they directly impact long-term benefits and reputation. Health and safety programs, diversity support, ethical sourcing practices, and employee engagement help mitigate risks, strengthen the brand, and improve financial performance. Firms that actively invest in social sustainability are more resilient in times of crisis, attract investors, and demonstrate higher long-term profitability due to strong relationships with employees, customers, and the community.
22	Yes, all these social dimensions are relevant.
23	Seems so, but again there may be other indicators from the available data or literature
24	Yes
25	Somewhat not necessary

26	Employee health and safety programs. Employee training and development Employee engagement Community support activities
27	Some of these dimensions are described quite generally (train and educate employees, engage, commit etc.) and difficult to measure. In general these dimensions are relevant, especially for green and responsible investments. Some investors can be more, less or not interested in the social dimensions of their investments, thus the weight of these dimensions depends on an investor.
28	yes
29	Yes especially when acquiring a business these metrics allow the investor to compare various firms even when the firms are not in the same sphere.
30	In my opinion the selected social indicators are relevant and significant in assessing investment attractiveness as play vital role in success of the businesses
31	Yes, the social dimensions are relevant, as they reflect key factors in sustainability reporting and investor decision-making.
32	Yes
33	I don't think these dimensions offer any edge in identifying attractive investment opportunities. The social disclosures and reporting frameworks are relatively immature in comparison to accounting standards and the high subjectivity make inference or extrapolation a challenge. Metrics such as employee turnover could offer some degree of insight into the ability of the company to be true to its word and do the right thing by its people but this helps provide colour, no necessarily identify alpha. These are hygiene factors an investor expects the company to manage.
34	Yes, I believe that employee health and safety programs, as well as training and development initiatives, are relevant for evaluating investment attractiveness.
35	Personally, I see the listed financial indicators as a reflection of how well-documented and structured the company is, and what stage of development it is currently in. The provided set of metrics mostly reflects the company's maturity. And yes, it adds weight to the overall assessment, showing that significant work has been done to systematize the business.
36	I think all dimensions are relevant for the evaluation of Investment Attractiveness
37	Yes
38	Not really, I think it would be smarter to group the Social dimensions into employee-relevant topics (as training, health at the workplace or inter community life) and social environment topics (as e.g social benefits or effects of action)
39	Employee Health and Safety Programs Employee Training and Development Employee Engagement Community Support Activities
40	I believe that the following indicators are important for assessing investment attractiveness: employee health and safety programs, promotion of workforce diversity, and respect for human rights and community engagement. These factors reflect a company's commitment to social responsibility and contribute to its long-term sustainability and reputational strength, which are increasingly valued by socially conscious investors.

41	This dimension is defiantly relevant for long term investments and is much less of importance for short term investments.
42	Yes, I agree. I believe that certain social indicators are relevant for assessing investment attractiveness. These factors can significantly influence a company's reputation, operational stability, and long-term value, making them important considerations for investors.

4. In your opinion, are the Environmental dimensions as defined all relevant for the evaluation of Investment Attractiveness?

Respondent	Review of responses
1	The environmental dimensions are relevant for the evaluation of Investment Attractiveness.
2	Yes. Due to climate change, the environmental factor has a great influence on the decision in the investment sector.
3	Yes, the environmental dimensions such as carbon emissions, energy efficiency, and biodiversity protection are not only relevant but increasingly essential in evaluating investment attractiveness, particularly in the maritime sector. Environmental performance is now a critical factor in both regulatory compliance and investor confidence. At maritime, environmental performance is a central aspect of our risk-based assurance and classification approach. We see growing demand from clients and stakeholders to demonstrate measurable environmental improvements not just for compliance, but also to unlock green financing, meet investor ESG criteria, and support long-term competitiveness. In this context, environmental dimensions are strategic investment criteria. They shape access to capital, market positioning, and operational viability. As such, I view them as entirely relevant and increasingly integral to investment decision-making in maritime and adjacent sectors.
4	Depends on country. In the “global West”, these metrics are relevant as they could be potential Indicators of Compliance levels. At the same time, these segments usually mean high compliance costs which firms have to factor in order to achieve compliance. Higher costs impact investment return on equity. A lot of investors choose markets/segments in less ESG strict zones
5	The majority of these metrics will also have a positive impact on the bottom line and public perception. e.g. it is much easier to not have an oil spill and thereby avoid the cost of clean-up and compensation and the negative media coverage. Insofar as fewer inputs do not lead to reduced output value, this is not a change to the profit-driven motivation of the private sector.
6	Yes, the defined environmental dimensions are relevant for evaluating investment attractiveness. Metrics like carbon emissions, energy efficiency, and biodiversity protection directly affect regulatory compliance, operational risk, and access to capital. As environmental performance becomes a key concern for investors and regulators, especially in high-impact sectors like O&G, these indicators are essential for a comprehensive risk and opportunity assessment.
7	Yes, all relevant, specifically for Lifestyle analysis.

8	the environmental dimensions defined in the study are highly relevant for evaluating investment attractiveness, especially as global finance continues to align with climate goals and sustainability imperatives. However, their interpretation and weight in investment analysis should be contextual, sector-sensitive, and paired with reliable data sources.
9	Yes.
10	Yes, but only at the margin
11	Again, it is probably not all as meeting these criteria would only be possible when they do not distort profits. Reducing materials consumption may have adverse impact on supply chain management for example, whereas reducing emissions often pose risks for efficient operations management.
12	Yes,it’s quite relevant as many investors do prioritise sustainability.where often involves energy efficient buildings ,heating/cooling systems and waste management on one hand and reducing operational cost on the other.
13	The identified environmental dimensions serve as relevant criteria for assessing investment appeal. Regulatory compliance, along with operational risk and access to capital, are directly influenced by metrics related to carbon emissions, energy efficiency and biodiversity protection. Environmental performance has become critical for investors and regulators in sectors like O&G, which makes these indicators fundamental for full risk and opportunity evaluations.
14	yes
15	Environmental dimensions are crucial in evaluating Investment Attractiveness, because they directly affect a company's future costs, profitability, long term sustainability. Environmental performance is a strategic advantage that affects risk, reputation and all key drivers of investment attractiveness.
16	In my opinion, points 1,2,3,4,5,12,17,19,22 are the most important.
17	All indicators are important
18	I think everything is important
19	They are partially relevant mainly because of Government restrictions.
20	To me, it doesn't matter at all.
21	Yes, the environmental dimensions are highly relevant for evaluating investment attractiveness. Reducing carbon footprint, energy consumption, and waste not only enhances a company's reputation but also leads to long-term business benefits. Firms with strong environmental practices reduce costs, ensure regulatory compliance, and build investor confidence. This creates a competitive advantage and supports sustainable growth, making these metrics crucial for investors.
22	Yes, all these environmental dimensions are relevant.
23	As above interesting indicators are there more?
24	Ideally yes
25	Nowadays yes

26	Reducing greenhouse gas emissions Reduction of emissions of other gases Oil spill response Reducing waste generation Reduced packaging usage Waste recycling Use of alternative modes of transport (using alternative fuels) Certification according to ISO 14001 standard Cooperation with suppliers Sustainable procurement
27	In general, the environment dimensions are relevant from the environment responsibility viewpoint (their weight can depend on an investor) and from the regulatory reporting and compliance viewpoint. The latter can depend on the investor's jurisdiction and industry type (bank, insurance comp., pension fund, hedge fund etc.). The dimensions can be viewed by the investor on an investment portfolio basis, i.e. some portfolio components may be greener than the other ones. Some of these indicators may be redundant (strongly correlated), like carbon footprint, GHG emissions, fuel consumption etc. Some of the indicators are not clearly described, like ""collaborate with the suppliers", "reduce fuel consumption": w.r.t. what, per which unit (e.g. per earned Euro, per ton of the output etc), by how much, within which timeframe? You can check the ESG regulation of the EU, for instance, and see the requirements and the used dimensions.
28	depending on the industry some might not be applicable - e.g. LCA in case of Software providers
29	In my opinion the Environmental components are important but only for certain types of acquisitions. They are more relevant in certain regions where environmental laws and regulations would impact business operations.
30	Yes, in the current Ecology climate it is very important to include in evaluation of investment the environmental factors as they play significant role in investment analysis
31	Yes, the environmental dimensions are relevant.
32	Yes
33	The infrastructure behind environmental reporting (in Europe and the UK at least) remains in its infancy. While clearly important for the energy transition, the recent withdrawal of major banking institutions and investment firms from climate pledges suggests this is not a critical determinant for investors. There are not enough opportunities to fulfil the needs of the vast amount of global capital.
34	Yes, I believe that waste reduction, recycling, and resource reuse are important for investment decision-making.
35	This is strictly my personal opinion. The environmental agenda is more of a political trend driven by European policy that has deeply integrated into large businesses. In my view, if a company is financially attractive, the environmental aspect can be overlooked. Personally, I don’t see it as something particularly important — perhaps it is somewhat relevant for large corporations, where the eco-agenda is more of a PR tool than a core priority.
36	I think all Environmental dimensions as defined are relevant
37	Yes, well defined

38	yes, these points are pretty much the most important ones considering environmental effects. But it should be clear that the inner contradiction between the reduction of emissions and the work as a oil company for example, is a big topic. Also worth a mentioning is the fact that most of the points are impairing the financial dimensions.
39	Yes, environmental aspects are important for investment decisions Reducing Greenhouse Gas Emissions Oil Spill Response Waste Recycling Resource Reuse ISO 14001 Certification Collaboration with suppliers Sustainable procurement
40	I believe that the following indicators are important for assessing investment attractiveness: emissions levels, reduction in resource consumption, reduction in energy usage, utilization of environmentally friendly materials, the location of the investment object in an ecologically clean area, and supplier sustainability assessments. These environmental factors play a critical role in evaluating the long-term viability and ecological responsibility of an investment, aligning with the growing emphasis on environmental, social, and governance (ESG) criteria in investment analysis.
41	This greatly depends on a market where company operates and country where the main production cycle is performed
42	Yes, I do believe that certain environmental indicators are highly relevant for assessing investment attractiveness. In particular, waste reduction, waste recycling, and resource reuse are critically important for investment decisions, especially in the current context. These practices demonstrate a company's commitment to sustainability, operational efficiency, and long-term environmental responsibility, all of which are increasingly valued by investors.

5. Do you feel that the criteria applied for each of the dimensions of Triple Bottom Line are relevant and adequately represent the dimension of Investment Attractiveness as defined?

Respondent	Review of responses
1	I think the criteria for each of the dimensions to TBL are relevant.
2	I think yes
3	Yes, overall the criteria under each TBL dimension appear relevant in reflecting investment attractiveness. The financial indicators provide a strong foundation for risk and return analysis. The social and environmental dimensions are increasingly important, particularly in the maritime sector, where factors like crew welfare, regulatory compliance, and decarbonisation have direct financial and operational implications. That said, the model would benefit from flexibility to adapt weightings based on sector-specific contexts. For instance, environmental performance carries more strategic weight in maritime investment decisions today due to emerging fuel technologies and various regulations.

4	It would be useful to specify regions. In EU/Central Asia (e.g. Singapore) this would be relevant. If we take, BRICS for example, some ESG metrics are not value adding. Post Trump election in the Us, the direction of travel is reduction in ESG requirements, so a lot of firms will no longer pursue these segments, but may still remain attractive investments opportunities
5	The principles outlined are all valid. More detailed consideration could consider the extent to which individual items are co-dependent. For example reduced use of resources (13) can be expected to lead to reduced use of energy (14) and so an effect may be overweighted through the direction of several linked indicators. The same logic applies to the people element. engagement with employees and training and education of employees work together, with other factors. It would be interesting to see a set of stochastic metrics.
6	Yes, the criteria applied under each TBL dimension appear relevant and adequately represent investment attractiveness. The financial, social, and environmental indicators are well-aligned with established frameworks and reflect both current performance and future risks. By incorporating diverse yet targeted metrics, the model captures a holistic view of a company's long-term value and resilience, supporting the internal coherence and practical applicability of the scoring system.
7	Yes
8	the criteria applied under each TBL dimension appear relevant and adequate in representing investment attractiveness, assuming they are appropriately selected, sector-sensitive, and methodologically robust. The model offers internal coherence as long as it clearly defines the rationale for inclusion, ensures indicator validity, and considers the evolving landscape of investor expectations.
9	Yes, definitely.
10	It's somewhat complex and needs to be simplified
11	No, some are relevant, some appear not.
12	Each dimensions of TBL are highly important and represent different aspects for example the growing focus on sustainability and investing.
13	The criteria established for each TBL dimension demonstrate relevance and effectively represent investment attractiveness. The indicators for financial performance, social responsibility, and environmental impact align perfectly with established benchmarks while showcasing present capabilities and potential future challenges. The model integrates different targeted metrics to achieve a complete perspective on a company's enduring value and strength, which helps maintain the scoring system's internal consistency and practical use.
14	yes
15	The model covers very comprehensive criteria for assessment required. The dimensions of TBL are designed to represent key aspects of investment attractiveness: types of risks, opportunity, performance, forward looking. The criteria is relevant and representative.
16	yes, I agree.
17	No additions
18	no additions
19	First of all, it depends on the country where the investment takes place.
20	It may be a good model for institutional investment agencies, but not so good for a retail investor.

21	Yes, the criteria for each Triple Bottom Line dimension are relevant and accurately reflect investment attractiveness. The economic criteria focus on profitability and risk management, the environmental criteria address sustainability and regulatory compliance, and the social criteria consider reputation and long-term stability. Together, these criteria provide a comprehensive view of a company's overall investment potential.
22	I think that the criteria applied for each of the dimensions of TBL are relevant and adequately represent the dimension of Investment Attractiveness.
23	It would depend on the data
24	Yes
25	In response to above most of it
26	This assessment system allows the company to work towards a sustainable social policy, employee development, and the promotion of sustainable business practices.
27	In general the proposed dimensions/indicators are relevant for the three areas (financial, social and environmental). They should beclearly defined and the scoring system should be calibrated. The weights of different indicators may depend on an investor and should be adjustable by the investor.
28	yes, but the impact on the market needs to be proven
29	yes
30	Yes, I believe that the criteria applied for each dimensions of TBL is accurate and adequately represent dimensions of Investment Attractiveness
31	Yes, the criteria for each dimension are appropriate and effectively reflect the concept of investment attractiveness, ensuring the model's internal consistency.
32	Yes
33	Yes
34	Yes, I believe the stated criteria adequately reflect investment attractiveness.
35	Overall, the criteria for each of the three components look logical and well-structured. It's clear that the approach is comprehensive and goes beyond just finance. But to be honest, for me personally, finance still plays the main role. The rest depends on the context — PR, sustainability, regulation. So yes, the criteria are adequate, but the actual impact they have is still an open question.
36	Yes, I do
37	Yes
38	surely they are, but it should be consider that Investments are still done to generate profits and shareholder-value. So the financial dimensions could be more important than others.
39	This assessment system allows the company to work towards sustainable social policy, employee development, safety and health, and the promotion of sustainable business practices.
40	I believe that the following indicators are important for assessing investment attractiveness: emissions levels, reduction in resource consumption, reduction in energy usage, utilization of environmentally friendly materials, the location of the investment object in an ecologically clean area, and supplier sustainability assessments. These environmental factors play a critical role in evaluating the long-term viability and ecological responsibility of an investment, aligning with the growing emphasis on environmental, social, and governance (ESG) criteria in investment analysis.
41	I wouldn't know

42	Yes, I do. I believe that the criteria applied to each of the three components of the Triple Bottom Line model are relevant and adequately reflect investment attractiveness. They provide a well-rounded assessment by incorporating economic, social, and environmental dimensions, which aligns with the evolving expectations of investors and stakeholders in today's market.

6. Do you feel that any important criteria related to Investment Attractiveness have been omitted (e.g. governance, innovation, geopolitical risk)? (Optional)

Respondent	Review of responses
1	I don't think that any important criteria related to Investment Attractiveness have been omitted.
2	It's quite possible. The world is changing very quickly.
3	Yes, while the Triple Bottom Line model provides a strong foundation, I believe a few critical areas could enhance its comprehensiveness and real-world applicability in evaluating investment attractiveness, particularly in complex, global sectors such as maritime. Governance - Strong corporate governance is a key determinant of long-term resilience and investor confidence. This includes transparency, ethical leadership, board diversity, and risk management maturity all of which influence how effectively an organisation can deliver on its financial, social, and environmental commitments. Weak governance can undermine performance across all TBL dimensions. Innovation and Technological Readiness - In sectors undergoing transition, like maritime, the ability to innovate is a major driver of attractiveness. Investments in low/zero-emission technology, digitalisation, and operational efficiency are central to future competitiveness. A company's capacity to adapt or lead in innovation could arguably be a fourth pillar in assessing investment potential. Geopolitical and Regulatory Risk - These factors are particularly relevant in maritime, given its global operations, exposure to regional regulation (e.g. EU ETS, IMO compliance), and vulnerability to trade disruptions. Ignoring these external risks can lead to underestimating potential volatility and mispricing of investment risk.
4	Geopolitical risk and cyber ris are very important. Do we know how good the Technology is of the company? Can AI break them down? You can have the most competitive product on the market, but if hackers can take you down, return on equity could be rather grim
5	Governance, innovation and geopolitical risk are essential considerations for any investor and cannot be excluded from an investment decisions. On innovation, how many patent applications has the company made in the last period? what new or enhanced products are coming to market? what markets can the company efficiently distribute to? Geopolitical risk is currently higher than any time since the end of the Cold War. The post-war consensus is under significant threat and that may lead to sudden and dramatic changes in trading patterns and access to resources. More risk averse investors are likely to adjust thinking around the geopolitical situation.

6	Yes, a few important criteria could be considered for inclusion. Governance is a critical factor—transparency, board structure, and ethical conduct significantly impact investor trust and risk management. Innovation is also key, especially in sectors undergoing transition like O&G, where adaptability drives long-term competitiveness. Additionally, geopolitical and regulatory risks can materially affect investment outcomes, particularly for global operations. Including these elements would strengthen the model's robustness and align it more closely with the multidimensional nature of investment decision-making.
7	No, government and geopolitical are part of the risk and should be identified and analysed as risk category rather than investment criteria.
8	While the TBL framework captures many core sustainability-linked aspects of investment attractiveness, it does omit critical dimensions such as governance, innovation, and external risk factors, which are highly material to investors. To close these methodological gaps, it would be beneficial to integrate selected elements from ESG, strategic management, and risk analysis frameworks for a more comprehensive evaluation.
9	No, It is a relevant measurement for determining the investment attractiveness.
10	yes- governance very important, and geopolitics, and national tax-raising needs
11	Yes, governance in particular.
12	
13	A limited number of crucial criteria are suitable for inclusion. Effective governance through transparent board structures and ethical behaviour plays a pivotal role in sustaining investor trust and managing risks. Innovation functions as a crucial component in rapidly changing sectors such as O&G because adaptability establishes the foundation for sustained competitive advantage. Global operations face substantial investment impacts due to geopolitical and regulatory risks. By incorporating these elements, the model would improve its robustness and better reflect the complex nature of investment decision-making processes.
14	
15	No, nothing has been omitted. The social and environment criteria cover these dimensions. Annual report can provide any additional info for investors (governance, and others).
16	No, I don't think so
17	
18	no additions
19	Yes, geopolitical is missing.
20	
21	Innovation: Innovation drives long-term growth and competitiveness. Firms investing in R&D and adapting to market trends are better positioned for sustained profitability. Innovation helps firms stay ahead in the market, making it an important factor for investors. Geopolitical and Regulatory Risk: Political instability and regulatory changes can significantly impact a company's performance, especially in global operations. Accounting for these risks allows investors to assess potential challenges and mitigate exposure to unexpected issues.

22	I think that all important criteria related to Investment Attractiveness have been used in this research.
23	I am not an expert but the indicators seem sound in a multi dimensional model. There may be more predictive variables discoverable through research or data analytics
24	Innovation
25	Geopolitical risk
26	The management criterion assessment helps to analyze forecasting, planning, organization of work in the company, motivation of employees and control of the company's activities
27	The candidate investment industry and geography may be relevant. The size and track record can be also relevant, like value, growth, venture capital investments etc.
28	
29	no
30	I believe that selected criteria is sufficient for assessing Investment attractiveness and the other factors can be omitted
31	
32	These indicators will reflect real world investment assessment so I would agree that these should be considered.
33	
34	Yes, to some extent there is an omission, as government and administrative bodies, armed conflicts, and natural disasters are often key factors.
35	Yes, something is definitely missing. For example, the founder's current reputation — that's a whole separate layer you can't capture with any metrics. Geopolitics is also a significant factor, especially if the company operates in countries with unstable conditions. Innovation? Yes, it matters, but it really depends on the company's stage. So yes, some additional criteria could be included — especially those that directly influence perception and risk.
36	Yes, I do
37	I would include innovation. G is usually addressed
38	i think that regarding governmental structures all dimensions mentioned have to be synergistic with the government because it builds restrictions and possibilities for the firms.
39	Evaluation of management criteria will help to analyze forecasting, planning, organization of work in the company, motivation of employees, and control of the company's activities.
40	
41	
42	Yes, I do. I believe that important criteria such as political decisions and natural disasters can significantly impact investment attractiveness and should be considered in the evaluation model. These external factors can introduce substantial risks and uncertainties, and their inclusion would enhance the model's comprehensiveness and robustness.

7. Do you have any other comments? (Optional)

Respondent	Review of responses
1	No comments
2	

3	The proposed framework shows strong potential to address the growing demand for a more integrated, sustainability-led approach to investment evaluation. The incorporation of the Triple Bottom Line is particularly relevant for sectors like maritime, where decarbonisation, digitalisation, and social responsibility are reshaping investment priorities.
4	Would be interesting to consider tokenization of real world assets as a segment. It is emerging solution, but it may be another item on the scorecard in the future
5	Investment decisions are driven by many factors but it is necessary to remember the role of human risk perception and aversion. The current US President has changed the world in several areas - one being diversity. Federal employees in this kind of work have been terminated and suppliers to the US Govt are under pressure to close DE&I programmes. This kind of dramatic change will have consequences for some years.
6	One recommendation is to ensure the scoring system remains adaptable across industries and evolving ESG standards. While the TBL framework is comprehensive, sector-specific weighting (e.g., stronger emphasis on environmental risk in O&G) could enhance precision. Also, consider integrating stakeholder feedback or market sentiment analysis to capture qualitative factors that influence investment decisions but may not be fully reflected in static metrics. Overall, the approach is solid, but ongoing refinement based on real-world application and investor input will strengthen its relevance and usability.
7	Tbl engages the stakeholders rather than shareholders and make all stakeholders responsible for the outcome of investment rather than simply focucing on the monetary gains.
8	None.
9	
10	No
11	Completed this survey require some knowledge of what determines attractiveness of investment, some terms may look complex for a non-specialist. I was luck to have a briefing on this research last year to fully understand the rationale. Also, financial performance measurements remain the key, with social and environmental added to satisfy the emerging trends in what appears to have little value to shareholders who are primarily concerned with dividend earnings. Thank you.
12	
13	Investment attractiveness scores should clearly show the impact of each metric through transparent weighting and scoring methods to build trust and usability among users. Testing the model against actual case studies and historical datasets can demonstrate its predictive accuracy. The investment model will maintain its relevance and practicality through time as the evolution of ESG standards and investor priorities occurs by incorporating flexibility to allow periodic updates.
14	
15	no
16	no comments
17	
18	
19	As I mentioned earlier, profitability is not always eco-friendly
20	

21	An important point is the need to continuously adapt the criteria for evaluating investment attractiveness. As markets, regulations, and investor priorities change, the metrics in the scoring system should evolve. Including emerging trends like technological innovation and cybersecurity can help ensure the model stays resilient to future changes. Gathering feedback from stakeholders will also help refine the tool and keep it relevant over time.
22	It looks like a very interesting and solid research.
23	
24	No
25	None
26	I would like to note the important role of human resource management strategies, such as administrative, managerial, economic, and psycho-emotional. Human resource management includes: workforce planning, skill acquisition, efficiency, training, and development. All this is necessary to understand and ensure that the right people with the necessary skills and capabilities are in the workplace. A lot, of course, depends on HR and plays an important role in ensuring the effectiveness and results of the company.
27	Success with your model development and tuning!
28	
29	no
30	No other comments
31	
32	I think the questionnaire is well designed however I am not an investment expert so my answers may not provide the depth required to support your research.
33	
34	
35	Not really a comment, more of an observation — in reality, many investment decisions aren't made based on models at all. They're often driven by context, personality, risk, and that same "gut feeling." A model is great for structuring things, but I wouldn't overestimate it as a universal tool. Its strength is in helping organize the picture, but in real life, a lot of decisions come down to things you just can't measure. So yes, the model is useful, but there always has to be room for common sense and the "here and now." Let me give a real-life example. The founder of a large grocery retail chain in Russia invested — and continues to invest — in a non-profit elder care project without any pitch deck or paperwork. Just because he personally believed in the idea, and a woman approached him who had deeply studied the topic and was adapting the franchise model from a well-known European company. Right time, right place, shared values. They shook hands — that was it.
36	
37	
38	

39	As an addition, I would like to point out the particularly important role of the human resource management strategy, namely: administrative, economic and psychosocial. Human resource management includes key components: workforce planning, talent acquisition and retention, performance management, and training and development, which are necessary to ensure that your workplace has the right people with the right skills. The HR deployment strategy is also crucial to ensure that HR resources are used effectively and efficiently.
40	
41	
42	

Appendix IV. Thematic Coding Results (NVivo)

1. Suggestions for Improving the Model

Files\\Questions (2) - § 8 references coded [6.04% Coverage]

Reference 1 - 0.44% Coverage

The value of the model depends on the investment objectives of the investors. It is much more common now to emphasise the importance of non-financial indicators and the ESG environment, but often that is in addition to expectations on financial returns.

Reference 2 - 0.38% Coverage

TBL can be a useful supplementary framework when assessing investment attractiveness, but it is not fully sufficient on its own.
TBL is valuable as a lens but should be combined with traditional financial analysis.

Reference 3 - 1.20% Coverage

The Triple Bottom Line (TBL) model serves as an appropriate tool for evaluating investment potential, particularly in the evolving O&G sector. Even though financial measures continue to take precedence, TBL integrates environmental and social aspects to deliver a wider perspective over the long horizon. The growing impact of sustainability factors on risk assessment, regulatory requirements and stakeholder expectations makes this especially significant. The Triple Bottom Line model enhances traditional financial analysis methods through its ability to measure non-financial value components, and it integrates with structures such as the Balanced Scorecard.

Reference 4 - 0.21% Coverage

TBL model is a new tool for assessing Investment Attractiveness of the company, that provides very accurate results.

Reference 5 - 2.02% Coverage

Yes, the Triple Bottom Line (TBL) model can be considered suitable for determining investment attractiveness, especially from a long-term perspective.

Unlike traditional financial models that focus primarily on short-term profitability, the TBL framework evaluates a company across three dimensions: economic performance, social responsibility, and environmental sustainability. This broader approach allows investors to assess not only the current financial health of a business but also its resilience, ethical standards, and environmental impact — all of which are increasingly relevant to stakeholders.

Firms that integrate TBL principles often build stronger reputations, attract responsible investors, and are better positioned to adapt to regulatory changes or shifting consumer expectations. In sectors like oil and gas, where environmental and social risks are high, the TBL model provides a more comprehensive view of future viability. Therefore, while it may not replace traditional valuation models, it serves as a valuable complement for assessing long-term investment potential and corporate reputation.

Reference 6 - 0.52% Coverage

I agree that the financial indicators named in the Rationale above are quite relevant for the determination of investment attractiveness. I am not familiar with the TBL model, but based on the provided rationale, it must be a promising candidate model for an investment attractiveness assessment.

Reference 7 - 0.47% Coverage

I think it depends on the type of investment; if one is considering purchasing a business I think using Triple Bottom Line model is appropriate; however if one is making an asset purchase or a minority passive investment the Triple Bottom Line model may not be as relevant.

Reference 8 - 0.81% Coverage

I deem it a suitable model to be used in conjunction with a plethora of other analytical tools and methods. Investment attractiveness at a point in time from a macro perspective is often driven by asset allocation and the broad economic backdrop that propels growth. The triple bottom line provides a useful tool to benchmark performance when evaluating peer group performance but is of limited use on a prospective basis to ascertain superior cash flows generation.

Files\\Questions (3) - § 23 references coded [10.71% Coverage]

Reference 1 - 0.62% Coverage

The proposed framework shows strong potential to address the growing demand for a more integrated, sustainability-led approach to investment evaluation. The incorporation of the Triple Bottom Line is particularly relevant for sectors like maritime, where decarbonisation, digitalisation, and social responsibility are reshaping investment priorities.

Reference 2 - 0.27% Coverage

Would be interesting to consider tokenization of real world assets as a segment. It is emerging solution, but it may be another item on the scorecard in the future

Reference 3 - 0.90% Coverage

The principles outlined are all valid. More detailed consideration could consider the extent to which individual items are co-dependent. For example reduced use of resources (13) can be expected to lead to reduced use of energy (14) and so an effect may be overweighted through the direction of several linked indicators.

The same logic applies to the people element. engagement with employees and training and education of employees work together, with other factors. It would be interesting to see a set of stochastic metrics.

Reference 3 - 0.90% Coverage

The principles outlined are all valid. More detailed consideration could consider the extent to which individual items are co-dependent. For example reduced use of resources (13) can be expected to lead to reduced use of energy (14) and so an effect may be overweighted through the direction of several linked indicators.

The same logic applies to the people element. engagement with employees and training and education of employees work together, with other factors. It would be interesting to see a set of stochastic metrics.

Reference 4 - 1.12% Coverage

Governance, innovation and geopolitical risk are essential considerations for any investor and cannot be excluded from an investment decision.

On innovation, how many patent applications has the company made in the last period? what new or enhanced products are coming to market? what markets can the company efficiently distribute to?

Geopolitical risk is currently higher than any time since the end of the Cold War. The post-war consensus is under significant threat and that may lead to sudden and dramatic changes in trading patterns and access to resources. More risk averse investors are likely to adjust thinking around the geopolitical situation.

Reference 5 - 0.70% Coverage

Investment decisions are driven by many factors but it is necessary to remember the role of human risk perception and aversion. The current US President has changed the world in several areas - one being diversity. Federal employees in this kind of work have been terminated and suppliers to the US Govt are under pressure to close DE&I programmes. This kind of dramatic change will have consequences for some years.

Reference 6 - 0.85% Coverage

Yes, the criteria applied under each TBL dimension appear relevant and adequately represent investment attractiveness. The financial, social, and environmental indicators are

well-aligned with established frameworks and reflect both current performance and future risks. By incorporating diverse yet targeted metrics, the model captures a holistic view of a company's long-term value and resilience, supporting the internal coherence and practical applicability of the scoring system.

Reference 7 - 1.09% Coverage

Yes, a few important criteria could be considered for inclusion. Governance is a critical factor—transparency, board structure, and ethical conduct significantly impact investor trust and risk management. Innovation is also key, especially in sectors undergoing transition like O&G, where adaptability drives long-term competitiveness. Additionally, geopolitical and regulatory risks can materially affect investment outcomes, particularly for global operations. Including these elements would strengthen the model's robustness and align it more closely with the multidimensional nature of investment decision-making.

Reference 8 - 1.06% Coverage

One recommendation is to ensure the scoring system remains adaptable across industries and evolving ESG standards. While the TBL framework is comprehensive, sector-specific weighting (e.g., stronger emphasis on environmental risk in O&G) could enhance precision. Also, consider integrating stakeholder feedback or market sentiment analysis to capture qualitative factors that influence investment decisions but may not be fully reflected in static metrics. Overall, the approach is solid, but ongoing refinement based on real-world application and investor input will strengthen its relevance and usability.

Reference 9 - 0.30% Coverage

TBL engages the stakeholders rather than shareholders and make all stakeholders responsible for the outcome of investment rather than simply focusing on the monetary gains.

Reference 10 - 0.08% Coverage

It's somewhat complex and needs to be simplified

Reference 11 - 0.14% Coverage

yes- governance very important, and geopolitics, and national tax-raising needs

Reference 12 - 0.05% Coverage

Yes, governance in particular.

Reference 13 - 0.84% Coverage

Investment attractiveness scores should clearly show the impact of each metric through transparent weighting and scoring methods to build trust and usability among users. Testing the model against actual case studies and historical datasets can demonstrate its predictive accuracy. The investment model will maintain its relevance and practicality through time as the evolution of ESG standards and investor priorities occurs by incorporating flexibility to allow periodic updates.

Reference 14 - 0.12% Coverage

First of all, it depends on the country where the investment takes place.

Reference 15 - 0.05% Coverage

Yes, geopolitical is missing.

Reference 16 - 0.77% Coverage

An important point is the need to continuously adapt the criteria for evaluating investment attractiveness. As markets, regulations, and investor priorities change, the metrics in the scoring system should evolve. Including emerging trends like technological innovation and cybersecurity can help ensure the model stays resilient to future changes. Gathering feedback from stakeholders will also help refine the tool and keep it relevant over time.

Reference 17 - 0.04% Coverage

It would depend on the data

Reference 18 - 0.05% Coverage

In response to above most of it

Reference 19 - 0.03% Coverage

Geopolitical risk

Reference 20 - 0.09% Coverage

I would include innovation. G is usually addressed

Reference 21 - 0.31% Coverage

surely they are, but it should be considert that Investments are still done to generate profits and shareholder-value. So the financial dimensions could be more important than others.

Reference 22 - 0.31% Coverage

Evaluation of management criteria will help to analyze forecasting, planning, organization of work in the company, motivation of employees, and control of the company's activities.

Reference 23 - 0.92% Coverage

As an addition, I would like to point out the particularly important role of the human resource management strategy, namely: administrative, economic and psychosocial. Human resource management includes key components: workforce planning, talent acquisition and retention, performance management, and training and development, which are necessary to ensure that your workplace has the right people with the right skills. The HR deployment strategy is also crucial to ensure that HR resources are used effectively and efficiently.

2. Respondent's Attitude Toward TBL Model

Files\\Questions (2) - § 22 references coded [7.04% Coverage]

Reference 1 - 0.19% Coverage

Yes, I think the Triple Bottom Line model is suitable for the determination of Investment Attractiveness.

Reference 2 - 0.02% Coverage

Yes , I agree.

Reference 3 - 2.29% Coverage

From the perspective of a Strategic Business Analyst working within maritime sector, I consider the Triple Bottom Line (TBL) model not only suitable but increasingly essential in determining investment attractiveness particularly in the context of the industry's decarbonisation agenda.

Investments in alternative fuel vessels such as LNG, methanol, ammonia, or hydrogen-powered ships are no longer evaluated purely on financial return metrics, but also on their long-term environmental and societal impact.

The TBL framework enables a more comprehensive assessment of such investments, accounting not only for capital efficiency and lifecycle cost, but also for:

- Environmental impact, such as emissions reduction and fuel lifecycle analysis;
- Social considerations, including crew safety, training on new fuel technologies, and the broader contribution to green corridor development and community health.

From maritime standpoint with its role in technical assurance, risk management, and supporting safe innovation the TBL model aligns well with how we assess new technologies and advise stakeholders on sustainable maritime investments. It helps investors and shipowners balance immediate costs with long-term resilience, regulatory compliance, and reputational value.

Reference 4 - 0.95% Coverage

Yes, the Triple Bottom Line (TBL) model is suitable for assessing investment attractiveness, especially in the transitioning O&G sector. While financial indicators remain dominant, TBL adds environmental and social dimensions, offering a broader, long-term view.

This is critical as sustainability factors increasingly influence risk, regulation, and

stakeholder expectations. TBL complements traditional financial models by capturing non-financial drivers of value, aligning with frameworks like the Balanced Scorecard.

Reference 5 - 0.22% Coverage

Yes, energy company consider TBL for investment decisions making such as investing in projects to increase sustainability.

Reference 6 - 0.06% Coverage

Yes, as long as it is put in context.

Reference 7 - 0.56% Coverage

Absolutely, TBL model is no doubt very suitable in terms of evaluation, especially as sustainability becomes one of the main elements in decision making. The overall picture on economic, environmental and social characteristics can help with both short term financial goals and long term sustainability objectives.

Reference 8 - 0.02% Coverage

Yes, I agree.

Reference 9 - 0.01% Coverage

Yes

Reference 10 - 0.01% Coverage

yes

Reference 11 - 0.28% Coverage

Yes, it certainly increases external investment attractiveness, boosts sales from ESG-interested customers, and gains long-term operational efficiencies.

Reference 12 - 0.01% Coverage

Yes

Reference 13 - 0.01% Coverage

Yes

Reference 14 - 0.27% Coverage

I consider this model to be suitable, as it defines the accounting structure that determines the effectiveness of the company's activities (directions).

Reference 15 - 0.48% Coverage

I consider TBL model suitable as an overall and comprehensive tool for assessing investment attractiveness since it's using not only traditional financial criteria but 2 other important dimensions i.e. social and ecological, for assessing investment attractiveness

Reference 16 - 0.17% Coverage

Yes, I consider the Triple Bottom Line model suitable for evaluating investment attractiveness.

Reference 17 - 0.24% Coverage

Yes, I believe so, as in the current context, economic, environmental, and social factors are of paramount importance in all respects.

Reference 18 - 0.03% Coverage

Yes, I consider

Reference 19 - 0.07% Coverage

Yes, absolutely, if applied properly

Reference 20 - 0.01% Coverage

yes

Reference 21 - 0.25% Coverage

I consider it appropriate because this model defines the accounting structure that determines the efficiency of the company's activities.

Reference 22 - 0.92% Coverage

Yes, I believe that the Triple Bottom Line (TBL) model is generally appropriate for assessing investment attractiveness. By integrating economic, environmental, and social

dimensions, the TBL framework provides a more comprehensive and sustainable perspective on evaluating potential investments. This multidimensional approach allows investors to consider not only financial returns but also the broader impacts of their investments, thereby aligning with the principles of responsible and ethical investing

Files\\Questions (3) - § 54 references coded [20.60% Coverage]

Reference 1 - 0.11% Coverage

I think the criteria for each of the dimensions to TBL are relevant.

Reference 2 - 0.17% Coverage

I don't think that any important criteria related to Investment Attractiveness have been omitted.

Reference 3 - 0.02% Coverage

I think yes

Reference 4 - 1.22% Coverage

Yes, overall the criteria under each TBL dimension appear relevant in reflecting investment attractiveness. The financial indicators provide a strong foundation for risk and return analysis. The social and environmental dimensions are increasingly important, particularly in the maritime sector, where factors like crew welfare, regulatory compliance, and decarbonisation have direct financial and operational implications.

That said, the model would benefit from flexibility to adapt weightings based on sector-specific contexts. For instance, environmental performance carries more strategic weight in maritime investment decisions today due to emerging fuel technologies and various regulations.

Reference 5 - 2.43% Coverage

Yes, while the Triple Bottom Line model provides a strong foundation, I believe a few critical areas could enhance its comprehensiveness and real-world applicability in evaluating investment attractiveness, particularly in complex, global sectors such as maritime.

Governance - Strong corporate governance is a key determinant of long-term resilience and investor confidence. This includes transparency, ethical leadership, board diversity, and risk management maturity all of which influence how effectively an organisation can deliver on its financial, social, and environmental commitments. Weak governance can undermine performance across all TBL dimensions.

Innovation and Technological Readiness - In sectors undergoing transition, like maritime, the ability to innovate is a major driver of attractiveness. Investments in low/zero-emission technology, digitalisation, and operational efficiency are central to future competitiveness. A company's capacity to adapt or lead in innovation could arguably be a fourth pillar in assessing investment potential.

Geopolitical and Regulatory Risk - These factors are particularly relevant in maritime, given its global operations, exposure to regional regulation (e.g. EU ETS, IMO compliance), and vulnerability to trade disruptions. Ignoring these external risks can lead to underestimating potential volatility and mispricing of investment risk.

Reference 6 - 0.62% Coverage

It would be useful to specify regions. In EU/Central Asia (e.g. Singapore) this would be relevant. If we take, BRICS for example, some ESG metrics are not value adding. Post Trump election in the Us, the direction of travel is reduction in ESG requirements, so a lot of firms will no longer pursue these segments, but may still remain attractive investments opportunities

Reference 7 - 0.42% Coverage

Geopolitical risk and cyber ris are very important. Do we know how good the Technology is of the company? Can AI break them down? You can have the most competitive product on the market, but if hackers can take you down, return on equity could be rather grim

Reference 8 - 0.01% Coverage

Yes

Reference 9 - 0.24% Coverage

No, government and geopolitical are part of the risk and should be identified and analysed as risk category rather than investment criteria.

Reference 10 - 0.69% Coverage

the criteria applied under each TBL dimension appear relevant and adequate in representing investment attractiveness, assuming they are appropriately selected, sector-sensitive, and methodologically robust. The model offers internal coherence as long as it clearly defines the rationale for inclusion, ensures indicator validity, and considers the evolving landscape of investor expectations.

Reference 11 - 0.74% Coverage

While the TBL framework captures many core sustainability-linked aspects of investment attractiveness, it does omit critical dimensions such as governance, innovation, and external risk factors, which are highly material to investors. To close these methodological gaps, it would be beneficial to integrate selected elements from ESG, strategic management, and risk analysis frameworks for a more comprehensive evaluation.

Reference 12 - 0.03% Coverage

Yes, definitely.

Reference 13 - 0.14% Coverage

No, It is a relevant measurement for determining the investment attractiveness.

Reference 14 - 0.81% Coverage

Completed this survey require some knowledge of what determines attractiveness of investment, some terms may look complex for a non-specialist. I was luck to have a briefing on this research last year to fully understand the rationale. Also, financial performance measurements remain the key, with social and environmental added to satisfy the emerging trends in what appears to have little value to shareholders who are primarily concerned with dividend earnings. Thank you.

Reference 15 - 0.24% Coverage

Each dimension of TBL are highly important and represent different aspects for example the growing focus on sustainability and investing.

Reference 16 - 0.95% Coverage

Reference 16 - 0.95% Coverage

The criteria established for each TBL dimension demonstrate relevance and effectively represent investment attractiveness. The indicators for financial performance, social responsibility, and environmental impact align perfectly with established benchmarks while showcasing present capabilities and potential future challenges. The model integrates different targeted metrics to achieve a complete perspective on a company's enduring value and strength, which helps maintain the scoring system's internal consistency and practical use.

Reference 17 - 0.01% Coverage

yes

Reference 18 - 0.46% Coverage

The model covers very comprehensive criteria for assessment required. The dimensions of TBL are designed to represent key aspects of investment attractiveness: types of risks, opportunity, performance, forward looking. The criteria is relevant and representative.

Reference 19 - 0.30% Coverage

No, nothing has been omitted. The social and environment criteria cover these dimensions. Annual report can provide any additional info for investors (governance, and others).

Reference 20 - 0.02% Coverage

yes, I agree.

Reference 21 - 0.03% Coverage

No, I don’t think so

Reference 22 - 0.11% Coverage

As I mentioned earlier, profitability is not always eco-friendly

Reference 23 - 0.17% Coverage

It may be a good model for institutional investment agencies, but not so good for a retail investor.

Reference 24 - 0.75% Coverage

Yes, the criteria for each Triple Bottom Line dimension are relevant and accurately reflect investment attractiveness. The economic criteria focus on profitability and risk management, the environmental criteria address sustainability and regulatory compliance, and the social criteria consider reputation and long-term stability. Together, these criteria provide a comprehensive view of a company’s overall investment potential.

Reference 25 - 0.97% Coverage

Innovation: Innovation drives long-term growth and competitiveness. Firms investing in R&D and adapting to market trends are better positioned for sustained profitability. Innovation helps firms stay ahead in the market, making it an important factor for investors.

Geopolitical and Regulatory Risk: Political instability and regulatory changes can significantly impact a company’s performance, especially in global operations. Accounting for these risks allows investors to assess potential challenges and mitigate exposure to unexpected issues.

Reference 26 - 0.26% Coverage

I think that the criteria applied for each of the dimensions of TBL are relevant and adequately represent the dimension of Investment Attractiveness.

Reference 27 - 0.18% Coverage

I think that all important criteria related to Investment Attractiveness have been used in this research.

Reference 28 - 0.09% Coverage

It looks like a very interesting and solid research.

Reference 29 - 0.28% Coverage

I am not an expert but the indicators seem sound in a multi dimensional model. There may be more predictive variables discoverable through research or data analytics

Reference 30 - 0.01% Coverage

Yes

Reference 31 - 0.28% Coverage

This assessment system allows the company to work towards a sustainable social policy, employee development, and the promotion of sustainable business practices.

Reference 32 - 0.31% Coverage

The management criterion assessment helps to analyze forecasting, planning, organization of work in the company, motivation of employees and control of the company’s activities

Reference 33 - 0.88% Coverage

I would like to note the important role of human resource management strategies, such as administrative, managerial, economic, and psycho-emotional. Human resource management includes workforce planning, skill acquisition, efficiency, training, and development. All this is necessary to understand and ensure that the right people with the necessary skills and capabilities are in the workplace. A lot, of course, depends on HR and plays an important role in ensuring the effectiveness and results of the company.

Reference 34 - 0.51% Coverage

In general, the proposed dimensions/indicators are relevant for the three areas (financial, social and environmental). They should be clearly defined and the scoring system should be calibrated. The weights of different indicators may depend on an investor and should be adjustable by the investor.

Reference 35 - 0.28% Coverage

The candidate investment industry and geography may be relevant. The size and track record can be also relevant, like value, growth, venture capital investments etc.

Reference 36 - 0.08% Coverage

Success with your model development and tuning!

Reference 37 - 0.01% Coverage

yes

Reference 38 - 0.25% Coverage

Yes, I believe that the criteria applied for each dimension of TBL is accurate and adequately represent dimensions of Investment Attractiveness

Reference 39 - 0.21% Coverage

I believe that selected criteria is sufficient for assessing Investment attractiveness and the other factors can be omitted

Reference 40 - 0.28% Coverage

Yes, the criteria for each dimension are appropriate and effectively reflect the concept of investment attractiveness, ensuring the model's internal consistency.

Reference 41 - 0.01% Coverage

Yes

Reference 42 - 0.19% Coverage

These indicators will reflect real world investment assessment so I would agree that these should be considered.

Reference 43 - 0.26% Coverage

I think the questionnaire is well designed however I am not an investment expert so my answers may not provide the depth required to support your research.

Reference 44 - 0.01% Coverage

Yes

Reference 45 - 0.14% Coverage

Yes, I believe the stated criteria adequately reflect investment attractiveness.

Reference 46 - 0.25% Coverage

Yes, to some extent there is an omission, as government and administrative bodies, armed conflicts, and natural disasters are often key factors.

Reference 47 - 0.67% Coverage

Overall, the criteria for each of the three components look logical and well-structured. It's clear that the approach is comprehensive and goes beyond just finance. But to be honest, for me personally, finance still plays the main role. The rest depends on the context — PR, sustainability, regulation. So yes, the criteria are adequate, but the actual impact they have is still an open question.

Reference 48 - 1.62% Coverage

Not really a comment, more of an observation — in reality, many investment decisions aren't made based on models at all. They're often driven by context, personality, risk, and that same "gut feeling." A model is great for structuring things, but I wouldn't overestimate it as a universal tool. Its strength is in helping organize the picture, but in real life, a lot of decisions come down to things you just can't measure. So yes, the model is useful, but there always has to be room for common sense and the "here and now."

Let me give a real-life example. The founder of a large grocery retail chain in Russia invested — and continues to invest — in a non-profit elder care project without any pitch deck

or paperwork. Just because he personally believed in the idea, and a woman approached him who had deeply studied the topic and was adapting the franchise model from a well-known European company. Right time, right place, shared values. They shook hands — that was it.

Reference 49 - 0.01% Coverage

Yes, I do

Reference 50 - 0.01% Coverage

Yes, I do

Reference 51 - 0.01% Coverage

Yes

Reference 52 - 0.31% Coverage

This assessment system allows the company to work towards sustainable social policy, employee development, safety and health, and the promotion of sustainable business practices.

Reference 53 - 1.03% Coverage

I believe that the following indicators are important for assessing investment attractiveness: emissions levels, reduction in resource consumption, reduction in energy usage, utilization of environmentally friendly materials, the location of the investment object in an ecologically clean area, and supplier sustainability assessments. These environmental factors play a critical role in evaluating the long-term viability and ecological responsibility of an investment, aligning with the growing emphasis on environmental, social, and governance (ESG) criteria in investment analysis.

Reference 54 - 0.49% Coverage

Yes, I do. I consider the Triple Bottom Line (TBL) model to be a suitable and comprehensive tool for assessing investment attractiveness, as it goes beyond traditional financial models. This is particularly relevant for the oil and gas sector in the context of the ongoing energy transition.

3. Reputation Risks Linked to Social Factors

Files\\Questions (2) - § 7 references coded [7.02% Coverage]

Reference 1 - 2.41% Coverage

Yes, the social dimensions, including labour practices, human rights, and community engagement are increasingly relevant in evaluating investment attractiveness, particularly as ESG and sustainability considerations become embedded in maritime and wider infrastructure investment strategies.

From the perspective of a maritime classification society, which works closely with shipowners, classification societies, and maritime regulators, social indicators are not only values-driven they are increasingly risk-driven. Poor labour standards, for example, can directly impact operational safety, reputation, and supply chain resilience.

In alternative fuel shipping and innovation-driven projects, social readiness is also a factor including training needs, upskilling, and safe handling of new fuels like ammonia or hydrogen. These social considerations directly influence adoption speed, operational continuity, and regulatory acceptance, which in turn shape long-term investment performance.

Therefore, I view the selected social dimensions as highly relevant. While they may not be as easily quantifiable as financial metrics, they play a crucial role in assessing long-term viability, resilience, and alignment with responsible investment principles all of which are critical in the maritime sector’s decarbonisation journey.

Reference 2 - 0.89% Coverage

Yes, the defined social dimensions are relevant for evaluating investment attractiveness. Factors like labor practices, human rights, and community engagement increasingly impact reputation, regulatory risk, and long-term viability—especially in sectors

like O&G. As investor focus shifts toward ESG performance, these indicators play a growing role in shaping risk perception and stakeholder confidence, aligning with emerging sustainability frameworks and studies like Papoutsi (2018).

Reference 3 - 0.22% Coverage

Yes, it is important specifically related to the reputation and how stakeholders precive the company and the investments.

Reference 4 - 1.09% Coverage

The established social dimensions serve as relevant criteria in determining the appeal of investments. Social-related aspects such as labour practices and human rights, together with community involvement, now heavily influence reputational standing and regulatory exposure while determining long-term survival prospects for businesses within the O&G industry. The transition of investor attention toward ESG performance results in these indicators having an increased influence on risk perception and stakeholder confidence, which matches new sustainability frameworks and research (Papoutsi, 2018).

Reference 5 - 0.62% Coverage

Social dimensions are increasingly relevant in evaluating Investment Attractiveness, especially in today's environment. While traditionally these decisions were mainly focused on financial metrics, social factors can significantly impact a company reputation, regulatory risk and long-term value. They add valuable insight for investors.

Reference 6 - 1.02% Coverage

Yes, all the listed social indicators are important for evaluating investment attractiveness, as they directly impact long-term benefits and reputation. Health and safety programs, diversity support, ethical sourcing practices, and employee engagement help mitigate risks, strengthen the brand, and improve financial performance. Firms that actively invest in social sustainability are more resilient in times of crisis, attract investors, and demonstrate higher long-term profitability due to strong relationships with employees, customers, and the community.

Reference 7 - 0.78% Coverage

I believe that the following indicators are important for assessing investment attractiveness: employee health and safety programs, promotion of workforce diversity, and respect for human rights and community engagement. These factors reflect a company's commitment to social responsibility and contribute to its long-term sustainability and reputational strength, which are increasingly valued by socially conscious investors.

4. Limitations of Social Factors

Files\\Questions (2) - § 11 references coded [4.68% Coverage]

Reference 1 - 0.26% Coverage

In theory - yes, in practice - no. In pursuit of "diversity" firms are forced to seek artificial ratios by sacrificing real quality. Virtue signaling

Reference 2 - 0.59% Coverage

the selected social dimensions are relevant and increasingly influential in investment attractiveness assessments, particularly in light of evolving stakeholder expectations and ESG integration. However, their effectiveness depends on sector relevance, quality of data, and integration into a broader analytical framework.

Reference 3 - 0.65% Coverage

No, not all as social dimension applicable in corporate world as some are considered as outdated concepts adding no value to monetary revenue generation - prime reason for a profit making organisation. Employee diversity, suppliers code of conduct, source responsibly and

community support activities are probably the dimensions which seem to be less priority if at all.

Reference 4 - 0.45% Coverage

It doesn't matter as much for the price of the stock, but it matters when it comes to regulation. If the company I am investing in is not socially responsible, then there may be some issues with Governmental Regulation, which can lead to a drop in the stock price.

Reference 5 - 0.15% Coverage

Seems so, but again there may be other indicators from the available data or literature

Reference 6 - 0.04% Coverage

Somewhat not necessary

Reference 7 - 0.22% Coverage

Employee health and safety programs.

Employee training and development

Employee engagement

Community support activities

Reference 8 - 0.68% Coverage

Some of these dimensions are described quite generally (train and educate employees, engage, commit etc.) and difficult to measure. In general these dimensions are relevant, especially for green and responsible investments. Some investors can be more, less or not interested in the social dimensions of their investments, thus the weight of these dimensions depends on an investor.

Reference 9 - 1.00% Coverage

I don't think these dimensions offer any edge in identifying attractive investment opportunities. The social disclosures and reporting frameworks are relatively immature in comparison to accounting standards and the high subjectivity make inference or extrapolation a challenge. Metrics such as employee turnover could offer some degree of insight into the ability of the company to be true to its word and do the right thing by its people but this helps provide colour, no necessarily identify alpha.

These are hygiene factors an investor expects the company to manage.

Reference 10 - 0.42% Coverage

Not really, I think it would be smarter to group the Social dimensions into employee-relevant topics (as training, health at the workplace or inter community life) and social environment topics (as e.g social benefits or effects of action)

Reference 11 - 0.22% Coverage

Employee Health and Safety Programs

Employee Training and Development

Employee Engagement

Community Support Activities

5. Limitations of Financial Analysis

Files\\Questions (2) - § 11 references coded [3.95% Coverage]

Reference 1 - 0.69% Coverage

the financial dimensions selected are relevant and provide a strong foundation for evaluating investment attractiveness. However, for a complete picture, they should be complemented with forward-looking metrics, qualitative assessments, and market-based indicators (like P/E ratio, beta, or innovation indices), especially in sectors driven by intangible assets or rapid change.

Reference 2 - 0.02% Coverage

Too many.

Reference 3 - 0.21% Coverage

Yes, however ratios are one of the many financial performance tools to determine attractiveness of a project to invest.

Reference 4 - 0.22% Coverage

All indicators seem valid, maybe use artificial intelligence to determine if from the data other indicators may be suitable

Reference 5 - 0.28% Coverage

Current liquidity. Monetary liquidity.

Financial leverage. Net walrus profits.

Turnover of working capital.

The Taffler Model (UK).

Cash flow to revenue ratio

Reference 6 - 0.57% Coverage

Most of these financial dimensions are relevant. Some of them are not familiar to me and/or described in general words (current ratio, quick ratio, financial leverage etc.), thus a brief definition would help. Also the listed bankruptcy tests are not familiar to me. I find the profitability and solvency ratios most relevant.

Reference 7 - 0.18% Coverage

depending on the industry some might not be applicable - e.g. Inventory in case of Software providers

Reference 8 - 0.67% Coverage

I am not sure if all of these are relevant -it really depends on the type of the potential investment. For example if one is purchasing a car manufacturer vs an oil company there will be a different need for various ratios and some may not be relevant. Another example would be Berkshire Hathaway - the company does not pay dividend as a result some of these metrics would not be applicable.

Reference 9 - 0.28% Coverage

Current liquidity

Quick liquidity

Debt to Equity Ratio

Net Profit Margin

Working Capital Turnover

Asset Turnover

Taffler Model (UK)

Cash Flow to Revenue Ratios

Reference 10 - 0.81% Coverage

I believe that the following indicators are essential for assessing investment attractiveness: the Cash Ratio, Financial Leverage, Return on Equity (ROE), Fixed Asset Turnover, the Altman Z-Score Model (USA), and Cash Flow Return on Equity. These metrics provide a comprehensive evaluation of a company's liquidity, financial stability, operational efficiency, and overall profitability, which are critical for informed investment decision-making.

Reference 11 - 0.03% Coverage

Most certainly

6. Limitations of Environmental Factors

Files\\Questions (3) - § 9 references coded [3.42% Coverage]

Reference 1 - 0.64% Coverage

Depends on country. In the “global West”, these metrics are relevant as they could be potential
Indicators of Compliance levels. At the same time, these segments usually mean high compliance costs which firms have to factor in order to achieve compliance. Higher costs impact investment return on equity. A lot of investors choose markets/segments in less ESG strict zones

Reference 2 - 0.63% Coverage

The majority of these metrics will also have a positive impact on the bottom line and public perception. e.g. it is much easier to not have an oil spill and thereby avoid the cost of clean-up and compensation and the negative media coverage. Insofar as fewer inputs do not lead to reduced output value, this is not a change to the profit-driven motivation of the private sector.

Reference 3 - 0.62% Coverage

the environmental dimensions defined in the study are highly relevant for evaluating investment attractiveness, especially as global finance continues to align with climate goals and sustainability imperatives. However, their interpretation and weight in investment analysis should be contextual, sector-sensitive, and paired with reliable data sources.

Reference 4 - 0.04% Coverage

Yes, but only at the margin

Reference 5 - 0.49% Coverage

Again, it is probably not all as meeting these criteria would only be possible when they do not distort profits. Reducing materials consumption may have adverse impact on supply chain management for example, whereas reducing emissions often pose risks for efficient operations management.

Reference 6 - 0.08% Coverage

As above interesting indicators are there more?

Reference 7 - 0.56% Coverage

Reducing greenhouse gas emissions
Reduction of emissions of other gases
Oil spill response
Reducing waste generation
Reduced packaging usage
Waste recycling
Use of alternative modes of transport (using alternative fuels)
Certification according to ISO 14001 standard
Cooperation with suppliers
Sustainable procurement

Reference 8 - 0.16% Coverage

depending on the industry some might not be applicable - e.g. LCA in case of Software providers

Reference 9 - 0.19% Coverage

This greatly depends on a market where company operates and country where the main production cycle is performed

7. Importance CSR

Files\\Questions (2) - § 22 references coded [3.30% Coverage]

Reference 1 - 0.12% Coverage

The social dimensions are relevant for Investment Attractiveness.

Reference 2 - 0.02% Coverage

I think yes

Reference 3 - 0.31% Coverage

These are all reasonable considerations that are expected outcomes of benign management in a well-governed stable enterprise investing in it's future development and growth.

Reference 4 - 0.01% Coverage

Yes

Reference 5 - 0.17% Coverage

Yes- generally firms that look after workforce seem to thrive; or is it the other way around?

Reference 6 - 0.26% Coverage

Overall, social dimensions play a significant role in investment as they both elaborate the operational success and a long-term sustainability.

Reference 7 - 0.01% Coverage

yes

Reference 8 - 0.07% Coverage

I think these indicators have a big impact.

Reference 9 - 0.02% Coverage

Yes, I agree

Reference 10 - 0.14% Coverage

Yes, all financial aspects are relevant to assessing investment attractiveness

Reference 11 - 0.01% Coverage

Yes

Reference 12 - 0.08% Coverage

Yes, all these social dimensions are relevant.

Reference 13 - 0.01% Coverage

Yes

Reference 14 - 0.27% Coverage

Yes especially when acquiring a business these metrics allow the investor to compare various firms even when the firms are not in the same sphere.

Reference 15 - 0.28% Coverage

In my opinion the selected social indicators are relevant and significant in assessing investment attractiveness as play vital role in success of the businesses

Reference 16 - 0.23% Coverage

Yes, the social dimensions are relevant, as they reflect key factors in sustainability reporting and investor decision-making.

Reference 17 - 0.01% Coverage

Yes

Reference 18 - 0.29% Coverage

Yes, I believe that employee health and safety programs, as well as training and development initiatives, are relevant for evaluating investment attractiveness.

Reference 19 - 0.63% Coverage

Personally, I see the listed financial indicators as a reflection of how well-documented and structured the company is, and what stage of development it is currently in. The provided set of metrics mostly reflects the company's maturity. And yes, it adds weight to the overall assessment, showing that significant work has been done to systematize the business.

Reference 20 - 0.15% Coverage

I think all dimensions are relevant for the evaluation of Investment Attractiveness

Reference 21 - 0.01% Coverage

Yes

Reference 22 - 0.21% Coverage

This dimension is defiantly relevant for long term investments and is much less of importance for short term investments.

8. Environmental Sustainability

Files\\Questions (3) - § 23 references coded [6.23% Coverage]

Reference 1 - 0.16% Coverage

The environmental dimensions are relevant for the evaluation of Investment Attractiveness.

Reference 2 - 0.20% Coverage

Yes. Due to climate change, the environmental factor has a great influence on the decision in the investment sector.

Reference 3 - 0.10% Coverage

Yes, all relevant, specifically for Lifestyle analysis.

Reference 4 - 0.01% Coverage

Yes.

Reference 5 - 0.82% Coverage

The identified environmental dimensions serve as relevant criteria for assessing investment appeal. Regulatory compliance, along with operational risk and access to capital, are directly influenced by metrics related to carbon emissions, energy efficiency and biodiversity protection. Environmental performance has become critical for investors and regulators in sectors like O&G, which makes these indicators fundamental for full risk and opportunity evaluations.

Reference 6 - 0.01% Coverage

yes

Reference 7 - 0.05% Coverage

All indicators are important

Reference 8 - 0.05% Coverage

I think everything is important

Reference 9 - 0.12% Coverage

They are partially relevant mainly because of Government restrictions.

Reference 10 - 0.05% Coverage

To me, it doesn’t matter at all.

Reference 11 - 0.84% Coverage

Yes, the environmental dimensions are highly relevant for evaluating investment attractiveness. Reducing carbon footprint, energy consumption, and waste not only enhances a company’s reputation but also leads to long-term business benefits. Firms with strong environmental practices reduce costs, ensure regulatory compliance, and build investor confidence. This creates a competitive advantage and supports sustainable growth, making these metrics crucial for investors.

Reference 12 - 0.09% Coverage

Yes, all these environmental dimensions are relevant.

Reference 13 - 0.02% Coverage

ideally yes

Reference 14 - 0.02% Coverage

Nowadays yes

Reference 15 - 0.30% Coverage

Yes, in the current Ecology climate it is very important to include in evaluation of investment the environmental factors as they play significant role in investment analysis

Reference 16 - 0.08% Coverage

Yes, the environmental dimensions are relevant.

Reference 17 - 0.01% Coverage

Yes

Reference 18 - 0.76% Coverage

This is strictly my personal opinion. The environmental agenda is more of a political trend driven by European policy that has deeply integrated into large businesses. In my view, if a company is financially attractive, the environmental aspect can be overlooked. Personally, I don't see it as something particularly important — perhaps it is somewhat relevant for large corporations, where the eco-agenda is more of a PR tool than a core priority.

Reference 19 - 0.10% Coverage

I think all Environmental dimensions as defined are relevant

Reference 20 - 0.03% Coverage

Yes, well defined

Reference 21 - 0.57% Coverage

yes, these points are pretty much the most important ones considering environmental effects. But it should be clear that the inner contradiction between the reduction of emissions and the work as a oil company for example, is a big topic. Also worth a mentioning is the fact that most of the points are impairing the financial dimensions.

Reference 22 - 1.03% Coverage

I believe that the following indicators are important for assessing investment attractiveness: emissions levels, reduction in resource consumption, reduction in energy usage, utilization of environmentally friendly materials, the location of the investment object in an ecologically clean area, and supplier sustainability assessments. These environmental factors play a critical role in evaluating the long-term viability and ecological responsibility of an investment, aligning with the growing emphasis on environmental, social, and governance (ESG) criteria in investment analysis.

Reference 23 - 0.81% Coverage

Yes, I do believe that certain environmental indicators are highly relevant for assessing investment attractiveness. In particular, waste reduction, waste recycling, and resource reuse are critically important for investment decisions, especially in the current context. These practices demonstrate a company's commitment to sustainability, operational efficiency, and long-term environmental responsibility, all of which are increasingly valued by investors.

9. Environmental Factors Improving

Files\\Questions (3) - § 11 references coded [7.65% Coverage]

Reference 1 - 1.71% Coverage

Yes, the environmental dimensions such as carbon emissions, energy efficiency, and biodiversity protection are not only relevant but increasingly essential in evaluating investment attractiveness, particularly in the maritime sector.

Environmental performance is now a critical factor in both regulatory compliance and investor confidence.

At maritime, environmental performance is a central aspect of our risk-based assurance and classification approach. We see growing demand from clients and stakeholders to demonstrate measurable environmental improvements not just for compliance, but also to unlock green financing, meet investor ESG criteria, and support long-term competitiveness.

In this context, environmental dimensions are strategic investment criteria. They shape access to capital, market positioning, and operational viability. As such, I view them as entirely

relevant and increasingly integral to investment decision-making in maritime and adjacent sectors.

Reference 2 - 0.82% Coverage

Yes, the defined environmental dimensions are relevant for evaluating investment attractiveness. Metrics like carbon emissions, energy efficiency, and biodiversity protection directly affect regulatory compliance, operational risk, and access to capital. As environmental performance becomes a key concern for investors and regulators, especially in high-impact sectors like O&G, these indicators are essential for a comprehensive risk and opportunity assessment.

Reference 3 - 0.39% Coverage

Yes, it's quite relevant as many investors do prioritise sustainability.where often involves energy efficient buildings, heating/cooling systems and waste management on one hand and reducing operational cost on the other.

Reference 4 - 0.82% Coverage

The identified environmental dimensions serve as relevant criteria for assessing investment appeal. Regulatory compliance, along with operational risk and access to capital, are directly influenced by metrics related to carbon emissions, energy efficiency and biodiversity protection. Environmental performance has become critical for investors and regulators in sectors like O&G, which makes these indicators fundamental for full risk and opportunity evaluations.

Reference 5 - 0.54% Coverage

Environmental dimensions are crucial in evaluating Investment Attractiveness, because they directly affect a company's future costs, profitability, long term sustainability. Environmental performance is a strategic advantage that affects risk, reputation and all key drivers of investment attractiveness.

Reference 6 - 0.12% Coverage

In my opinion, points 1,2,3,4,5,12,17,19,22 are the most important.

Reference 7 - 1.60% Coverage

In general, the environment dimensions are relevant from the environment responsibility viewpoint (their weight can depend on an investor) and from the regulatory reporting and compliance viewpoint. The latter can depend on the investor's jurisdiction and industry type (bank, insurance comp., pension fund, hedge fund etc.). The dimensions can be viewed by tge investor on an investment portfolio basis, i.e. some portfolio components may be more green than the other ones. Some of these indicators may be redundant (strongly correlated), like carbon footprint, GHG emissions, fuel consumption etc. Some of the indicators are not clearly described, like ""collaborate with the suppliers", "reduce fuel consumption": w.r.t. what, per which unit (e.g. per earned Euro, per ton of the output etc), by how much, within which timeframe? You can check the ESG regulation of the EU, for instance, and see the requirements and the used dimensions.

Reference 8 - 0.38% Coverage

In my opinion the Environmental components are important but only for certain types of acquisitions. They are more relevant in certain regions where environmental laws and regulations would impact business operations.

Reference 9 - 0.69% Coverage

The infrastructure behind environmental reporting (in Europe and the UK at least) remains in its infancy. While clearly important for the energy transition, the recent withdrawal of major banking institutions and investment firms from climate pledges suggests this is not a critical determinant for investors. There are not enough opportunities to fulfil the needs of the vast amount of global capital.

Reference 10 - 0.20% Coverage

Yes, I believe that waste reduction, recycling, and resource reuse are important for investment decision-making.

Reference 11 - 0.40% Coverage

Yes, environmental aspects are important for investment decisions

Reducing Greenhouse Gas Emissions

Oil Spill Response

Waste Recycling

Resource Reuse

ISO 14001 Certification

Collaboration with suppliers

Sustainable procurement

10. Criticism or Limitations of the TBL Model

Files\\Questions (2) - § 8 references coded [2.95% Coverage]

Reference 1 - 0.21% Coverage

Can’t provide a blanket answer. It may be suitable for certain firms/segments of the market, but can’t be 100% universal

Reference 2 - 0.29% Coverage

I reserve judgment. I would like to see the R2 of these measures. since only small oil producers have gone bust, it is difficult to apply to the large listed oil firms.

Reference 3 - 0.57% Coverage

TBL appears to be a suitable and comprehensive tool for assessing investor attractiveness. Its strengths and robustness are argued for well by Ekaterina.

As with all models, using other tools to support decition making is conducive to a more rounded approach that relies on different, but often interconnected, indicators.

Reference 4 - 0.16% Coverage

It is not suitable, unfortunately, unsustainable technology could be more profitable.

Reference 5 - 0.15% Coverage

My investments are based on Social Arbitrage rather than Tripple Bottom Line model.

Reference 6 - 0.44% Coverage

differentiating institutional and individual investors we have two separate use-cases here: for the first one investing in ESG is increasing attractiveness, while the later may accept a lower quantitative return in favor of a positive impact on ESG

Reference 7 - 0.34% Coverage

I believe it is not only suitable but critical to a future where investors (and by inference firms) will be making decisions based on firms’ ability to integrate sustainable practices.

Reference 8 - 0.79% Coverage

I believe that financial forecasts do not always have a significant impact on a company’s valuation. It is also important to consider the reputation of the company’s founder at the time of assessment. One example is Oleg Tinkov. Additionally, the political situation in the country where the company is based plays a crucial role — for instance, the sale of Western firms operating in Russia during the period of the Special Military Operation (SMO).

Files\\Questions (3) - § 6 references coded [3.05% Coverage]

Reference 1 - 0.70% Coverage

Investment decisions are driven by many factors but it is necessary to remember the role of human risk perception and aversion. The current US President has changed the world in several areas - one being diversity. Federal employees in this kind of work have been terminated and suppliers to the US Govt are under pressure to close DE&I programmes. This kind of dramatic change will have consequences for some years.

Reference 2 - 0.07% Coverage

No, some are relevant, some appear not.

Reference 3 - 1.10% Coverage

A limited number of crucial criteria are suitable for inclusion. Effective governance through transparent board structures and ethical behaviour plays a pivotal role in sustaining investor trust and managing risks. Innovation functions as a crucial component in rapidly changing sectors such as O&G because adaptability establishes the foundation for sustained competitive advantage. Global operations face substantial investment impacts due to geopolitical and regulatory risks. By incorporating these elements, the model would improve its robustness and better reflect the complex nature of investment decision-making processes.

Reference 4 - 0.08% Coverage

yes, but the impact on the market needs to be proven

Reference 5 - 0.78% Coverage

Yes, something is definitely missing. For example, the founder's current reputation — that's a whole separate layer you can't capture with any metrics. Geopolitics is also a significant factor, especially if the company operates in countries with unstable conditions. Innovation? Yes, it matters, but it really depends on the company's stage. So yes, some additional criteria could be included — especially those that directly influence perception and risk.

Reference 6 - 0.32% Coverage

I think that regarding governmental structures all dimensions mentioned have to be synergistic with the government because it builds restrictions and possibilities for the firms.

11. Contextual Importance of Financial Metrics

Files\\Questions (2) - § 24 references coded [6.27% Coverage]

Reference 1 - 0.16% Coverage

The financial dimensions are relevant for the evaluation of investment Attractiveness.

Reference 2 - 0.02% Coverage

Yes of course,

Reference 3 - 0.03% Coverage

At high level - yes

Reference 4 - 0.81% Coverage

Yes, the financial dimensions defined are relevant for evaluating investment attractiveness. Drawing from Kaplan's framework and established bankruptcy models ensures the inclusion of key indicators like profitability, liquidity, solvency, and efficiency, core to financial analysis. These 31 metrics provide a comprehensive view of a company's financial

health and future performance, aligning with what practitioners use to assess risk and return.

Reference 5 - 0.02% Coverage

All relevant

Reference 6 - 0.01% Coverage

Yes!

Reference 7 - 0.93% Coverage

The selected financial dimensions prove important in evaluating how attractive an investment might be. According to the research, by applying Kaplan's framework with established bankruptcy models, businesses can incorporate essential financial analysis indicators such as profitability, liquidity, solvency, and efficiency in their operations. The 31 metrics give a complete overview of a business's financial standing and future performance, which matches the criteria professionals use to evaluate risk and return

Reference 8 - 0.01% Coverage

yes

Reference 9 - 0.50% Coverage

We analysed and applied these indicators for testing our company, including all the bankruptcy tests which were didn't test before. The results were impressive - closely aligning with our anticipated numbers and results (about risk, growth potential) from previous calculations.

Reference 10 - 0.02% Coverage

yes, all.

Reference 11 - 0.05% Coverage

Yes, including all indicators

Reference 12 - 0.02% Coverage

Yes, I agree

Reference 13 - 0.04% Coverage

Yes they are relevant

Reference 14 - 2.32% Coverage

Yes, I believe the financial indicators selected in the study are generally relevant for evaluating investment attractiveness, especially when considering long-term financial stability, operational efficiency, and risk exposure.

From the table provided, several key metrics stand out as particularly important for long-term investment evaluation:

Return on Assets (ROA) and Return on Equity (ROE) reflect how effectively a company uses its resources and equity to generate profit.

Debt-to-Equity and Debt-to-Capital ratios are essential for assessing financial leverage and long-term solvency — a critical concern in capital-intensive industries like oil and gas.

Cash Flow to Revenue and Interest Coverage ratios help evaluate the company's ability to generate and manage cash, which is fundamental for sustainable operations.

Altman's Z-Score is a validated tool for predicting bankruptcy risk and remains highly relevant in risk-sensitive sectors.

By combining profitability, solvency, and cash-based indicators with established bankruptcy models, the study ensures a comprehensive and multidimensional view of investment potential. While no set of indicators is universally perfect, the selected 31 metrics are well-aligned with both academic theory and practical investment analysis.

Reference 15 - 0.09% Coverage

Yes, all these financial dimensions are relevant.

Reference 16 - 0.03% Coverage

Definitely yes

Reference 17 - 0.02% Coverage

Absolutely

Reference 18 - 0.19% Coverage

Yes, I believe that all selected financial criteria is relevant for evaluation of Investment Attractiveness

Reference 19 - 0.08% Coverage

Yes, the financial dimensions are relevant.

Reference 20 - 0.14% Coverage

Yes to being relevant however the value of each metric will vary in importance

Reference 21 - 0.20% Coverage

I agree that all the financial indicators mentioned above are relevant for assessing investment attractiveness.

Reference 22 - 0.18% Coverage

In my opinion, all financial dimensions are relevant for the evaluation of Investment Attractiveness

Reference 23 - 0.01% Coverage

Yes

Reference 24 - 0.41% Coverage

These are surely relevant regarding that financial metrics should be grouped by liquidity, security and rentability. Therefore I think that the importnace of the Cash ratios should be secondary to the classical liquidity ratios.

Files\\Questions (3) - § 1 reference coded [0.21% Coverage]

Reference 1 - 0.21% Coverage

Yes, I agree. I believe that certain financial indicators are indeed relevant for assessing investment attractiveness.

12. Complementing Financial Metrics with Non-Financial Factors

Files\\Questions (2) - § 5 references coded [5.10% Coverage]

Reference 1 - 2.15% Coverage

Yes, the financial dimensions outlined are all relevant and valuable for evaluating investment attractiveness, particularly from a risk and performance analysis perspective.

However, in today's investment, particularly in areas such as alternative fuel ship investments (as an example), financial indicators alone do not always offer a complete picture. While traditional metrics like ROE, Debt ratios, and Cash flow forecasts remain essential, they must be interpreted in context:

- High CAPEX and longer payback periods for sustainable vessels may initially weaken short-term financial ratios, but may still be strategically and environmentally sound investments.

- Conversely, short-term profitability may mask long-term exposure to carbon pricing, environmental regulation, or stranded asset risk.

In conclusion, while the financial dimensions included in the study are highly relevant from a technical and analytical standpoint, their application must be contextualised within a broader strategic and sustainability-focused framework, particularly in the maritime sector (for example), where the investment landscape is shifting in response to decarbonisation and regulatory change.

Reference 2 - 0.63% Coverage

Several financial aspects need to be considered. Cost control and efficiency (how well the company manages cost). Cash flow (absolutely vital for the company. Investors will be interested in strong support and future growth. Market position and risk factors. (A financially healthy company will have procedures to manage any risks efficiently)

Reference 3 - 0.42% Coverage

Although indicators are widely used within the investment industry, they often lag behind the market; therefore, I prefer to invest by considering the stock's price. If the stock is cheap and the company's fundamentals are good, I invest.

Reference 4 - 1.34% Coverage

These are valid metrics but must be used with knowledge that management teams today are more aware of predictive analytical models that ever. Take the Benish indicator or Altman score, this can be gamed with a minor tweak to the financial statements. The addition of tools such as neural linguistic programming performed by machine learning models to analyse management transcripts, annual reports and trained to identify patterns that exemplify bullish or bearish tones.

I would also add some return on capital measure to avoid disparity were capital structure causes problems with return on equity. Plus, the metrics exclude growth readings i.e. EPS or revenue growth that give a good insight into momentum which is a highly correlated factor to outperformance.

Reference 5 - 0.57% Coverage

I believe that yes, financial indicators play a major role in evaluating a company. Especially when we are talking about 31 financial metrics, rather than just a few traditional ones like revenue, EBITDA, and so on. However, as I mentioned earlier, there are also important non-financial factors that should be considered.

Appendix V. Expert Interview with John Elkington, Founder of the Triple Bottom Line

1. How did you come up with the idea of the Triple Bottom Line back in 1994? What were the main drivers behind it?

So, I've asked, I've been asked the question, why or how did I come up with the idea of the triple bottom line. The year was 1994 and I spent 18 months trying to pin down a name for what I felt was the coming agenda for business and for financial markets. And when it finally occurred to me in 1994, I thought I must have heard it before. I was absolutely convinced that I'd heard the term somewhere already, and I rang people in the field and said, did you come up with this? Have you heard this before? And the answer was no; it's they felt novel. But then, about 20 years later, I was reading through a book by Alvin Toffler, and it was called the third wave. He's perhaps best remembered for a book called Future Shock. And I'm just I very rarely read books again, but I just flicking through the third wave on about page 267 I came across a head, a subheading, and it was multiple bottom lines.

And as soon as I saw that, I thought, well, that's where the seed of the idea came from. And I read that book in 1980, so it was 14 years before I started thinking about the triple bottom line in terms of the drivers. There was a lot of work going on at the time in and around business. A lot of it good work. A lot of it focused on what was called Eco efficiency. So how can business become more efficient, more productive, in terms of waste, in terms of resources, terms of energy, in terms of water, all of that good stuff. How could it make or save money by doing the right thing in terms of environmental and resource management. And I thought that was fine for engineers, but in my mind, it wasn't addressing the economic side.

Yes, it was talking about financial elements in terms of making or saving money, but it wasn't talking about the economic impact of business, nor was it discussing the social side at all. And so, with the triple bottom line, people, planet and profit, which is what I called it the following year. So, 1995 to try and simplify it a bit, I was trying to say any business has multiple dimensions of impact, positive and negative. And if we're going to make sense of the 21st Century, we're going to have to learn how to not only track and account for these different forms of value and impact, but we're also going to have to learn how to value that positive and negative impacts.

That's where it started. That's where the idea came from. As I say, it took 18 months to come up with just those three words, which is ridiculous, and then 2018 I launched the first ever product recall for a management concept. I don't say that. This was the editors of the Harvard Business Review who published the recall article. And the reason why I did that was I still thought it was a good idea. I still think it's a good idea to have a triple bottom line agenda, and I think it's better in many ways than ESG, and we can perhaps come on to that a little later. But the idea for the recall was just simply to say it's not being used in the way that I think would drive change in the directions and at the scale that is now needed.

2. What are the most common mistakes firms make when trying to implement the Triple Bottom Line?

So, when we started with the triple bottom line. I mean, there really no firms were doing anything like that anywhere in the world. And then very soon, a small number of firms started to pick up the concept and apply it. So, an earlier one was shell so it's a fossil fuels company. It's on the wrong side of history. But nonetheless, they were interested, how could they apply a triple bottom line framework to what they did? And in 1997 I think it was, they published

their first ever sustainability report, and it was called people, planet profit and. And so they were. They were trying to work out how you calculate value at value but created and value destroyed. Novo Nordisk, Danish company, then both in enzymes and healthcare, human healthcare also picked it up.

In effect, they became the first B Corporation. So, B Corporations embraced the triple bottom line. They didn't formally register as one, but they were the first company, in my understanding, who embraced it that agenda fully, and I worked with them for probably, overall, 20 years as they try to get their brains around it, then try to embed it, and so on. Now any particular company goes through cycles, and you have CEOs who understand and commit, and you have then replacement CEOs who think differently, and at that time, you sort of had an up and then quite sharply down. Dynamic in firms now it's slightly different, or it was slightly different until Trump got into the White House. And what was the pattern that we began to see was where, if you had a succession in a company, the new CEO did not instantly reverse all the triple bottom line or ESG or sustainability work that his or her predecessor was doing, but they worked out how to carry it forward.

Now with Trump, you've got a lot more questioning. You've got more firms asking, do we really need to do this? Our competitors aren't doing this. Why should we? And so, on were very much in a zero-sum world, which wasn't true for much of the evolution of sustainability. And then the question is, what do firms get wrong? And in my mind, one of the things that they get profoundly wrong and consistently and routinely is they think that this is basically a matter of trade-offs. So, any form of management and accounting and so on is about trade-offs. But when they think about the triple bottom line, what they're thinking about is, well, we make a profit. That's the economic side that ops ticked Well, the economic agenda is very much bigger than just the question of whether you make a profit or not.

We employ people, we give people what they want, or they need. That's a social box tick. Well, no again, and the social agenda is much, much bigger, particularly if you get into human rights and some of those bigger themes, and particularly if you're in a company like Facebook or Google or Microsoft or chat, open AI or whatever, and you're you are developing AI because you think that just simply by provide, providing an AI service or product, you're giving people what they want. You're not taking into account fully all of the different social and human implications are worse, that the impact on democracy would be just one extreme example, and then very often what you get is currently saying, at the end of all of this, well, yeah, but it's a shame about the environment.

We do all this good stuff in other areas, but the environment suffers, or it may be the society suffers. It depends on the company and the industry and the geography. But I think that when I did the product recall in 2018 through Harvard Business Review, that was my message that this isn't at least in my mind, it was never about trade-offs. They happen. They need to be. You know, you need to pay attention to the those trade off dynamics. But it's fundamentally about, how do you integrate the creation of net positive value on the economic, on the social and environmental sides? And just final point there is, you know, at the time when I did all of this, politics was somewhere out there.

I mean, business was encouraged like Shell, after Nigeria, the executions of Ken Saro Wiwa and his colleagues in Nigeria, shell had long been encouraged to stay out of politics. No big company stays out of politics, and then they were encouraged to come back in, as long as they pushed the right line was, don't, don't hang these protesters against oil development in Nigeria. So, but now, what we have is a radically politicized agenda and a growing assumption that firms will be involved in politics, and that needs, that activity needs to be very much more transparent. And one of the projects that we're doing at Volans, my company, is looking at the. The way in which firms advocate and lobby for particular types of policy framework, or the removal of policy frameworks.

So that's a bit about the history. It's a bit about what firms I think get wrong. But when you look at the B Corporation movement, and that's 10,000 firms, and some big firms like Natura in Brazil, who I visited just a few weeks ago in Brazil. These are firms that understand it needs to be an integrated approach. But there's still that tension between people who have a minimalist view. All they'll do is say, well, we have a triple bottom line approach, and those who properly understand it properly try to embed it, integrate it into everything that they do.

3. How can businesses effectively balance the three dimensions of the TBL, especially in profit-driven environments?

So, a big question is, in a world of markets that are primarily driven by financial considerations, return on investment and so on, financial performance on a quarterly or annualized basis. How can the triple bottom line properly be integrated? Well, one way of addressing that question is to start to think about proxies, ways in which you can measure different forms of value in a standard language or a standard currency. Perhaps so. One of the things we've seen people increasingly experimenting with the value balancing Alliance firms like Novartis, BASF and so on, is the question, how can you put a financial value on the social and environmental aspects of the triple bottom line?

So, for example, if you're Novartis or you're a big pharmaceutical company, you might have a metric around quality adjusted life years, what are known as qualities and a quality, or a quality adjusted life year is about the additional years or time that a patient might live given the use of a particular pharmaceutical product. And that's a metric that can be applied in that area. And you can put a value on that. It's a contentious area because, you know, when I was right back in the early 70s studying city planning, one of the things that we were asked to do, just to stretch our thinking, was put a value on a church, in this case, a Norman church, going back to about the 1100s in this country, Britain. And it's very difficult, I mean, and that needed to be done because that Norman church was about to be bulldozed out of the way for an urban motorway.

So, what sort of value should you put on something like that, not just the structure, but the centuries of history, the people buried there, the people baptized there, the people whose weddings or funerals were held there. It's a very challenging set of questions to try and ask, and the triple bottom line is shot through with questions like that. But I do think that some of the experiments to put financial measures on social and environmental aspects of business reformers are worth doing, as long as we don't forget that, if you're, for example, looking in the environmental space of biodiversity, nature has a right to exist in its own right. It's not simply there because we choose to have it and therefore can put our value on it.

It has an intrinsic value. So how do you capture that? And again, I think that's very embryonic. A lot of that work, it's interesting because I think over time, it may give us very useful inputs to our decision-making processes. At the moment, just a final point is that the financialization of these non-financial or extra financial considerations is challenging for a rather different reason, which is that when we choose to put a social financial value on something that is like the right to privacy in the social domain, for example, or the right to free speech. And again, in the social domain, how do you put a price on that? And once you put a price on it, do you not run the risk of trivializing that particular issue because it's suddenly got this price tag and it looks affordable? Okay? Well, in the earlier case.

Knock down the normal church, because the motorway over time will save a lot of time, and if you put a financial value on that, that's a bigger number than the cost of removing a bit of history. So it takes you in directions that are challenging, but just a very quick case study, I mentioned Novartis. For five years, I chaired a committee or advisory board within Novartis looking at the financial financialization, or how do you put a financial value on the wider

impacts of a company? And it was quite interesting, because when we started, there were 30 people in a room, all of them internal, Novartis people.

The second year, there were 40 people, all of them internal, all of them Nevada's people. The third year coincided with COVID the pandemic, and so that year, for the first time ever, we went virtual, and we invited the wider world in. So, the third year, 1000 people. The fourth year, 2000 people. And in the end, Novartis, the senior management, thought, oh, what are we doing here? I mean, this is, this is going to be the tail that wags the dog. Let's bring it back internal, internally. So, the fifth year, it was just internal, and that year it was 900 people. So, we went from 30 to 40 to 900 and I think that just gives a sense of the interest, both within some of these big firms and in the wider world. And how do we properly and legitimately and usefully put price tags on some of these non or extra financial considerations?

4. Do you consider the Triple Bottom Line Model suitable overall for the determination of Investment Attractiveness?

One of the difficult and challenging areas in the evolution of the triple bottom line has been in taking it into the financial world, into financial markets, because the return on investment mindset is very much entrenched there, and it's simply measured in financial terms. And if you can't demonstrate that you're making progress against those financial metrics, you've got a problem. You're probably not going to get the investment. All of that said, there has been a series of movements that try and bring this non-financial set of considerations even into the financial world. So, for example, we've had ethical investment, we've had socially responsible investment, we've had the financial side of the shared value movement.

We've had ESG, environmental, social and governance investments. That has been a bit of a problem, because what we see is what we often see in financial markets. We're a herd animal, and that's exaggerated in financial markets. So, you have the bull periods, where everyone is stampeding into a new landscape of what they see to be opportunity, very often, ignoring the risk. And then you have the bear period, and what we're about to see, I think, is another really, really fierce bear period. And when people in the bull market, they find it very hard to hear people telling them about climate risk and biodiversity risk and some of that. We'll sort that out. And anyway, I'm a billionaire, so I have a charity. Go and talk to my charity people. That might be Jeff Bezos, it might be Bill Gates, or whatever, some of these people doing very good work, Bezos through the earth fund. Bill Gates through the Bill and Melinda Gates Foundation.

But nonetheless, they have tended very often to see these sorts of considerations as outside their core business decision making processes. So, I think over and now we've got a period where ESG, having been having grown at an incredible rate, is being tidied up by the regulators, particularly in the European Union. You now have new rules which require investment funds that claim to be ESG to demonstrate that that is probably the case. And we've seen something like 900 funds remove all of the claims that they made. So, it's quite a big number of funds who've been forced to give up ESG washing, a form of green washing.

And I think that's healthy, because I think that what very often happens, and it happens with sustainability, it happened with a triple bottom line, it's happened with the. SG, it'll happen with circularity, with all of these different concepts, is that as firms, as business and they may be in the financial sector, embrace these different concepts. They dilute them. They don't always intend to do that, but they just make them comfortable for the world in which they live. And what that means over time, you may believe in homeopathy, I don't. I don't believe that something that is has disappeared, leaves a trace and the back can treat you well. I don't believe that ESG can be watered down to the point where there's almost nothing left, and that can help save the world. I think that's just delusional.

So, I think we need a clean-up, and I think what we're getting now is a fairly fierce correction. And it's not just anti ESG and the ESG recession, its anti-woke a whole raft of different things have been challenged at the same time. Final thing I would just say on that is, I think that's the biggest opportunity of our careers, possibly even our lifetimes, because now we're at the point where we have to think, if not that what we've been doing to date, then what? And we've got a very short period of time in which to sort that question out.

5. In your view, which industries should be the first to adopt the TBL as a mandatory practice?

Which sectors of the global economy should be the first to be forced. Well, let's put it more gently, I'm encouraged to adopt mandatory requirements in relation to the triple bottom line. Well, I actually think one of the critical sectors which, in my mind, would be very early on, there's there are combination one is water. Water is going to be increasingly a security issue, not just in desert countries, but as we see now in Europe with the heat waves, people are being told that they probably won't be able to fill their swimming pools. In the future, they'll have host pipe bands, as we see in my own country, the United Kingdom.

So, I think water is one of those areas where I think it's a natural target or a natural application area for the triple bottom line, a very, very closely related one, is food and drink and agriculture is going to be already is being very hard hit by climate change. It's one of the biggest factors worldwide in the loss of biodiversity. So that is going to start to register with people. The pressure is going to come on farmers and farming and the whole agricultural supply chain, and that's one of the reasons why, increasingly, we hear people talking about regenerative agriculture, and if you took the same concept and you cross supplied it into the water sector, then the question would, how do you regenerate watersheds, water catchment areas such that they don't just dump you? Rain comes in fiercer and fiercer storms, goes into rivers through drains, goes out of the river because they're canalized and out into the sea. And so, water utilities, water firms find it very much harder now because they don't have the storage capacity.

So how would you regenerate aquifers? How would you generate water catchment areas such that they better retained water until we actually needed the problem at the moment is we just then have to pump rivers when they're already very low, and that means that they're very hot, and that means that very much warmer than in normal conditions, and that also means that fish and other life forms are hugely impacted. So, I would say water, I would say food and drink. But in the end, any sector that is creating goods and services for people really ought to have this sort of framework in mind. And when you look at the B Corporation world, you'll find that it straddles many, many different sectors of the economy. And I think that's just reflection that if this is for anybody, it's actually for everyone.

6. How has your own perspective on sustainability evolved over the past 30 years?

When in 1987 we set up a company called sustainability, and that was my choice of word, we regretted it for a number of years. I mean, not we were happy. We picked it, but we regretted it because it meant nothing to nobody, and people would send us letters. Then we did still get letters, and they would be addressed as sustainability. Survivability. All these people just didn't know the term. Now it's endemic. Everyone thinks they know the term, and they think they know what it means. The problem is that they understand the term in quite different ways. So, my own thinking about sustainability has evolved when we set it, when we set up the company sustainability, I was it was the same year 1987 when the Brundtland Commission report came out.

Gro Harlem Brundtland, three times Prime Minister of Norway, chaired that and in that report, and I was involved in putting the report together. There was economic, there was social, there were environmental objectives already. You had that sort of thinking in play. What I did was just to try and make it more relevant to the business world by calling it triple bottom line. I think what's happened over the intervening decades is that I've come to see this whole agenda as very much more systemic than even I realized back in the late 80s. I already knew it was a system change agenda, and when we set up valence in 2008 it was specifically to address the system change agenda as it applied to business and financial markets.

So, I think, I think what's changed during that period of time, partly, is the scientific context. So, for example, for 11,700 years, we've been in what we choose to call the Holocene geological epoch. And that's the period in which our agriculture, our urban civilizations and so on have evolved. Scientists now say, not all of them, but a significant group, say that we're now in the Anthropocene. So, the first time in human history, the first time in geological history where a single species, our own, Homo sapiens, is having effects on the planet which are akin to geological forces, volcanoes, earthquakes, you know all of this.

And that's interesting, because that suddenly puts in a scientific frame the sustainability agenda, in a way that's much harder for firms to gain, because it's very easy for firms to say, we do a sustainability report, we embrace sustainable finance or sustainable transport or Sustainable Food or whatever it happens to be that they the language that they choose. But you can then ask in the Anthropocene, how does your approach really measure up in a world headed towards from eight to 10 billion people? Does it? Does it really stack up? Will it really help rein in climate change, loss of biodiversity, these sorts of issues at the rate that we now need to deliver.

And the answer in almost every country in the world currently would be, if they're honest, no, it doesn't. It simply doesn't stack up now they will then tend to point to government and say it's government's fault. Government should regulate and will obey, but they spend much of their time trying to stop government regulating for these sorts of things. They don't like the idea of a carbon tax we've just done with globe scan and Canada erm Sustainability Institute, which is basically worldwide, and our own company, volunteers have done a survey of sustainability professionals, professionals around the world. It's called sustainability at a crossroads, and later on today, July the 15th, 2025 we'll do a webinar.

Well over 1000 people already signed up for that. And what's interesting from the results of that survey, which I insisted that globe scan and erm do, because I found it increasingly boring and frustrating to do the standard questions that they've done for 20 plus years. They need the time series data to see how things have changed over time. But I said we're at extraordinary times. The questions do not address the sorts of issues that we're now having to face. So, I talked about eight to 10 billion people.

Well, that's the population growth agenda, and we've been obsessing about that, quite naturally, for a long time, or ignoring it. What we're ignoring totally at the moment is the depopulation agenda. I noticed this morning in the Financial Times, the biggest baby food manufacturer in Japan has just stopped. Is producing all baby foods. It's the preferred brand in many different areas, and the reason is, there aren't enough babies in Japan. And what's true of Japan? So you have very rapidly aging populations, it's also true of China.

In Europe, it's particularly true of countries like Italy, but we'll feel the effects of this aging trend and the extraordinary imbalances and injustices that are increasingly sensed across those generational boundaries, divides, and so when I think about the triple bottom line, I'm not simply thinking about this particular company and this particular market with these particular geographies in mind. I'm thinking about our civilization and its future. I'm thinking about our societies, not just our economies. And if we fail to address some of these really big issues, like depopulation, I think we will fail on many other fronts at the same time.

So this is a much bigger story than I think I properly recognized back in the late 1980s I don't think that most people in the sustainability industry yet properly acknowledge that, and yet the biggest surprise for me, of this in the survey is that 93% of respondents say that sustainability needs to be refreshed revamped, and 57% say it needs a radical Change. And I think that's new. I think I think these are people like Chief Sustainability officers saying this, that is new. When we set up violence in 2008 that's where we hope to get to, a lot faster than we've got that. But what's happening is this, having press being pressed forward, driven forward by a series of increasingly problematic challenges, and not just for business and not just financial markets, for all of us.

7. How do you see the future of the Triple Bottom Line in the context of climate crisis, social polarization, and rapid technological change?

So, one of the questions that can be asked is, is there a future for the triple bottom line? And in a way, I would love to sort of say, you know, did its work, end of story. But in a way, it's like a compass. It's got three points on it rather than four, but it's basically helping people think about and navigate through the social disruptions, the economic disruptions, the environmental crises that we increasingly face, and as I mentioned earlier on, the political chaos in some ways that surrounds all of this, the way in which some of these new technologies are damaging the basic process of democracy.

My personal view is that AI is not guaranteed to be the answer to anyone's prayers, and at the moment, people are quite naturally obsessing about the energy, particularly electricity and water footprint, of some of these big data processing sites that the big AI firms require. But you're beginning to see early applications of AI in areas which are of critical interest to the sustainability world. So for example, one of the really big problems, and it's a geopolitical and it's a geo economic challenge, is that China has very strategically positioned itself on the commanding heights of tomorrow's economy. So, if you look at rare earth, metals and minerals, you look at solar and batteries and wind, you look at electric vehicles.

You look at precision fermentation. You look at drones. You look at AI. Wherever you look, China is developing some form of stranglehold on those areas the economy. And it's not accidental. I mean, firstly, they want to be a successful economy and country in the 21st Century, but also, they are weaponizing some of those areas. And critically, the rare earth, minerals and metals sector is really being used as a weapon now, and I think what's happening as a result of that is that people are beginning to recognize that the sustainability agenda isn't a nice to have. It's actually fundamental. It's about security. And it's interesting that during the pandemic, one of the projects I did was with the British Ministry of Défense.

So I did a session with admirals and generals and air marshals, and we were talking about climate chaos, and they were interested in and already thinking about forced migration on a scale that we haven't Europe has not seen today that the Americans haven't seen today, but we will see and some of that's forced by conflict, and we'll see a lot more of that. So, it's forced by the scarcity of critical resources like water.

And I would just say that the some of the best of those people that I interacted with are more thoughtful, are more sensitive to are more concerned about these sorts of issues than any CEO I've ever met, and the reason is they have to be now at the moment, business can sort of get away by sort of hiding in The shadow of Trump and his ilk, and they can lobby for the European Union to water down its reporting and due diligence, other directives and regulations and so on. But in the end, this is going to catch up with us all, and those firms that have failed to do enough, as this becomes properly a security concern will find that what used to be viewed as a relatively soft agenda will develop the characteristics of reinforced concrete. It'll come at them really, really hard, very fast, much faster than they used to and it'll be life on earth if they

can't cope, if they can't adapt in the necessary timescales, those brands, those firms, will die. So, this is an extinction event. Either you're on the right side of history or you're on the wrong side.

8. Do you think the Triple Bottom Line can become a universal reporting standard for all businesses?

When I came up with the triple bottom line, I had, I mentioned a compass a moment ago. I had three points in mind. They could go economic, social, environmental. You could put the points wherever you like, on the triangle. And then in the middle of the triangle, I saw things like governance, like politics. Like education. So, they were enablers or constraints on the interplay between the other three factors. One of the things that we quite quickly saw was people trying to add purpose and politics and policy and, well, not all P's, but I mean lots of different things. So, they would have a quadruple bottom line, they'd have a quintuple bottom line, and so on. I actually think there's a real benefit to simplicity. I think the human brain, certainly, my brain, finds it much easier to remember three things than to remember even four or five things.

So, I stick with the idea that we think about the economic, the social and environmental dimension of what any business does. It's a huge useful framework. Now you can think about shared value, for example, as a way of plotting, mapping, managing for overlaps between the different areas. One of the big disagreements I had with Michael Porter and Mark Kramer when they came up with the shared value proposition, was that for them, shared value was always a win outcome. And my point was, sustainability isn't all about Win outcomes. It may actually be about Win, lose. It may even, in some cases, have been lose, lose, in a sense that for a period of time, because you're shutting down an industry, there's a social cost of that, even environmental cost, because you don't have the revenues still to clean up the mess that the industry has made.

So, I think the triple bottom line will live on, because it's simple, because there's an installed base, and it's not just the 10,000 plus B Corporations. I mean, there are many, many 1000s around the world, firms around the world who report against the Global Reporting Initiative on similar standards. But I think the challenge over time will be to integrate value creation across those multiple forms of capital, those multiple forms of value creation or destruction. And one of the things I'm very struck by is the number of young people who come up to me, not just the conferences in the community where I live in London, who now are being taught at university, not just business schools. The Triple Bottom Line as part of the standard equipment for people who are going to be involved in business.

Now, I think that's great, but the question is, is that also true of government? Is that also true of financial markets? Is that also true of the civil society sector and so on? Because if it's just business doing this, then you've got them doing the accounting, you've got them doing the reporting, and all of that reporting is coming out in the form of triple bottom line, non-financial extra financial sustainability, ESG, whatever reports, but who's actually using the reported data and information In a way that properly directs our economies and societies in the right direction, and my sense is we're not yet properly using all of that data and information to create market intelligence for the future. And I think AI might well help with that, because it has this capacity to absorb huge amounts of information and produce interesting, often usable and sometimes reliable intelligence.

So, it's, again, one of the reasons why I've spent quite a lot of time recent years visiting some of the AI firms, trying to get a sense of what they're doing and what, trying to work out what might cross apply of what they're doing into the sustainability space. And a final point is one of the things I've found is that the people in the AI firms are radically younger than I am,

but they also really want to address the sustainability agenda, because it's their future. It's not something that they choose to opt into. It's just something. It's a natural thing out there.

The question is, how they then come at it, whether they see a degree of responsibility or they blame older generations. And I think that intergenerational form of politics is one of the forms of friction in all of this, which we will see a very great deal more of in the coming years and possibly even decades, absent the right sort of leadership, with the right sort of leadership, then we could actually address these things quite quickly. But I'm not always confident that human beings. General and politicians in particular, will do the right thing.

9. If you could give just one piece of advice to young entrepreneurs committed to sustainability, what would it be?

Immediately, I came into the sustainability space when I was young, so in my 20s, initially through the environmental door, but then increasingly on a much broader front. One thing I've discovered over time in the civil society movement, in business, also to some degree, in the financial world, in the world of governance and government and public policy, is there are some fascinating people trying to do good work. And one of the things I would suggest to anyone of whatever age, but particularly younger people coming into this space, is go out and see people, go and talk to people, go and try and find out what they're trying to do, what's working, what does, what isn't working. And very quickly, you'll build up a picture of the force fields in the space.

You'll also get a sense of where you should probably be applying your efforts over the years and the case of your working lives and careers. But the one thing I would say, don't expect a guaranteed sustainability branded or labelled role to be there. I think Chief Sustainability officers, for example, with enormous expansion in their number in different parts of the world, is that that population is going to be squeezed somewhat because we see chief economist, chief financial officers, all sorts of people suddenly seeing in the Chief Sustainability Officer budgets opportunities to take some of that work away into their own CFO reporting activities or whatever it might be.

Nonetheless, the total number of roles in this space, broadly defined, can only grow over time. We will see the ESG recession, and with a reinvention of ESG, we'll see the sustainability recession, and with a reinvention of sustainability, and that process of reinvention, of rediscovery, in some ways, is an area where I think the triple bottom line will continue to have real world applications and utility. So, consider it, but don't. Don't use it as the only tool. Just consider some of the other tools that are out there and use it where it makes sense to use it, but as with the compass, the triple bottom line, I think, helps Orient, orient us and our organizations at a time when everything seems to be in flux, and if we think that's going to improve by next Tuesday or next Wednesday, I think that would be a category error.

I think would be a fundamental mistake. I think we're entering into a period of 10, 1215, years where disruption will become absolutely endemic, and the capacity of us all, not just high visibility branded firms, to navigate through that will be a test of leadership in every possible dimension. I happen to find that exciting. I happen to find that interesting as a set of challenges. But some people recoil from it just thinking it's frightening, and they don't know how to deal with it. We're all going to have to deal with it. And I think sustainability as a set of conversations, not just as a set of principles or tools, is going to be critically important. Good luck.