The Green Engine of Growth: Unraveling the impact of ESG, green marketing, R&D investments, and sustainable innovation on business expansion

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ABSTRACT

The pursuit of sustainable development has become an essential component of contemporary business strategies, as organizations increasingly recognize the importance of environmental, social, and governance (ESG) practices in fostering long-term growth. This master thesis aims to investigate the impact of ESG, green marketing, research, and development (R&D) investments and sustainable innovation on business expansion. By examining the relationships among these critical factors, the study seeks to provide valuable insights into how organizations can effectively leverage sustainable practices to enhance their growth and competitive positioning in the market.

The research employs a quantitative methodological approach, utilizing a structured questionnaire survey administered to a diverse sample of companies across various industries, ranging from small enterprises to large multinational corporations.

The survey specifically gathers data concerning the implementation of ESG practices, the adoption of green marketing strategies, the allocation of R&D investments towards sustainability initiatives, and the influence of sustainable innovation on business expansion.

The collected data will undergo statistical analysis to explore and quantify the relationships among ESG, green marketing, R&D investments, sustainable innovation, and business expansion. The outcomes of this research have the potential to significantly contribute to existing scholarly literature on sustainable business practices. Specifically, the findings will elucidate the extent to which ESG practices, green marketing strategies, R&D investments and sustainable innovation positively impact business expansion. Furthermore, the study will identify drivers and barriers organizations face when adopting sustainable practices, ultimately providing practical recommendations to enhance their effectiveness and strategic impact on business growth.

Keywords: Sustainable Development, Green Marketing, R&D Investments, Sustainable Innovation, Sustainable Performance, Enterprise ESG Performance, Business Expansion

ΠΕΡΙΛΗΨΗ

Η επιδίωξη της βιώσιμης ανάπτυξης έχει καταστεί απαραίτητο στοιχείο των σύγχρονων επιχειρηματικών στρατηγικών, καθώς οι οργανισμοί αναγνωρίζουν ολοένα περισσότερο τη σημασία των πρακτικών περιβαλλοντικής, κοινωνικής και εταιρικής διακυβέρνησης (ESG) για την επίτευξη μακροπρόθεσμης ανάπτυξης. Η παρούσα μεταπτυχιακή διπλωματική εργασία διερευνά τον αντίκτυπο των πρακτικών ESG, του πράσινου μάρκετινγκ, των επενδύσεων σε έρευνα και ανάπτυξη (R&D), καθώς και της βιώσιμης καινοτομίας στην επιχειρηματική επέκταση. Μέσα από τη μελέτη των αλληλεπιδράσεων αυτών των κρίσιμων παραγόντων, η έρευνα επιδιώκει να προσφέρει χρήσιμα συμπεράσματα σχετικά με τον τρόπο που οι οργανισμοί μπορούν να αξιοποιήσουν αποτελεσματικά τις βιώσιμες πρακτικές, ώστε να ενισχύσουν την ανάπτυξη και την ανταγωνιστική τους θέση στην αγορά.

Η έρευνα υιοθετεί ποσοτική μεθοδολογική προσέγγιση, χρησιμοποιώντας δομημένο ερωτηματολόγιο που διανεμήθηκε σε ένα αντιπροσωπευτικό δείγμα εταιρειών από διάφορους κλάδους, που περιλαμβάνουν τόσο μικρές επιχειρήσεις όσο και μεγάλες πολυεθνικές εταιρείες.

Το ερωτηματολόγιο επικεντρώνεται στη συλλογή δεδομένων που αφορούν την εφαρμογή πρακτικών ESG, την υιοθέτηση στρατηγικών πράσινου μάρκετινγκ, την κατανομή επενδύσεων σε R&D που στοχεύουν σε πρωτοβουλίες βιωσιμότητας, καθώς και την επίδραση της βιώσιμης καινοτομίας στην επιχειρηματική επέκταση.

Τα δεδομένα που θα συλλεχθούν θα αναλυθούν στατιστικά, προκειμένου να διερευνηθούν και να ποσοτικοποιηθούν οι σχέσεις μεταξύ ESG, πράσινου μάρκετινγκ, επενδύσεων σε R&D, βιώσιμης καινοτομίας και επιχειρηματικής ανάπτυξης. Τα ευρήματα της έρευνας αναμένεται να συμβάλουν σημαντικά στην υπάρχουσα επιστημονική βιβλιογραφία σχετικά με τις βιώσιμες επιχειρηματικές πρακτικές. Συγκεκριμένα, τα αποτελέσματα θα αποσαφηνίσουν τον βαθμό στον οποίο οι πρακτικές ESG, οι στρατηγικές πράσινου μάρκετινγκ, οι επενδύσεις σε R&D και η βιώσιμη καινοτομία επηρεάζουν θετικά την επιχειρηματική ανάπτυξη. Επιπλέον, η μελέτη θα εντοπίσει συγκεκριμένους παράγοντες που είτε διευκολύνουν είτε δυσχεραίνουν την υιοθέτηση βιώσιμων πρακτικών από τους οργανισμούς, παρέχοντας πρακτικές προτάσεις για τη βελτίωση της αποτελεσματικότητάς τους και του στρατηγικού τους αντίκτυπου στην ανάπτυξη των επιχειρήσεων.

Λέξεις κλειδιά: Βιώσιμη Ανάπτυξη, Πράσινο Μάρκετινγκ, Επενδύσεις σε Έρευνα και Ανάπτυξη (E&A), Βιώσιμη Καινοτομία ,Βιώσιμη Επίδοση, Επίδοση ESG των Επιχειρήσεων, Επιχειρηματική επέκταση

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SYMBOLS AND ACRONYMS

CFP	Corporate Financial Performance
CS	Corporate Sustainability
CSV	Creating Shared Value
ESG	Environmental, Social and Governance
FFE	Fuzzy Front End
GDP	Gross Domestic Product
GRI	Global Reporting Initiative
IGM	Internal Green Marketing
IGMO	Internal Green Marketing Orientation
LCA	Life Cycle Assessment
MDGs	Millennium Development Goals
NPD	New Product Development
PPPs	Purchasing Power Parities
R&D	Research and Development
SASB	Sustainability Accounting Standards Board
SDGs	Sustainable Development Goals

SGM	Strategic Green Marketing
SR	Stakeholder Risk
TBL	Triple Bottom Line (TBL)
TCFD	Task Force on Climate-related Financial Disclosures
TGM	Tactical Green Marketing
TGMO	Tactical Green Marketing Orientation
WCED	World Commission on Environment and Development

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1. INTRODUCTION

As the global economy shifts toward a more sustainable and inclusive model, businesses face increasing pressure to move beyond short-term profitability and adopt strategies aligned with long-term environmental and social objectives. Within this evolving landscape, six critical dimensions—Sustainable Development, Green Marketing, R&D Investments, Sustainable Innovation, Sustainable Performance, and Enterprise ESG Performance have emerged as central to reimagining growth in a way that is both responsible and resilient.

This dissertation explores how these six pillars interact to influence business expansion in the modern era. Positioned within the domains of sustainability management and innovation strategy, the study investigates how firms can embed sustainability not merely as a compliance requirement, but as a strategic lever for innovation, differentiation, and long-term value creation.

Sustainable development provides the overarching framework, emphasizing a balance between economic progress, environmental responsibility, and social equity. Green marketing is increasingly recognized not only as a communication tactic but also as a strategic differentiator that reflects a company's commitment to environmental values. When R&D investments are directed toward sustainability goals, they lay the foundation for sustainable innovation—the development of products, services, or processes that reduce environmental harm while creating economic and social value.

Collectively, these efforts contribute to a company's sustainable performance, reflecting its ability to achieve long-term success while managing environmental and societal impacts. Enterprise ESG performance offers a structured lens through which to assess a company's adherence to environmental stewardship, social responsibility, and governance best practices—factors increasingly prioritized by investors, regulators, and stakeholders.

Despite the growing significance of these domains, there remains a limited understanding of how they collectively shape business growth trajectories. This study seeks to address that gap by providing an integrated, empirical assessment of the relationships among these six variables and their combined impact on business expansion. Drawing on data from a broad spectrum of Greek industries, the research identifies best practices, common obstacles, and contextual factors that influence the effectiveness of sustainability-driven strategies in fostering competitive advantage.

2. THEORY

2.1 DEFINITIONS

This section presents the key definitions that form the conceptual foundation of the research, ensuring clarity and consistency throughout the master thesis.

Sustainability

Sustainability is the ability to maintain or preserve the conditions necessary for continued existence or success over time. This includes preserving natural resources and biodiversity, reducing pollution and greenhouse gas emissions, and promoting social and economic well-being.

The word sustainability is derived from the Latin sustinere (tenere, to hold; sus, up). The way in which sustainability is used nowadays is based on the English term "sustainability," which is an expression of the possibility of a certain matter to be supported. Sustainability is seen as a paradigm for thinking about the future in which environmental, societal, and economic considerations are balanced in the pursuit of an improved quality of life. The ideals and principles behind it lie in broad concepts such as intergenerational equity, gender equity, social tolerance, poverty alleviation, environmental preservation and restoration, natural resource conservation and building just and peaceful societies ("Encyclopedia of Corporate Social Responsibility," 2013).

Sustainable development, by contrast, is a broader concept that encompasses sustainability, but also includes the idea of meeting the needs of the present without compromising the ability of future generations to meet their own needs. This means that sustainable development considers economic, social, and environmental considerations, aiming to balance these dimensions.

In other words, while sustainability is an end goal, sustainable development is a process to achieve that goal.

Sustainable development

Sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). This concept emphasizes an integrated approach to achieving long-term sustainable growth by balancing economic, social, and environmental objectives**.**

Sustainable Development Goals (SDGs)

The SDGs outline a global framework for sustainability, comprising 17 interconnected goals that address the major challenges facing humanity, such as poverty, inequality, climate action, peace,

and environmental degradation. The SDGs aim to guide global efforts towards sustainable development by 2030 (United Nations Transforming Our World: The 2030 Agenda for Sustainable Development. A/RES/70/1, 2015).[1]

Business sustainability

Business sustainability refers to the practices and strategies that companies implement to manage financial, social, and environmental risks, obligations, and opportunities. These practices are designed to ensure long-term economic performance and value creation while contributing positively to society and minimizing environmental impact. Business sustainability encompasses not only environmental sustainability but also a firm's commitment to ethical governance, social equity and economic prosperity. By integrating these dimensions into their core operations, businesses aim to foster resilience, innovation and growth that can endure over time, benefiting shareholders, stakeholders, and the broader community.

Sustainable performance

Sustainable performance refers to a company's ability to achieve long-term success while minimizing negative environmental and social impacts. It is accomplished through implementing sustainable business practices that prioritize adding value for stakeholders while also managing environmental, social and governance (ESG) risks and opportunities.

Innovation

The Oslo Manual distinguishes between innovation as an outcome (an innovation) and the activities by which innovations come about (innovation activities). The 2018 edition defines an innovation as *"a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)".* This general definition is given a more precise formulation for use with businesses, which represent the focus of this manual(OECD, 2018).

Sustainable innovation

Sustainable innovation involves creating and applying novel solutions—ranging from products and services to processes and business models—that advance environmental protection, economic viability, and social equity simultaneously. It encompasses innovations that lead to a reduction in environmental risks, optimize the use of resources, and contribute positively to the economy and society. The goal of sustainable innovation is to ensure that development meets today's needs without compromising the ability of future generations to meet their own, thereby aligning economic growth with environmental stewardship and social progress (Adams et al., 2016).

[1] https://sdgs.un.org/

Environmental, Social and Governance (ESG)

Environmental, Social, and Governance (ESG) criteria encompass a set of practices for assessing how a company performs in areas that are crucial to sustainable, ethical, and responsible business operations.

- **Environmental:** This factor considers a company's stewardship of the environment. It evaluates how the company's daily operations impact the environment and measures their commitment to ecological sustainability. This includes, but is not limited to, energy use, waste management, pollution, and natural resource conservation.
- **Social:** This aspect examines how the company manages relationships with its employees, suppliers, customers, and the communities in which it operates. It includes the company's business ethics, labor standards, and how it contributes to the community.
- **Governance:** Governance involves the internal systems of practices, controls, and procedures a company adopts in order to govern itself, make effective decisions, comply with the law, and meet the needs of external stakeholders. This includes but is not limited to considerations such as corporate audit and internal controls, board diversity, executive remuneration, and shareholder rights.

The ESG framework assists stakeholders in evaluating how well a company manages sustainability-related risks and opportunities. These criteria are increasingly relevant in assessing the sustainability and ethical impact of investments, especially given their potential to influence financial performance and investor satisfaction (Au et al., 2023).

ESG performance

ESG performance refers to a company's ability to effectively manage and report on its environmental, social, and governance practices. It involves evaluating how well a company adheres to ESG criteria that assess its impact on the environment, its relationships with employees, customers, and communities, and the governance standards that guide its operations and policies. ESG performance is often quantified through ratings or scores, which provide a comparative measure of a company's sustainability and ethical practices relative to industry standards or peer organizations. These metrics are crucial for investors, consumers and regulatory bodies interested in the sustainability and ethical implications of a company's operations (Whelan et al., 2021).

Green marketing

Green marketing refers to promoting products or services by emphasizing their environmental benefits. Practices may include reducing the environmental impact of products or packaging and using sustainable business practices and marketing strategies to appeal to environmentally conscious consumers (Papadas et al., 2017).

Strategic Green Marketing (SGM)

Strategic green marketing orientation refers to long-term, top management actions and policies specifically focusing on corporate environmental strategy. For instance, forming partnerships and collaborations with organizations that follow similar environmental policies would be considered a strategic green marketing initiative (Papadas et al., 2017). This approach prioritizes environmental sustainability, focusing on developing and promoting products or services that are environmentally friendly throughout their lifecycle—from design and production to distribution and disposal. Strategic green marketing is designed to meet consumer demand for eco-friendly products while enhancing the company's reputation and competitive edge in the market (Papadas et al., 2019).

Tactical Green Marketing (TGM)

Tactical green marketing orientation involves short-term actions that transform the traditional marketing mix into a greener one. This typically involves adjustments in marketing strategies that are directly related to promoting sustainable practices, such as utilizing eco-friendly materials in product packaging, reducing carbon footprints in logistics, or emphasizing digital over physical marketing materials to reduce waste. Tactical green marketing actions are focused on creating immediate environmental benefits that are tangible and measurable, which supports the broader strategic goals of an organization's commitment to sustainability (Papadas et al., 2017).

Internal Green Marketing (IGM)

Internal green marketing is defined as the incorporation of sustainable and environmentally responsible practices within the internal operations and culture of a company. This involves initiatives that improve energy efficiency, reduce waste, and promote recycling among employees. Internal green marketing aims to align a company's internal environment with its external green marketing strategies, enhancing overall corporate sustainability and strengthening its reputation among stakeholders (Papadas et al., 2017).

Research and Development (R&D)

The Frascati Manual, published by the Organization for Economic Co-operation and Development (OECD), defines Research and Development (R&D) as creative and systematic work undertaken to increase the stock of knowledge, including knowledge of humanity, culture, and society, and to devise new applications of available knowledge. The primary objectives of R&D are to discover new facts, develop new products and processes, and improve existing products and processes (OECD, 2015).

Research and Development (R&D) investments

R&D investments are the financial resources allocated by companies to create or improve products, services, or processes. These investments are crucial for fostering innovation, particularly in the development of sustainable technologies and practices that align with long-term environmental and social goals.

Gross domestic spending on R&D

Gross domestic spending on R&D is defined as the total expenditure (current and capital) on R&D carried out by all resident companies, research institutes, universities, and government laboratories, etc., in a country. It includes R&D funded from abroad but excludes domestic funds for R&D performed outside the domestic economy. This indicator is measured in USD constant prices using 2015 base year and Purchasing Power Parities (PPPs) and as percentage of GDP (OECD, 2023).

Business expansion

Business expansion refers to the strategies and actions that a company undertakes to grow beyond its current operational size and capabilities. This can involve increasing the company's market presence, diversifying its product offerings, entering new geographical areas, or acquiring other businesses. The goal of business expansion is typically to increase profitability, grow market share, and enhance stakeholder value.

2.2 LITERATURE REVIEW

2.2.1 Sustainability and sustainable development

Sustainability and sustainable development are essential frameworks shaping modern environmental, economic, and social policies. Sustainability refers to the responsible use of natural resources to meet present needs without compromising future generations. Sustainable development expands on this by promoting a more holistic strategy that integrates ecological balance, economic growth, and social equity. It addresses global challenges such as resource scarcity and pollution, not merely through impact management, but by enabling systemic change aimed at building a resilient and equitable global society.

2.2.1.1 Evolution of sustainable development: Historical to modern perspectives

Sustainable development is now firmly embedded in global policy agendas and corporate strategy, yet its conceptual origins predate its widespread adoption in the late 20th century. The foundational principles of sustainability can be traced to early 20th-century conservation movements, which advocated for the prudent management of natural resources and cautioned against the unchecked pursuit of economic growth. These early frameworks established the philosophical and practical groundwork for the modern understanding of sustainability.

A major turning point came in the 1970s. In 1972, the Club of Rome published *The Limits to Growth*, a study that used computer models to simulate the impacts of unchecked population and industrial growth. The report warned that without significant changes, humanity would face severe resource shortages and ecological collapse within a century (Meadows et al., 1972). Its message was clear: infinite growth is impossible on a finite planet. Though initially controversial, the study inspired a wave of environmental thinking and helped shape modern sustainability discourse (Döring & Aigner-Walder, 2022).

Figure 1 shows that if society follows a path of unregulated growth, key variables like industrial output, population, and food production are expected to peak mid-century and then sharply decline, while pollution increases and resource availability plummets. These projections have proved remarkably resilient in recent updates, aligning closely with observed global trends.

That same year, the United Nations hosted the Conference on the Human Environment in Stockholm—the first major global effort to connect environmental issues with development. It marked a shift in international thinking, framing environmental challenges as shared global responsibilities.

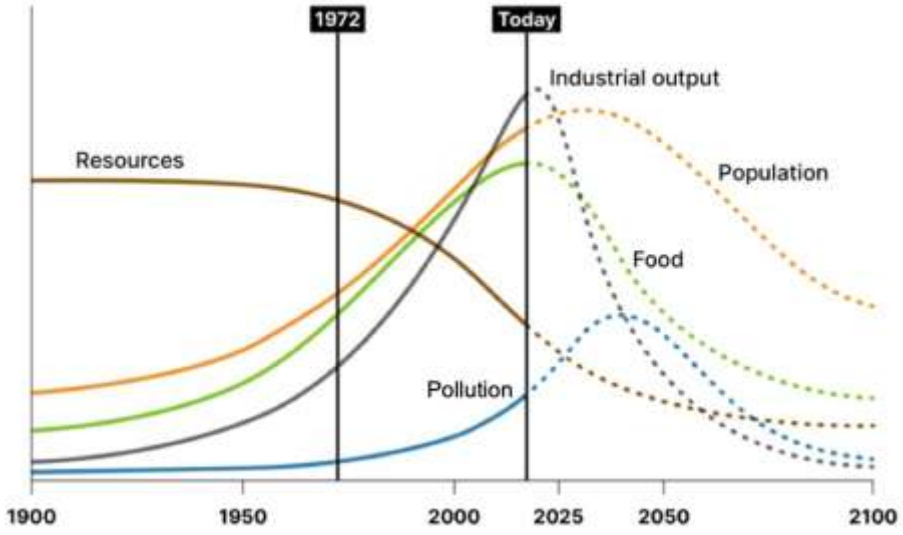


Figure 1: Simulated dynamics of key global variables from 1900 to 2100 in The Limits to Growth scenario. Adapted from Meadows et al. (1972), Earth4All.

Furthermore, the term "sustainable development" gained international recognition with the publication of the Brundtland Report (Our Common Future) in 1987, by the World Commission on Environment and Development (WCED). It defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). This definition emphasized the need to balance environmental protection, social well-being, and economic progress—now widely known as the "three pillars" of sustainability.

The Brundtland Report not only offered a definition; it framed sustainability as a global responsibility. It called for long-term thinking, equitable development, and broad participation from all sectors—governments, businesses, civil society, and local communities. It also introduced the principle of intergenerational equity: the idea that we owe it to future generations to preserve the planet's natural systems and resources.

Following the Brundtland Report, the 1992 Earth Summit in Rio de Janeiro expanded global commitment to sustainability. It led to the adoption of Agenda 21, the Rio Declaration, and the creation of the Commission on Sustainable Development (UNCED, 1992). These agreements helped institutionalize sustainable development across national and international policies.

In 2000, the United Nations introduced the Millennium Development Goals (MDGs), which addressed poverty, health, and education. Although they didn't explicitly use the term "sustainable development," the MDGs laid the groundwork for broader sustainability goals (United Nations, 2000) .

The concept reached a new level of maturity in 2015 with the adoption of the Sustainable Development Goals (SDGs)—a set of 17 goals designed to tackle global challenges like poverty, inequality, climate change, and environmental degradation (Le Blanc, 2015) .The SDGs marked a shift toward a more integrated, universal vision of sustainability, requiring collaboration from all nations and sectors.

Alongside these global agreements, new frameworks have emerged to deepen our understanding of sustainability. One such concept is the "One Planet Approach," which emphasizes living within Earth's ecological boundaries (Jeanrenaud et al., 2017). This model argues that nature is the foundation of all life, including human societies. As Jeanrenaud et al. (2017) put it, "there is no business to be done on a dead planet."

This thinking is aligned with the model of strong sustainability, which holds that natural systems are not interchangeable with economic or social systems. Without healthy ecosystems, human life and economies cannot function. Ecologically, sustainability implies that biological systems should retain their diversity, strength, and productivity over time, which is crucial for the well-being of humans and other life forms (Kopnina & Blewitt, 2018). From a corporate point of view, sustainability means running businesses in ways that avoid depleting natural resources or harming communities—ensuring long-term viability (Alexandra Spiliakos, 2018).

All these approaches—whether framed through resources, ecology, or business—share a core idea: today's actions must not compromise tomorrow's opportunities. The One Planet Approach brings this home by reminding us that sustainable development means balancing our current needs with the limits of the planet.

In summary, sustainable development has evolved from early conservation ideals to a robust global framework. From The Limits to Growth and the Brundtland Report to the SDGs and the One Planet Approach, the world has increasingly recognized that economic and social development must be rooted in environmental responsibility. Today, sustainability is no longer optional—it is a shared

commitment to building a future that is fair, resilient, and capable of sustaining life for generations to come.

2.2.1.2 The Sustainable Development Goals

The Sustainable Development Goals (SDGs) were adopted in 2015 by the United Nations as a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030. These 17 goals build on the success of the Millennium Development Goals (MDGs) and aim to go further to end all forms of poverty. Unlike the MDGs, the SDGs apply to all countries and focus on five key areas: people, planet, prosperity, peace, and partnership. The SDGs are illustrated in Figure 2.

Figure 2: Sustainable Development Goals. Source: adapted from (United Nations, 2019)

The private sector plays key role in advancing SDGs. By integrating sustainability into their operations and value chains, businesses can not only contribute to global development but also foster innovation, competitiveness, and resilience. For instance, Unilever has committed to sourcing all its agricultural raw materials from suppliers that can demonstrate a 50% reduction in environmental impact, while also pledging to improve the health and well-being of one billion people by 2030. These initiatives directly support SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action).

Similarly, IKEA has announced its aspiration to become “climate positive” by 2030 by investing in renewable energy initiatives as well as designing sustainable products to stimulate demand for sustainable consumption patterns. These commitments intersect with SDG 7 (Affordable and Clean Energy) and SDG 13.

Innovation also plays a crucial role in advancing the SDGs. Tesla, for example, is developing electric vehicles and sustainable energy storage solutions to reduce the carbon footprint of the transportation sector (Tesla, 2021), thereby contributing to SDG 13. The wind energy sector supports SDG 7 by expanding access to sustainable energy sources. Companies such as Vestas and SolarEdge are at the forefront of innovation in renewable energy technologies.

Looking ahead, investment in the SDGs is expected to focus on the development of new business models that prioritize sustainability at their core and extend their impact across value chains. An increasing number of companies recognize that sustainability not only drives long-term profitability but also enhances corporate reputation and social license to operate. In this regard, the UN Global Compact encourages businesses to support an inclusive, sustainable development agenda.

However, aligning with SDGs presents significant challenges. Balancing short-term financial goals with long-term sustainability commitments is particularly difficult in industries driven by quarterly results, where sustainable investments might initially increase costs(Sachs, 2015). Furthermore, the complexity of measuring and reporting SDG impacts poses a challenge. Although frameworks like the Global Reporting Initiative provide guidelines, companies struggle to quantify impacts in meaningful ways to stakeholders (KPMG, 2019).

The regulatory environment also affects business engagement with SDGs. Fluctuating support for sustainability initiatives and policy uncertainties can undermine long-term sustainable investments. Businesses need stable regulatory frameworks to commit to SDG targets effectively. When business engages with the SDGs in a meaningful way, it strengthens its own competitive edge while delivering social and environmental benefits at scale. The private sector's positive and proactive involvement can help accelerate progress towards several SDGs which in turn can have a ripple effect promoting economic, social, and environmental well-being at greater scale.

In conclusion, business engagement with the Sustainable Development Goals is essential for achieving sustainable development at a global level. As companies align these goals with their core operations, they contribute to solving global challenges while also building their own resilience and reputation. Addressing the challenges of financing, impact measurement, and regulatory frameworks will be critical for maximizing the private sector's contribution to the SDGs.

2.2.1.3 Business sustainability concepts and frameworks

Business sustainability is a concept that varies in definition depending on the quality of sources and the timing of their publication. As shown in various international surveys, business sustainability is constantly changing and there is no single accepted definition of corporate sustainability yet. Each definition may include some specific assumptions or points of view. However, the economic, social, and environmental approach is widely accepted as business sustainability dimensions.

2.2.1.3.1 Corporate Social Responsibility (CSR)

CSR refers to a framework through which companies acknowledge their impact on the environment and society.

The first dimension, **environmental sustainability,** plays a vital role in CSR – this includes efforts to minimize a business's carbon output, manage waste effectively, use sustainable resources and conserve natural resources wherever possible. This component not only addresses the urgent need for environmental protection but also aligns with global efforts to combat climate change.

The second dimension, **social responsibility** involves the company's commitment to ethical practices that favor the well-being of employees and the community. It means treating workers fairly, getting involved in the community through philanthropy or development programs and striving to improve the lives of those directly or indirectly affected by the company's operations.

The third dimension, **economic responsibility**, involves conducting business in an economically ethical manner that contributes positively to the economy without solely focusing on profitability. It includes practices like fair trade, responsible sourcing, and helping out with economic development in the communities where companies operate.

These components not only build a positive image and trust among stakeholders, but they also ensure long-term sustainability and profitability. By aligning the interests of different groups like investors, customers, and local communities, businesses can tackle important global challenges, drive innovation, and establish a strong foundation for future growth.

Thus, by effectively integrating CSR principles, companies not only contribute positively to society and the environment but also position themselves for long-term success.

CSR has been a topic of interest in management studies and business practices for more than four decades (Dahlsrud, 2008). What began as philanthropic initiatives has evolved into a strategic discipline deeply embedded in modern business operations. In the early years of the 20th century, CSR primarily revolved around businessmen such as Andrew Carnegie and John D. Rockefeller who practiced philanthropy in various forms to offer welfare services that would enhance worker's living standards and encourage loyalty to the company. In the mid-20th century, thinkers such as Howard Bowen gave formal recognition to the concept and argued that business has obligations aside from the economic and legal.

In the 1970s, as society at large was influenced by environmental movements, civil rights activities and consumer campaigns, CSR grew to encompass more formal and systematic approaches that integrated social and environmental issues in business operations. First corporate conduct codes also emerged during this period.

In the latter half of the 20th century and the early 21st century, CSR strategies became more closely aligned with the business objectives and grew more sophisticated with the advent of thinking such as the Triple Bottom Line that considered not just the economic but also social and environmental impact of businesses. During this time, international standards and guidelines were developed to shape CSR practices.

Over the last few years, there has been a shift towards Creating Shared Value (CSV) which underlines the dependence of a company's success on the health of the communities it operates in. Today, CSR encompasses all of these and more with a holistic approach that integrates sustainability in every aspect of a business and tackles global challenges such as climate change, inequality, and poverty. Far from being merely a risk management exercise, modern day CSR is considered critical to innovation, crucial for creating competitive advantages and integral to the long-term success of a business.

Table 1 provides a concise chronological overview, tracing the evolution of CSR from its origins to its current strategic integration in business practices.

Several theoretical frameworks support the development and implementation of CSR practices in organizations, including the following(Rodriguez-Gomez et al., 2020):

- **Stakeholder Theory**: This theory emphasizes that organizations must consider the interests and impacts on all stakeholders, not just shareholders.
- **Resource-Based View**: Focuses on leveraging organizational capabilities and resources to achieve competitive advantages while fulfilling CSR obligations.
- **Institutional Theory**: Highlights how societal norms and institutional pressures shape CSR practices.
- **Legitimacy Theory**: Suggests that businesses engage in CSR to gain legitimacy and acceptance from the public and other stakeholders (Rodríguez-Gómez et al., 2020).

Table 1: Evolution of Corporate Social Responsibility: Milestones and Practices

Source: Adapted from Rodríguez-Gómez, S., Arco-Castro, M. L., López-Pérez, M. V., & Rodríguez-Ariza, L. (2020). Where Does CSR Come from and Where Does It Go? A Review of the State of the Art. Administrative Sciences, 10(3), 60. https://doi.org/10.3390/admsci10030060

Period	Key development	Main theories and concepts	CSR practices
LATE 1800S - EARLY 1900S	Emergence from labor conflicts due to the Industrial Revolution.	N/A	Initial social welfare programs; focus on employee conditions and labor rights.
1950S - 1960S	Recognition of corporate impact on society; Universal Declaration of Human Rights (1948).	Beginnings of Stakeholder Theory	CSR emerges as a concept; companies begin to take voluntary steps beyond legal requirements.
1970S	Rise of social, environmental, civil rights, and women's rights movements.	Expansion of Stakeholder Theory	Integration of broader social issues into business practices.

1980S - 1990S	Heightened environmental awareness; CSR becomes a management concept integrated into daily operations.	Resource-Based View, Institutional Theory	Environmental focus: CSR reporting begins; stakeholder engagement becomes structured.
2000S	Globalization and increased focus on corporate governance.	Legitimacy Theory, expanded Stakeholder and Resource-Based Views	CSR integrated into core business strategies; increased emphasis on innovation and sustainability.
2010S - PRESENT	CSR as a strategic element essential for sustainability and competitive advantage.	Continuation and refinement of all previous theories; integration of sustainability	Holistic and strategic CSR approaches; focus on creating shared value and sustainable development goals.

Moreover, the figure below offers a concise overview of how CSR has evolved over the years from 1930 to 2010. Each dot on the graph represents a major turning point in the way CSR activities are viewed and practiced. Figure 3 illustrates that CSR in the 1930s was primarily driven by legal obligations, evolving into a strategic business function by the 2010s.This suggests that the concept of CSR has evolved and expanded from simple legal obligation (1930s) to a strategic function deeply embedded in modern.

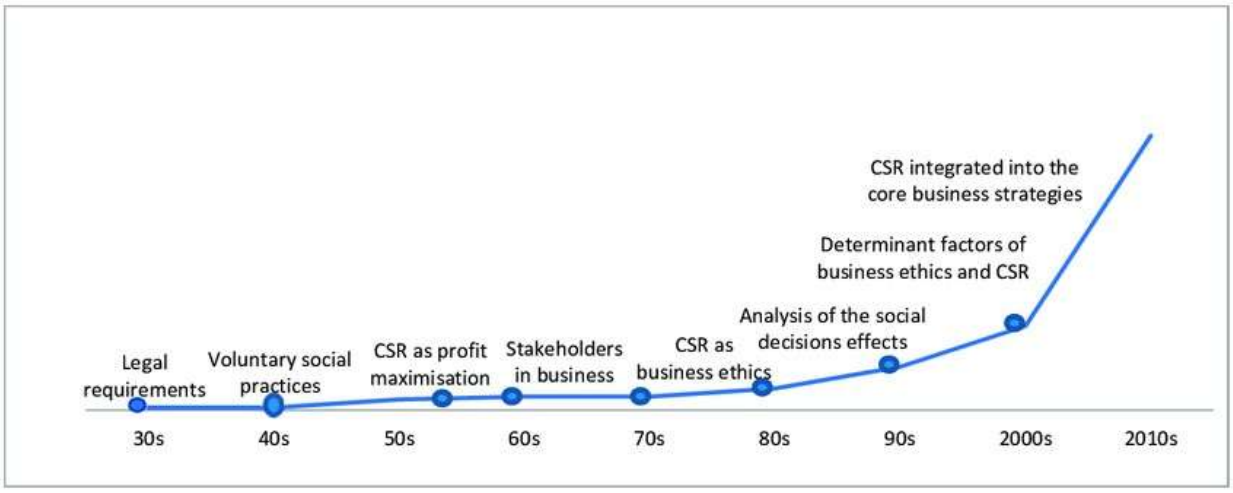


Figure 3: Evolution of CSR concept(Source: https://www.researchgate.net/figure/Evolution-of-CSR-concept_fig1_348740338)

CSR's progression from philanthropic roots to a comprehensive strategic imperative demonstrates its growing importance in achieving sustainable business outcomes. In conclusion, CSR has evolved into a core strategic element for modern businesses, reflecting an integrated approach to value creation for all stakeholders.

2.2.1.3.2 Corporate sustainability -Triple Bottom Line

Corporate sustainability refers to the strategies and practices corporations adopt to manage the triple bottom line—a framework that includes social, environmental, and financial responsibilities. This approach aims to create long-term stakeholder value by embracing opportunities and managing risks derived from economic, environmental, and social developments.

Figure 4 is a timeline detailing the development of theories and key definitions related to Corporate Social Responsibility (CSR) and Corporate Sustainability from 1953 to 2018. It begins with Howard Bowen's 1953 work, which laid the foundation for CSR, and traces through significant milestones including the introduction of three-dimensional CSR by Carroll in 1979, Stakeholder Theory by Freeman in 1984, and the Triple Bottom Line by Elkington in 1998, which expanded CSR to include environmental and social impacts alongside financial performance. The timeline transitions into corporate sustainability in the early 2000s with key definitions from Dyllick and Hockerts and the European Commission. It also highlights the integration of CSR with broader business theories, marking a shift in how businesses view their roles within society. The timeline uses a visual format with color-coded sections to differentiate between the periods focused primarily on CSR and the emergence of corporate sustainability concepts, illustrating the progression, and expanding scope of corporate responsibilities over time(Ashrafi et al., 2020).

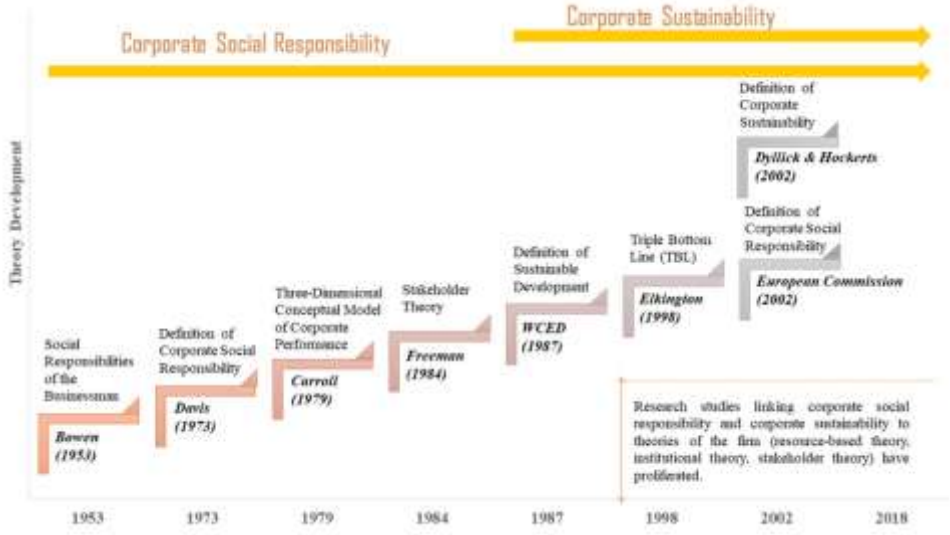


Figure 4: Timeline of the development of CSR and CS framework (Source: Ashrafi et al. (2020))

The concept of the "triple bottom line" (TBL or 3BL) was introduced in 1994 by John Elkington, a business writer, and the founder of the consultancy firm SustainAbility. Elkington argued that the traditional way of measuring a company's success—through its net income or profit—was inadequate for capturing its true value. He pointed out that a company could be profitable yet still have a detrimental impact on the social and environmental contexts in which it operates.

To address this, Elkington proposed that businesses expand their evaluation frameworks to include two additional "bottom lines." Companies should not only assess their economic performance but also their social impact, or their contributions to social equity and welfare, and their environmental impact, or their ecological footprint. These three dimensions—social, environmental, and economic—are also commonly known as the "three Ps": People, Planet, and Profit(Elkington, 1997).

- **Economic:** This is the traditional measure of corporate profit—the "bottom line" of the profit and loss account. In the TBL context, it is important not only to foster profitability but also to ensure that economic actions arising from the business do not harm the social and environmental bottom lines.
- **Social:** This area, often referred to as "people," assesses the business's impact on people or the community within which it operates. This includes labor practices, involvement in the community, and ensuring that operations do not negatively impact the social fabric.
- **Environmental:** This "planet" component measures how environmentally responsible a company has been. It involves sustainable environmental practices that ensure the health of the planet is maintained or improved. This includes managing resource use and reducing pollution and waste.

Table 2 provides a summary of key academic contributions to the TBL framework, including their main insights and conclusions.

Table 2: Overview of research on the Triple Bottom Line: Key insights and conclusions[2]

Title	Authors	Source	Year	Summary	Conclusion
Sustainable Development: Performance and Reporting	Elkington, J.	California Management Review	1998	Introduced the concept of Triple Bottom Line (TBL) emphasizing the importance of people, planet, and profit.	The TBL framework is essential for fostering sustainable development, balancing economic, social, and environmental goals.
The Triple Bottom Line: What Is It and How Does It Work?	Slaper, T. F., & Hall, T. J.	Indiana Business Review	2011	Explains the TBL framework and its application in business practices, highlighting	TBL is effective in promoting comprehensive business sustainability, though it requires careful implementation and measurement.

[2] Elkington, J. (1998). Sustainable development: Performance and reporting. California Management Review, 40(2), 90-100.
Slaper, T. F., & Hall, T. J. (2011). The triple bottom line: What is it and how does it work? Indiana Business Review, 86(1), 4-8.
Dahlsrud, A. (2008). Corporate social responsibility and environmental management. Journal of Business Ethics, 87(2), 155-168.
Norman, W., & MacDonald, C. (2004). The triple bottom line and corporate sustainability: Measuring and managing sustainability. Business Ethics Quarterly, 14(2), 243-262.
Gibbons, D. (2010). Sustainability and triple bottom line reporting: What is it all about? International Journal of Business Performance Management, 12(1), 25-42.

Title	Authors	Source	Year	Summary	Conclusion
				benefits and challenges.	
Corporate Social Responsibility and Environmental Management	Dahlsrud, A.	Journal of Business Ethics	2008	Analyzes the role of corporate social responsibility in the context of TBL and its impact on environmental management.	CSR practices aligned with TBL can significantly enhance environmental management and corporate reputation.
The Triple Bottom Line and Corporate Sustainability	Norman, W., & MacDonald, C.	Business Ethics Quarterly	2004	Critiques the TBL approach, discussing its strengths and limitations in achieving corporate sustainability.	While TBL has potential, it faces challenges in standardization and real-world application, requiring further refinement.
Sustainability and Triple Bottom Line Reporting – What is It All About?	Gibbons, D.	International Journal of Business Performance Management	2010	Provides a comprehensive overview of TBL reporting practices and their significance for sustainability.	TBL reporting is crucial for transparency and accountability, driving better sustainability practices among organizations.

The TBL framework is a way to evaluate the performance of a business not just on a financial scale but also on the scale of social responsibility and environmental sustainability. It aims to encourage companies to focus on long-term value creation rather than short-term gains, promoting a more sustainable approach to business that benefits stakeholders including shareholders, employees, communities, and the environment. Organizations using the TBL approach often report on these three areas in their annual reports, sustainability reports, and other communications to demonstrate their CSR initiatives and their impact on creating a sustainable future.

In terms of economic growth, the focus is on profitability and growth. Profitability looks at the financial health of an organization, including revenue, profits, and return on investment. Growth and innovation look at an organization's ability to innovate, adapt and adapt to market changes, and ensure long-term sustainability. By encouraging innovation, firms can maintain competitive advantage and explore new market opportunities, thereby fostering long-term, economic growth (Prainsack, 2012).

Social entrepreneurship is assessed through employee well-being, community engagement, and diversity and inclusion. Employee well-being considers fair wages, working conditions, and employee

development opportunities. Organizations that prioritize employee well-being tend to have higher levels of employee satisfaction and productivity, which can improve organizational performance (Prainsack, 2012). Community engagement looks at an organization's contributions to the community, including charitable activities and partnerships. Actively engaging with the public can enhance a company's reputation and create stronger community connections. Diversity and Inclusion examines efforts to create an inclusive workplace, where diversity is encouraged at all levels of the organization. Diverse and inclusive workplaces tend to be more innovative and better at solving problems because of a broader range of ideas and perspectives.

Environmental performance covers consumption, waste reduction and carbon footprint. The resource management process involves analyzing the efficient use of resources including energy, water and materials. Efficiency not only reduces costs but also reduces environmental impact. Reduction addresses efforts to reduce waste generation and implement recycling programs. Companies that manage waste properly can reduce operating costs and comply with environmental regulations. The carbon footprint examines policies designed to reduce greenhouse gas emissions and mitigate climate impacts. Reducing the carbon footprint is important in addressing climate change and meeting regulatory requirements(Sroufe, 2018).

Carayannis' expanded framework includes the concept of a "quadruple helix" involving education, industry, government, and society. The Academy plays an important role in promoting innovation and providing skilled manpower. By collaborating with academic and research institutions, organizations can access cutting-edge knowledge and technology. Joint ventures work together to foster technological advancement and economic growth. Partnerships between firms can lead to new products and services, increasing competition. Government policies and programs support sustainable practices and innovation. Governments can create favorable conditions for sustainable development through incentives and regulations. Public participation, including non-governmental organizations (NGOs) and the public, promotes social and environmental responsibility. Civic engagement can help organizations align their practices with societal norms and expectations(Prainsack, 2012).

In this concept, the figure below illustrates the evolution from the Triple Helix Model to the Quadruple Helix Model in the context of innovation and knowledge production. The Triple Helix Model, comprising the interaction among Government, Business, and Academia, highlights the collaborative framework driving innovation. The transition to the Quadruple Helix Model introduces a fourth dimension, societal-based innovation user stakeholders, underscoring the importance of including the societal perspective in the innovation ecosystem. This evolution signifies a more inclusive approach to fostering innovation by integrating diverse stakeholder inputs and ensuring that societal needs and demands are addressed.

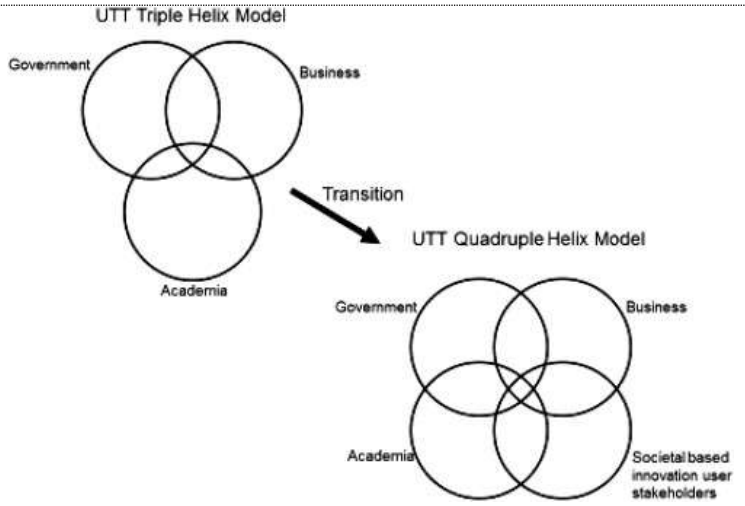


Figure 5: Triple and quadruple helix UTT Source: Adapted from Carayannis and Campbell (2009)

The model and approach encourage an organization to think systemically seeing the interconnections of economic, social, and environmental causes and effects. By engaging stakeholders (all involved and concerned with the operations and achievements of the organization) organizations can create extensive networks for innovation. Collaborative networks of stakeholders (employees, customers, educators, students, local community members, investors, and others) can help develop sustainable business models that create new products, services, and solutions to complex problems. Increasing resilience involves diversification of resources and capabilities to ensure that organizations can withstand changes and surprises in their operating environments. Sustainable growth balancing profit, social justice and environmental sustainability is critical for long term viability and success.

Practical implications of this approach include incorporating TBL goals into strategic objectives, ensuring alignment with long-term sustainability. Setting goals and developing metrics of success will allow organizations to measure their progress. Stakeholder participation is essential for organizational success and by opening the TBL process to stakeholders, organizations can benefit from the expertise and resources available both internally and externally. Finally, develop holistic metrics to measure and report on the TBL performance. In today's environment of increased transparency and corporate accountability, organizations need to openly communicate their goals and progress towards these goals. By establishing comprehensive performance metrics organizations can monitor their progress and communicate their successes to their stakeholders.

In conclusion, Carayannis' holistic approach to the Triple Bottom Line not only meets the demands of modern stakeholders but also positions organizations as leaders in sustainable and responsible business practices. By integrating economic, social, and environmental considerations, organizations can achieve sustainable growth and create value for all stakeholders. As sustainability continues to evolve as a strategic priority, models like the Triple Bottom Line and Quadruple Helix provide a comprehensive roadmap for resilient, inclusive, and innovation-driven growth.

2.2.1.4 Sustainable innovation

The concept of integrating sustainable practices into today's business environment has evolved from a basic legal compliance requirement to a key driver of strategic advancement. Sustainable innovation is no longer merely an ethical or responsible choice; it has become a business imperative in addressing the challenges posed by the Triple Bottom Line (TBL) — balancing economic, environmental, and social performance. The urgency to advance sustainable innovation is amplified by escalating environmental threats, evolving regulatory frameworks, and growing consumer demand for environmentally friendly products. As a result, sustainability is becoming embedded in the core of corporate innovation processes. Notably, this integration not only mitigates risk and reduces costs but also unlocks new revenue streams and strengthens competitive advantage.

2.2.1.4.1 Current state of sustainable innovation

Over the past decade, sustainable innovation has emerged as a strategic priority for both businesses and governments. It involves integrating environmental, social, and economic values into the innovation process, enabling long-term development and competitiveness.

This shift is supported by systemic approaches such as transition management and innovation systems research, which explore how sustainable technologies are adopted in society. However, existing business models often overlook industrial risk factors, highlighting the need for more resilient and balanced frameworks. The COVID-19 pandemic intensified the urgency for sustainability, leading to major policy shifts. The European Green Deal and the Next Generation EU Plan emphasize sustainable innovation as a key driver for economic recovery, digital transformation, and ecological resilience.Sustainable innovation serves not only as a response to environmental and social challenges but also as a source of competitive advantage, shaping the future of both business and public policyA summary of national governments' announcements regarding sustainability, as of August 2022, is presented below.

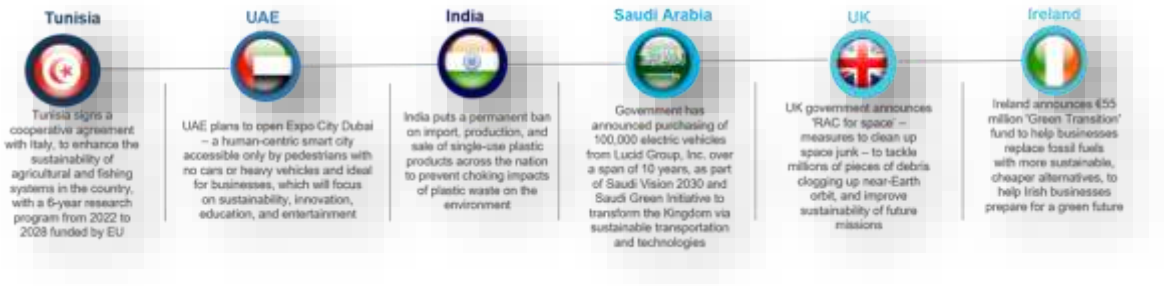


Figure 6: National Governments' Announcements-August 2022[3]

[3] Source: https://phronesis-partners.com/insights/sustainability-news-and-trends-august-2022/

2.2.1.4.2 Differences between sustainable innovation and traditional innovation

Traditional innovation typically focuses on developing new products or services that are more advanced or efficient than existing ones. These innovations often rely on expensive technologies and resources, with primary goals being improved productivity, performance, and market competitiveness. However, they tend to prioritize short-term gains and may overlook long-term environmental and social impacts.

Sustainable innovation, in contrast, emphasizes the creation of products, services, and technologies that are not only economically viable but also environmentally friendly and socially responsible. Its core objective is to meet present needs without compromising the ability of future generations to meet theirs. This involves using renewable energy, minimizing waste and pollution, improving resource efficiency, and designing for reuse or recyclability. Importantly, sustainable innovation must be embedded into the organizational culture rather than being confined to isolated R&D departments. When sustainability principles are integrated into the core values and operations of a firm, the innovation process becomes more holistic and impactful.

Figure 7: Firms can engage in three types of sustainable innovation; Source: Adams et al. (2015)[4]

[4] Source: https://www.nbs.net/articles/what-is-sustainable-innovation-and-how-to-make-innovation-sustainable

In summary, while traditional innovation prioritizes economic efficiency and technological advancement, sustainable innovation adopts a broader perspective—addressing the long-term well-being of society and the environment alongside business objectives.

Table 3: Differences between sustainable innovation and traditional innovation[5]

Traditional Innovation	**Sustainable Innovation**
Balances performance, cost,technology,attractivness	Sustainability factors are balanced with performance, cost, technology and desirability
Innovators traditionally design for systems to source, produce, sell, and use their products or services, making them cheaper to make, easier to sell, or better to use.	Sustainable innovation looks further up- and downstream to a wider set of lifecycle stages – considering resource extraction, distribution, and waste and disposal issues too.
Seeks customer and consumer insight	Seek all stakeholders' insights
Inspiration from Technology & Culture	Inspired by Nature
Innovation shaped by technological breakthroughs (new manufacturing techniques, digital technology, material innovation) or by new social-cultural developments (modernism, consumerism, 60s counterculture, etc).	Natural systems are becoming an equally valuable source of inspiration, via concepts like biomimicry, cradle-to-cradle, ecological design, industrial ecology, and closed loop manufacturing – all using nature as their model, measure, and mentor.
Serves Commercial Goals	Serves Societal Goals

The notion of sustainable innovation is strongly related to several theoretical paradigms that share common features in terms of integrating social, environmental, and economic considerations in the innovation process. The first relevant paradigm is the Triple Bottom Line approach, which balances profits, people, and the planet to achieve long-term sustainability. Another relevant approach is the theory of Ecological Modernization, which stresses the role of technology and innovation in promoting environmental change without sacrificing economic performance. The third important paradigm is the Circular Economy approach, which suggests rethinking the production and consumption patterns to achieve the minimization of waste and the shares of material flows through recycling and upcycling activities. Finally, systems thinking represents an important lens to understand complex socio-ecological systems and their interdependencies, providing valuable tools to address unpredictable and dynamic problems related to environmental sustainability and social equity. These paradigms provide valuable guidelines to explore sustainable innovation as the creation of additional values beyond economic profits towards a more sustainable and fair future.

[5] Source: https://too4to.eu/sustainable-innovation-in-businesses

2.2.2 Green marketing

Green marketing involves the promotion of environmentally friendly products and practices while developing sustainable business strategies. It represents a broad area of practice and study, incorporating sustainability into both the marketing process and the products themselves. This approach aligns with increasing consumer awareness and regulatory demands for reduced environmental impact, and positions companies to benefit from the "green" trend.

2.2.2.1 Evolution of green marketing

Green marketing has evolved significantly over the past few decades, emerging as a critical component of strategic business approaches that promote environmental responsibility while pursuing market success. The ideology of green marketing gained significant attention in the late 1980s (Peattie & Crane, 2005) when environmental issues began to surface due to increased public awareness and legislation. Since its inception, it has undergone considerable transformation. Green marketing encompasses various environmental activities employed by firms to promote their goods and services in ways that minimize environmental harm(Rex & Baumann, 2007) .These activities aim not only to influence external market perceptions but also to instigate internal changes within the organization (Taghian et al., 2015).Examples include modifying products and services, altering production processes, and changing packaging and advertising strategies (Polonsky, 1994).

Green marketing is defined as a management process that prioritizes and meets the needs and desires of customers and society in a sustainable way(Eden, 1998). Similarly, others describe green marketing as the promotion of products that are beneficial to both the environment and society(M. Sharma & Trivedi, 2018). The effectiveness and visibility of green marketing are largely dependent on its capability to promote products and services deemed environmentally safe.

Table 4: Definitions of green marketing Source: (Vilkaite-Vaitone & Skackauskiene, 2019)

Author(s)	Definition
A. Mahamuni, M. Tambe (2014)	Marketing efforts for the production, promotion, and application of environmentally sensitive products
P. Mishra, P. Sharma (2014)	Holistic marketing concept where marketing, consumption, production, disposal of products happens in a way that is less harmful to environment with increased awareness about the impact upon global warming, harmful effect of pollutants, non-biodegradable solid waste
S. Thapa, S. Verma (2014)	The process of selling products based upon their environmental benefits
C. D'Souza et al. (2015)	Green marketing is a company's strategic effort that intends to supply customers with green products
P. Singh et al. (2016)	Marketing of environmentally safe products
M. Ahmadzadeh et al. (2017)	Strategic effort to present organization's eco-friendly products to customers

Author(s)	Definition
C. I. Lazar (2017)	The complex of economic methods and production means applied in organization to ensure the achievement of organization's objectives without pollution and avoidance of any component that does harm to environment
K. K. Papadas et al. (2017, p. 240)	Organization's engagement in strategic, tactical and internal activities and processes that have a holistic aim to create, communicate and deliver products with the minimal environmental impact
R. K. Ranjan, R. K. Kushwaha (2017)	All marketing activities that are taken by companies in a way that has a positive effect upon environment
I. D. Parkman, A. J. Krause (2018)	Marketing products as energy efficient, environmentally friendly or organic

Green marketing has evolved through three distinct stages (Peattie, 2004). The Ecological Phase focused on addressing environmental problems through basic compliance and green advertising. The Environmental Phase introduced eco-friendly innovations, such as sustainable technologies and products. The current Sustainable Phase integrates environmental considerations into all aspects of business strategy and operations, promoting long-term ecological and economic value.

Figure 8: Development of green marketing orientation Source: (Vilkaite-Vaitone & Skackauskiene, 2019)

Each phase highlights the changing focus of green marketing strategies over the years.

Ecological Phase (1960 - 1985)

In the Ecological Green Marketing phase, the primary focus was on the most damaging industries. This stage concentrated on addressing and reducing environmental problems caused by these industries. Companies aimed at mitigating the environmental impact of their products and processes by adhering to environmental regulations and reducing pollution. The emphasis was on compliance and remediation.

Environmental Phase (1985 - 2000)

The Environmental Green Marketing phase saw companies integrating environmental considerations into their marketing strategies. The focus shifted from mere compliance to proactive efforts to improve environmental performance. This included the adoption of clean technologies, eco-friendly product design, sustainable packaging, and corporate social responsibility initiatives. Companies began to address specific environmental problems through innovative and green solutions.

Sustainable Phase (2000 onwards)

In the Sustainable Green Marketing phase, sustainability became a core value for companies. The focus was on creating long-term environmental benefits through products, services, and business practices. This involved a holistic approach that considered the entire lifecycle of products and aimed to foster sustainable consumption and production patterns. Businesses actively engaged with stakeholders to promote sustainability and encourage consumers to make eco-conscious choices, emphasizing specific requirements for products to meet sustainability standards.

2.2.2.2 Differences between traditional marketing and green marketing

While both traditional and green marketing aim to promote products and drive sales, they differ significantly in principles and strategic focus. Traditional marketing emphasizes short-term goals such as profitability, market share, and consumer satisfaction through price, promotion, and positioning (Kotler & Armstrong, 2018).Its approach is primarily economic and competitive.

In contrast, green marketing integrates environmental sustainability and ethical responsibility into marketing strategies. It seeks not only to satisfy consumer needs but also to reduce ecological impact and promote responsible consumption (Polonsky, 2011).This shift reflects evolving societal values and increased demand for sustainable products.

Key distinctions include broader stakeholder consideration, focus on the full product life cycle, and proactive engagement with environmental groups. Green marketing extends beyond compliance, embedding sustainability into product design, sourcing, and post-use stages.

Figure 9: Differences between traditional and green marketing Source: (Punitha & Rasdi, 2013)

2.2.2.3 Dimensions of green marketing

Green marketing can be implemented at three key levels: strategic, tactical, and internal. These dimensions reflect how companies embed environmental considerations into their operations, stakeholder engagement, and market offerings.

In today's business environment, applying green marketing practices is vital for organizations aiming to achieve sustainable growth, mitigate stakeholder risks, and improve product performance.

Figure 11 illustrates how stakeholder risk (SR) influences the success of new products (NPS) through the three green marketing orientations:

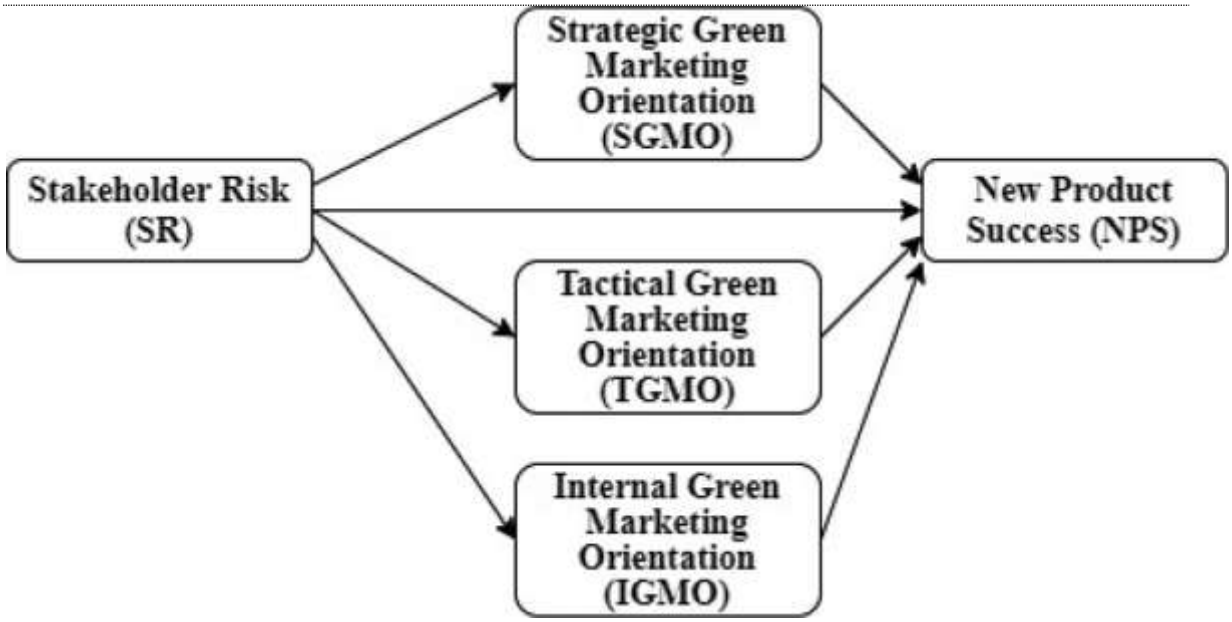


Figure 10: Dimensions of green marketing Source(Vilkaite-Vaitone & Skackauskiene, 2019)

Figure 11 illustrates how stakeholder risk (SR) influences the success of new products (NPS) through the three green marketing orientations:

- **Strategic Green Marketing Orientation (SGMO):** Involves integrating environmental goals into long-term business strategy and planning. SR affects how firms define their strategic green direction.
- **Tactical Green Marketing Orientation (TGMO):** Encompasses short-term actions, such as eco-friendly packaging or advertising, that directly respond to environmental expectations. SR also impacts these tactical choices.
- **Internal Green Marketing Orientation (IGMO):** Refers to internal processes promoting sustainability within the organization, such as employee training or green procurement. SR plays a role in shaping these internal efforts.

Each of these orientations contributes to New Product Success (NPS)—measured not only by market acceptance but also by environmental impact. Arrows in the figure show that SGMO, TGMO, and IGMO collectively enhance product success when stakeholder risks are effectively addressed.

This framework highlights the importance of managing stakeholder expectations through a multi-dimensional green marketing approach to drive sustainable innovation and competitive advantage.

2.2.2.3.1 Strategic green marketing orientation

SGM has become a critical component of modern business strategies in response to increasing environmental challenges. SGM involves the proactive integration of environmental objectives into long-term business planning to gain competitive advantage while promoting sustainability (Papadas

et al., 2017).It extends beyond regulatory compliance, often encompassing voluntary environmental initiatives such as support for low-carbon technologies, renewable energy investments, and eco-innovation in R&D.

Effective SGM practices include building partnerships with environmental organizations, enhancing corporate reputation, and fostering collaborative innovation (Menon & Menon, 1997). Investments in eco-friendly technologies and sustainable product designs reduce environmental impacts and position firms as industry leaders in sustainability (Aragón-Correa, 1998). Furthermore, engaging stakeholders in environmental dialogues and integrating their feedback into strategic planning improves transparency and strengthens corporate legitimacy (Polonsky, 1995). Market research targeting environmentally conscious consumers also ensures product-market alignment sustainability (Papadas et al., 2017).

The impacts of SGM extend to multiple business dimensions. Firms that implement SGM effectively can achieve differentiation, leading to higher customer loyalty, stronger brand equity, and expanded market share (Kramer & Porter, 2019). Empirical studies suggest that sustainable practices not only reduce operational costs through efficient resource use but also drive revenues through green product innovation (Cronin et al., 2011).Additionally, SGM is closely aligned with CSR, promoting ethical conduct and voluntary environmental standards beyond compliance (S. Sharma & Vredenburg, 1998).

Nonetheless, the implementation of SGM faces significant challenges. The initial costs of adopting green technologies and sustainable practices can be substantial, requiring careful alignment with financial goals (Shrivastava, 1995). Consumer willingness to pay a premium for eco-friendly products varies, underlining the importance of effective marketing communication and consumer education (Ottman, 2007). Internally, fostering a "green mindset" across all organizational levels is critical, necessitating staff training and cultural change initiatives (Kotler et al., 2019).

In conclusion, SGM represents a strategic nexus between business success and environmental stewardship. Integrating sustainability into corporate strategy can lead to competitive advantage, improved financial performance, and enhanced social legitimacy. However, successful implementation requires balancing costs, market dynamics, and internal support. Future research should further explore how cultural, social, and economic contexts influence the dynamics and outcomes of SGM across different industries.

2.2.2.3.2 Internal green marketing orientation

Internal green marketing orientation (IGMO) focuses on embedding environmental values within an organization, fostering a corporate culture that supports sustainability from within. Unlike strategic or tactical green marketing, which target external stakeholders, IGMO emphasizes internal alignment—engaging employees, promoting eco-conscious behavior, and integrating sustainability into organizational values and processes (Charter & Polonsky, 2017).

At the core of IGMO is the development of a green organizational culture. This includes environmental training programs, internal communications about green initiatives, and the formation of

sustainability teams or green committees (Papadas et al., 2017).These efforts aim to raise awareness, build commitment, and encourage environmentally responsible behavior across all organizational levels.

Key activities for implementing IGMO include:

- **Environmental training and education:** These programs raise awareness, teach sustainable practices, and empower employees to contribute meaningfully to environmental goals.
- **Leadership engagement:** Managerial support is crucial. Leaders who champion sustainability help shape organizational behavior and encourage widespread adoption of green values (Ramus, 2001).
- **Internal communication:** Consistent messaging through newsletters, meetings, and updates helps embed sustainability into everyday operations.
- **Formal structures:** Creating sustainability-focused departments or cross-functional green teams ensures coordination and accountability (Papadas et al., 2017).

When effectively implemented, IGMO can enhance employee satisfaction and loyalty by fostering a sense of purpose and shared values. It can also improve operational efficiency through waste reduction and resource optimization (Daily & Huang, 2001). Moreover, it lends credibility to external green marketing by aligning messaging with authentic internal practices (Leonidou et al., 2013).

However, IGMO faces notable challenges. Resistance to change is common, especially in organizations where sustainability is not yet a core value. Overcoming this requires leadership, continuous communication, and tailored educational efforts (McDonagh & Prothero, 2013). Additionally, the benefits of IGMO are often long-term and intangible, making impact measurement difficult. Developing clear metrics is essential for evaluating success and securing stakeholder support ("Making Sustainability Work: Best Practices in Managing and Measuring Corporate Social, Environmental and Economic Impacts," 2008).

In conclusion, IGMO is a vital component of corporate sustainability, serving as the foundation for authentic and effective green marketing. By embedding environmental values internally, firms not only improve their performance but also strengthen their external green credibility. Future research should examine how IGMO is applied across diverse sectors and cultural settings to refine best practices and assess long-term outcomes.

2.2.2.3.3 Tactical green marketing orientation

One of the most crucial roles that tactical green marketing (TGM) plays is the relation of a company's marketing mix to their environmental goals. While SGM mainly deals with long-term strategic approaches involving high-level management, TGM involves short-term actions that transform traditional marketing elements into more sustainable practices. These tactical actions are essential for implementing green strategies that can yield immediate benefits and foster a company's commitment to sustainability.

The conceptualization of TGM is centered around integrating environmental considerations into the core elements of the marketing mix: product, price, place, and promotion. This approach aims to reduce the environmental impact of marketing activities while satisfying consumer needs and achieving business objectives (Leonidou et al., 2013). TGM includes actions such as using environmentally friendly materials, adopting green packaging, implementing sustainable pricing strategies, optimizing distribution channels for efficiency, and promoting green attributes of products through eco-labels and certifications (Ottman, 2007).

Implementing TGM involves several key activities. First, product-related decisions are crucial. Companies are increasingly focusing on eco-design, which involves developing products with minimal environmental impact throughout their lifecycle. This includes using recyclable materials, reducing resource consumption, and enhancing product durability (Pujari et al., 2003). Additionally, firms are adopting sustainable packaging solutions to minimize waste and encourage recycling (Cronin et al., 2011).

Pricing strategies in TGM are designed to reflect the environmental costs and benefits of products. Green pricing may include premium pricing for eco-friendly products, competitive pricing to attract cost-conscious green consumers, or value-based pricing that considers long-term environmental savings. Such strategies not only enhance the perceived value of green products but also signal a company's commitment to sustainability. Distribution strategies in TGM focus on optimizing the supply chain to reduce environmental impact. This includes selecting eco-friendly transportation methods, reducing energy consumption in logistics, and implementing reverse logistics to manage product returns and recycling(Zhu & Sarkis, 2004). Efficient distribution not only reduces carbon footprints but also improves overall supply chain sustainability.

Promotion is a key part of TGM as it’s about communicating the environmental benefits of products to consumers. Effective green promotion strategies utilize eco-labels, certifications, and environmental claims to build consumer trust and differentiate products in the market.Social media and digital marketing is also used to engage consumers and promote sustainable(Tripathi, 2014).

The implications TGM are significant for both business performance and environmental sustainability. TGM helps companies build a green brand, which can increase customer loyalty and attract environmentally conscious consumers (“The Green Marketing Manifesto,” 2012). TGM also aids with regulatory compliance and mitigates the risks associated with environmental regulations.

Despite its benefits, TGM faces several challenges. One major challenge is the potential trade-off between environmental sustainability and profitability. Implementing green practices can incur higher initial costs, which may deter some companies from adopting TGM fully (Shrivastava, 1995). Additionally, consumer skepticism towards green claims, often referred to as greenwashing, can undermine the effectiveness of green promotions (Parguel et al., 2011). Companies must ensure transparency and authenticity in their green marketing efforts to maintain consumer trust.

Therefore, tactical green marketing is acknowledged as a crucial strategy for firms interested in incorporating the concept of sustainability into their marketing strategies. Companies may see immediate advantages when they target the environmental aspects of the marketing mix while boosting

their sustainability performance. More studies should be conducted into the further development of TGM and its application in various sectors and organizational cultures to gain further understanding of TGM's practices and effectiveness.

2.2.3 ESG

Environmental, Social, and Governance (ESG) criteria have become increasingly critical in the decision-making processes of corporations, investors, and regulators worldwide. ESG is an umbrella term that covers a broad range of issues that are crucial for the sustainable and ethical operation of companies. The growing importance of ESG reflects a shift in business practices where long-term value creation is prioritized alongside financial performance.

2.2.3.1 Evolution of ESG

The origins of Environmental, Social, and Governance (ESG) can be traced back to the rise of Socially Responsible Investing (SRI) in the 1960s. At the time, investors began excluding companies involved in contentious activities, such as tobacco production or supporting apartheid in South Africa, from their portfolios. These early practices reflected growing public concern about the ethical implications of business operations. By the 1980s, SRI gained considerable traction, especially through global divestment campaigns that challenged companies with ties to apartheid-era South Africa. During this period, SRI was closely aligned with the emerging principles of Corporate Social Responsibility (CSR), particularly in relation to human rights and ethical labor practices.

A major shift occurred in the 1990s as environmental and governance considerations began to complement the social dimension. In 1995, the U.S. Social Investment Forum (SIF) reported that sustainable investments in North America had reached $639 billion. This finding highlighted a notable change: investors were increasingly willing to align capital allocation with ethical principles, rather than focusing solely on financial returns.

Throughout the late 1990s and early 2000s, the momentum around ESG intensified. Asset managers started incorporating ESG factors into risk assessments and long-term investment strategies. One key development was the creation of the Global Reporting Initiative (GRI) in 1997, initially focused on environmental disclosures but soon expanded to include social and governance indicators.

The formalization of ESG as a distinct investment framework was shaped by a series of international initiatives. The United Nations Environment Programme Finance Initiative (UNEP FI), launched in 1992, played an early role in promoting ESG values in the financial sector. In 2006, the UN's Principles for Responsible Investment (PRI) provided a structured approach to integrating ESG considerations into investment decision-making. These efforts helped institutionalize ESG in global finance and encouraged businesses to adopt more transparent and sustainable practices.

Another milestone came in 2002 with the launch of the Carbon Disclosure Project (CDP), which prompted investors to request climate impact data from firms. That same year, 245 companies responded to ESG-related inquiries from 35 institutional investors—marking a shift toward greater

accountability. The term ESG itself gained broader recognition following the 2004 UN Global Compact report, Who Cares Wins, which argued that integrating ESG factors into investment analysis could lead to improved long-term performance (UN Global Compact., 2004).

The 2010s marked a period of rapid mainstreaming for ESG, driven by increased public concern over climate change, corporate misconduct, and social inequality. Investors began demanding clearer ESG reporting and performance metrics, which led to the widespread adoption of frameworks such as GRI, the Sustainability Accounting Standards Board (SASB), and the Task Force on Climate-related Financial Disclosures (TCFD) (Eccles et al., 2014).

The growing influence of ESG was also evident in financial markets. The Global Sustainable Investment Alliance (GSIA) reported that by 2020, ESG-focused investments had reached $35.3 trillion in assets under management globally (GSIA, 2020). Impact investing and sustainability-themed funds became increasingly prominent, reflecting a deeper integration of ESG considerations across asset classes.

The COVID-19 pandemic further tested the resilience of ESG-oriented companies. Contrary to initial fears that ESG might be deprioritized, firms with robust ESG frameworks often performed better during the crisis. Their ability to anticipate and adapt to systemic risks reinforced the value of ESG as a strategic tool for long-term sustainability.

Figure 12 presents a timeline of key milestones in ESG's evolution from 1890 to 2021.

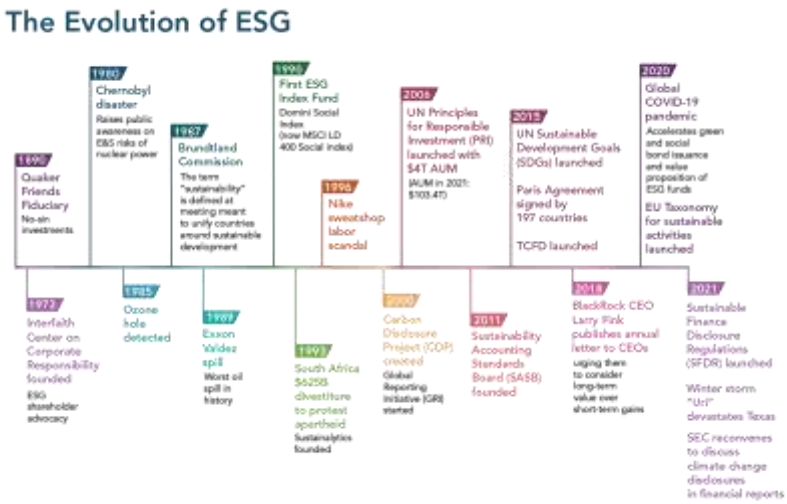


Figure 11:The evolution of ESG[6]

Today, ESG is no longer a peripheral concern; it is central to investment analysis, corporate governance, and regulatory frameworks. Investors now assess companies based on a wide range of ESG

[6] https://co2ti.com/esg-history/

indicators—such as emissions intensity, board diversity, supply chain ethics, and employee turnover—using both qualitative and quantitative metrics.

Regulatory momentum is also shaping the future of ESG. The European Union's Corporate Sustainability Reporting Directive (CSRD), for example, mandates more detailed disclosures on environmental and social performance. In parallel, regulators in the United States, Canada, India, Brazil, and other countries are advancing policies to make ESG reporting more standardized and enforceable.

The rise of ESG indices, such as those developed by MSCI, reflects the growing demand for tools to evaluate corporate sustainability. These indices help investors allocate capital more effectively by identifying companies with strong ESG credentials.

Looking ahead, ESG is expected to evolve further, especially with the help of technological advances. Big data, machine learning, and artificial intelligence are beginning to address long-standing challenges in ESG reporting by offering more precise and real-time insights into corporate sustainability performance.

In conclusion, ESG has developed from a niche concept rooted in ethical investing to a fundamental component of how companies and investors measure risk, value, and impact. As global challenges grow in complexity, ESG will remain a key framework for guiding sustainable and responsible business practices.

2.2.3.2 ESG rating

ESG ratings are essential tools for assessing a company's performance on environmental, social, and governance factors. They are based on structured metrics and KPIs that reflect both risks and opportunities tied to sustainability.

Major ESG rating agencies like Refinitiv, MSCI, and Bloomberg offer comprehensive scoring models.

- Refinitiv uses over 630 metrics, with 186 selected for scoring, and incorporates a separate ESG Controversies Score to reflect risk incidents (see Figure 12).
- MSCI evaluates ESG performance across key themes under three pillars—Environment, Social, and Governance—covering issues like emissions, labor rights, and corporate behavior (see Figure 13).

These ratings guide investors in making responsible, risk-aware investment decisions.

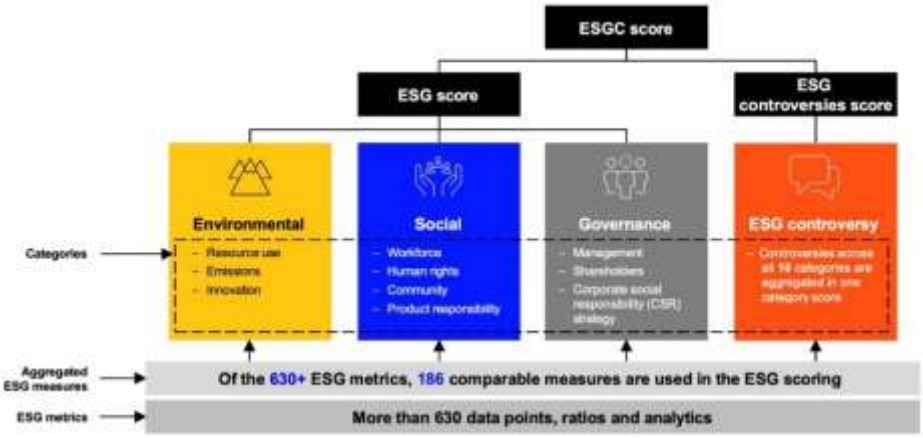


Figure 12:Refinitiv ESG Rating Hierarchy (Source: Refinitiv ESG Rating Methodology, LSEG)

Figure 13: MSCI ESG Rating Hierarchy (Source: MSCI ESG Rating Methodology, MSCI)

2.2.3.3 ESG performance of companies

Companies are increasingly recognizing the strategic importance of integrating ESG into their operations. The concept of "shared value," suggests that companies can enhance their competitiveness while simultaneously advancing the economic and social conditions of the communities in which they operate(Porter & Kramer, 2011). This has led to a shift in corporate strategy, where ESG is no longer viewed merely as a compliance issue but as a driver of innovation and long-term value creation. Companies like Unilever, Patagonia, and Tesla have been cited as leaders in ESG, leveraging their sustainability practices to differentiate themselves in the marketplace and attract environmentally conscious consumers (Eccles et al., 2014).

ESG performance and financial outcomes in companies

The relationship between ESG performance and CFP remains a central focus in academic research. Research typically reveals a positive association between effective ESG practices and improved financial results. For example, organizations that implement comprehensive sustainability initiatives often achieve superior long-term performance compared to their competitors, particularly regarding stock valuation and profitability (Eccles et al., 2014). Additionally, firms with strong ESG performance often benefit from lower capital costs, as they are perceived as lower risk by investors (Clark et al., 2014).

Table 5: Literature review of empirical studies on relationship between ESG disclosure/performance and firms' value[7]

Authors (Year)	**Sample (Period)**	**ESG measurements**	**Firms' financial variables**	**Results**
Starks et al. (2017)	21,378 firm-year observations (2000–2014)	ESG Score (Strength & Concern)	Book-to-Market Ratio, Dividend Yield, Profitability Ratio, Past 12-month Return, Return Volatility, Stock Turnover, SP500 Dummy, Underlying Fund Flow Volatility, Market Cap, Portfolio turnover ratio	Investors with a long-term horizon tend to prefer companies with a high ESG score.
Perez de Toledo and Bocatlo (2014)	201 firms (2009–2012)	ESG scores range from 0 (worse) to 100 (best)	Cash, Leverage, Dividends, Earnings, Interest, Stock return, Portfolio return, Market capitalization, Net Assets, New finance, Excess stock return	The same dollar of cash is more valuable in companies with high ESG scores than in companies with low ESG scores.
Chauhan and Kumar (2019)	3,837 firm-year observations from 630 firms (2007–2016)	ESG disclosure (NFD Index), Environment Index, Social Index, Governance Index	Leverage, Dividend dummy, Foreign Investments, Mutual fund investment	Companies with strong ESG-related activities are preferred by foreign investors.
Del Bosco and Misani (2016)	5,335 firm-year observations (2008–2012)	Environmental score, Social score, Corporate governance score	EBITDA on sales, Debt/equity, Market-to-book ratio	Cross-listed firms affect positively CSR performance

[7] https://www.researchgate.net/publication/346399683_Does_ESG_disclosure_transparency_help_mitigate_the_Covid-19_pandemic_shock_An_empirical_analysis_of_listed_firms_in_the_UK

Authors (Year)	Sample (Period)	ESG measurements	Firms' financial variables	Results
				but not corporate governance.
Li et al. (2018)	2,415 firm-year observations from 367 firms (2004–2013)	ESG disclosure score, environmental disclosure, social disclosure, CEO Power	Net property, plant and equipment (PPE), total assets, total debts, sales, cash, capital expenditure, ROA, Leverage, Tobin's Q	Results show a positive relationship between the level of ESG disclosure and firm value.
Fatemi et al. (2018)	1,640 firm-year observations from 403 U.S. listed firms (2006–2011)	ESG disclosure scores 0.1 (lowest) and 100 (highest)	ROA, Growth of return on assets, sales, Asset intensity, Leverage, Net to gross PPE	A strong ESG performance increases the firms' value and low ESG performance decreases it.

Case studies reinforce these findings. For instance, Microsoft's commitment to carbon neutrality by 2030 has enhanced its brand and attracted impact investment. Similarly, Walmart's energy efficiency initiatives have yielded cost savings and boosted its sustainable image (Lee et al., 2022).

Industry-specific ESG performance

The priorities and performance related to ESG vary considerably among different industries. In sectors with significant environmental impact, such as oil and gas, mining, and manufacturing, issues like carbon emissions, pollution, and resource depletion are vital elements of ESG performance. Organizations operating in these fields are under mounting pressure to adopt cleaner technologies and minimize their carbon footprints. For instance, Royal Dutch Shell and BP have made substantial investments in renewable energy and have established ambitious targets to reach net-zero carbon emissions by 2050.

Conversely, industries that are service-oriented, such as finance and technology, generally place greater emphasis on governance and social dimensions of ESG. In these sectors, factors such as diversity, data privacy, and corporate governance frameworks are essential components of their ESG strategies. Companies like JPMorgan Chase and Google have enacted extensive policies aimed at fostering diversity and inclusion, ensuring data security, and promoting ethical corporate governance (Clark et al., 2014). While these industries may not encounter the same degree of environmental scrutiny as those that are resource-intensive, they are increasingly facing demands for greater transparency and accountability in their governance practices.

In addition, Corporate governance is essential in influencing a company's performance ESG matters. Robust governance frameworks ensure that ESG initiatives are in harmony with the overall strategic goals of the organization and that there are accountability systems to monitor advancements. Firms

with strong governance practices are more inclined to adopt effective ESG strategies. This inclination arises from governance mechanisms—such as an independent board, transparency in executive remuneration, and active stakeholder engagement—that improve decision-making and mitigate agency conflicts.

A prominent example is Danone, which revamped its governance structure to embed sustainability within its fundamental decision-making processes. The CEO of Danone initiated an executive-level sustainability committee and tied executive compensation to the fulfillment of ESG objectives, leading to a notable enhancement in the company's ESG performance and an increase in stakeholder confidence(Mark et al., 2018) .

In conclusion, the incorporation of ESG principles into corporate strategies is crucial for achieving sustained success. Although the influence of ESG may differ across various sectors, effective governance remains a fundamental driver of these initiatives. Ultimately, aligning ESG considerations with business objectives enables companies to attain sustainable growth in a marketplace that is becoming increasingly aware of social and environmental issues.

Figure 14:Industry specific ESG risks[8]

[8] https://www.certaintysoftware.com/esg-risks-across-industries/

2.2.3.4 Challenges of ESG

The increasing significance of ESG metrics is accompanied by several challenges in their implementation and interpretation. A primary issue is the absence of standardization among various ESG reporting frameworks. Although organizations such as GRI, SASB, and the Task Force on Climate-related Financial Disclosures (TCFD) offer guidelines, there is no universally recognized set of ESG standards. This lack of uniformity often leads to inconsistent and non-comparable data across different firms and sectors(Christensen et al., 2021; Passas et al., 2022) .

Additionally, ESG metrics face criticism for their inherent subjectivity and the risk of "greenwashing." Greenwashing refers to the practice where companies inflate or misrepresent their ESG initiatives to project a more sustainable image than is warranted. Research indicates that firms operating in industries under significant public scrutiny are more inclined to undertake symbolic ESG actions without implementing meaningful changes, thereby compromising the reliability of ESG metrics(Kotsantonis et al., 2016; Passas et al., 2022).

Figure 15 outlines a conceptual framework for greenwashing, derived from research featured in the Journal of Management and Governance. This framework emphasizes the various pressures and incentives that compel companies to partake in greenwashing, including stakeholder demands, the desire to enhance reputation, and the need to obscure scandals. Furthermore, it examines how companies may employ selective, symbolic, or deceptive practices in their communications to create an illusion of environmental accountability without engaging in meaningful actions.

This process is influenced by institutional and regulatory environments, which can either promote or inhibit such practices, shaped by the actions of regulators, non-governmental organizations, and media oversight. Stakeholders are pivotal in this context, as their perceptions can determine whether a company's greenwashing efforts result in allegations or reputational damage. The framework indicates that greenwashing not only impacts corporate valuation but also significantly influences the relational dynamics between businesses and their stakeholders(Passas et al., 2022).

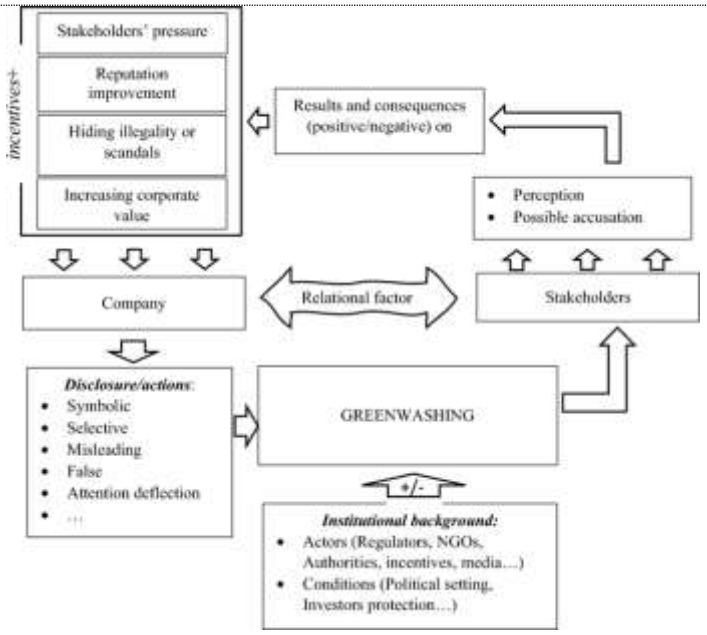


Figure 15: Greenwashing: a conceptual vision[9]

Another significant challenge lies in the quantification of social and governance factors, which is often more complex than measuring environmental metrics. While environmental impacts can frequently be assessed using objective indicators such as carbon emissions, social and governance factors are generally more qualitative, making them more challenging to evaluate and quantify. This disparity can result in an undue focus on environmental metrics, potentially neglecting social and governance issues(Gibson Brandon et al., 2021).

2.2.3.5 ESG rating agencies in the European Union (EU)

In February 2024, the European Union reached an agreement on a proposal to enhance the regulation of Environmental, Social, and Governance (ESG) rating agencies, aiming to improve transparency, reliability, and investor confidence in sustainable investment. The new regulation requires ESG rating providers to be authorized and monitored by the European Securities and Markets Authority (ESMA), with clear transparency requirements concerning their methodologies and information sources. This initiative is designed to standardize ESG ratings across the EU, ensuring their consistency and reliability to foster greater trust in capital markets, thereby encouraging sustainable investment practices.

Key aspects of the proposed regulation include:

- All unregulated ESG rating providers operating in the EU will now be supervised by ESMA. ESMA, established in 2011 to replace the Committee of European Securities Regulators,

[9] https://link.springer.com/article/10.1007/s10997-023-09686-5

serves as a centralized agency aimed at enhancing investor protection and ensuring stable financial markets within the EU(Moloney, 2014).

- ESG ratings from non-EU-based agencies must be endorsed by EU-regulated raters to ensure alignment with EU standards.
- The regulation requires ESG raters to separately assess each of the three ESG pillars: Environmental, Social, and Governance. In cases where only a combined ESG rating is provided, the agency must explicitly disclose the weighting of each pillar.
- Ratings on the environmental pillar must consider alignment with international agreements, such as the Paris Agreement on reducing carbon emissions.
- The regulation also aims to support the growth of smaller ESG rating firms by offering them a lighter regulatory regime. This is designed to help them compete with larger players, such as MSCI, Moody's, and Sustainalytics, which dominate the market(Berg et al., 2022).
- It is expected that this regulation will come into effect by 2025.

2.2.4 R&D investments and sustainability

R&D investments have increasingly become a central focus in efforts to address global sustainability challenges, particularly in the context of environmental sustainability. As climate change, resource depletion, and biodiversity loss escalate, the need for innovative solutions to mitigate environmental damage is more urgent than ever.

2.2.4.1 Global perspective

Globally, investments in R&D are crucial for advancing technological innovations that lead to the creation of green technologies, enhance energy efficiency, and minimize the ecological impact of various industries. Theoretical frameworks, including innovation theory and sustainability-oriented innovation (SOI), provide insights into the relationship between R&D activities and environmental results. Schumpeter's innovation theory posits that technological advancements are fundamental to economic growth; within the realm of sustainability, such advancements can markedly decrease environmental harm by improving resource utilization and fostering the development of cleaner technologies. SOI specifically targets innovations aimed at addressing environmental issues, such as lowering greenhouse gas emissions, managing waste effectively, and preserving natural resources.

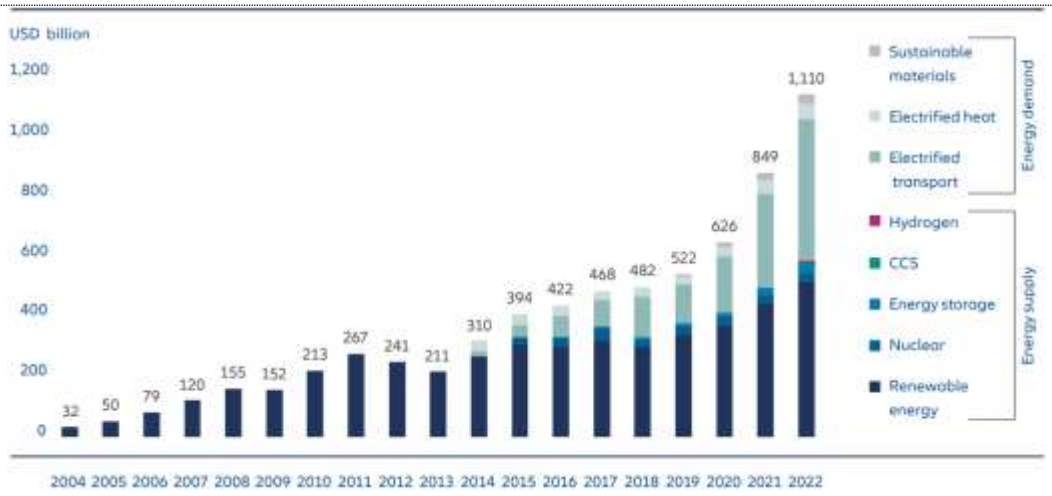


Figure 16: Global investment in energy transition by sector (USD billion)[10]

Countries that invest heavily in R&D, particularly in sectors like renewable energy, tend to lead in environmental innovations. For instance, countries like the United States, China, and Japan allocate significant portions of their GDP to R&D, especially in sectors critical for sustainability, such as clean energy and water technologies. In particular, China's "Made in China 2025" initiative includes massive investments in green technologies and renewable energy through R&D. Similarly, in the United States, firms such as Tesla have revolutionized sustainable transportation through extensive R&D in electric vehicle (EV) technologies.

Table 6: R&D Investments in sustainability by leading global companies and their impact on business expansion

Company	Sector	Sustainability R&D Focus	Investment (USD)	Business Expansion Result	Academic reference
Tesla, Inc.	Electric Vehicles (EVs)	Development of electric vehicles and energy storage technologies	$1.5 billion (2020)	Tesla's R&D investments expanded its global EV market share, increasing production facilities worldwide and its market capitalization.	Stringham, M., Miller, D., & Clark, M. (2015). Green innovation and clean energy development. Journal of Environmental Sustainability, 5(2), 45-65.

[10]Source: BloombergNEF. Note: start years differ by sector but all sectors are present from 2019 onward. Nuclear figures start in 2015

Investing in the energy transition | Allianz Global Investors (allianzgi.com)

Company	Sector	Sustainability R&D Focus	Investment (USD)	Business Expansion Result	Academic reference
Siemens AG	Energy and Automation	Energy-efficient systems, renewable energy technologies	€5.6 billion (2019)	Siemens' R&D helped secure contracts in smart grids and renewable energy globally, strengthening its presence in Asia and Europe.	Hermann, L., Moeller, K., & Malte, S. (2018). Corporate sustainability: Exploring Siemens' strategy . Energy Policy Journal, 67(3), 104-117.
Unilever	Consumer Goods	Sustainable product design, water-efficient systems, and recycling	$1 billion (2021)	Unilever expanded its portfolio into eco-friendly products, increasing its market share in sustainability-conscious regions.	Dauvergne, P., & Lister, J. (2012). Big brand sustainability: Governance prospects and environmental limits. Global Environmental Change, 22(1), 36-45.
Volkswagen Group	Automotive	Development of electric mobility, battery technology, and recycling	€15 billion (2021)	Volkswagen entered the EV market with global models, significantly increasing its share in the European and Chinese EV markets.	Wells, P., & Nieuwenhuis, P. (2017). Corporate innovation and sustainability in the automotive sector. Journal of Cleaner Production, 165, 1400-1410.
Nestlé	Food and Beverage	Sustainable packaging, water efficiency, and reducing carbon footprint	$2.5 billion (2020)	Nestlé tapped into new markets by offering eco-friendly packaging and reducing its environmental footprint, enhancing brand loyalty among sustainability-focused consumers.	Jones, A., Hill, T., & Friedman, M. (2020). The role of R&D in sustainability: Nestlé's approach. Sustainable Food Systems Journal, 12(2), 120-135.

Company	Sector	Sustainability R&D Focus	Investment (USD)	Business Expansion Result	Academic reference
Iberdrola	Energy	Renewable energy sources (wind, solar), smart grids	€4.3 billion (2020)	Iberdrola expanded its renewable energy projects, becoming one of the world's largest wind energy producers, with major operations in the U.S. and Europe.	Pardo, A., & Canales, A. (2019). Innovation in renewable energy: Iberdrola's global leadership. Renewable Energy Reviews, 92, 233-250.
BP (British Petroleum)	Energy (Oil & Gas)	Transition to renewable energy, low-carbon technologies	$500 million (2020)	BP transitioned to renewables, expanding renewable energy projects in Europe and North America, particularly in offshore wind.	Skeete, J., & Wells, P. (2020). BP's R&D investments in low-carbon technologies. Energy Research & Social Science, 64, 101401.
Apple Inc.	Technology	Renewable energy in supply chain, carbon-neutral products	$2.5 billion (2020)	Apple's R&D efforts led to a greener supply chain, expanding its market appeal to eco-conscious consumers and enhancing brand value globally.	Johnson, R., & Parente, V. (2021). Sustainability practices in global tech companies: A case study of Apple. Journal of Sustainability Management, 9(4), 224-238.
General Electric (GE)	Energy and Manufacturing	Energy-efficient appliances, wind and gas turbines, smart grids	$4.1 billion (2019)	GE expanded its renewable energy footprint, growing its wind turbine market in Asia and Latin America, leading to significant revenue growth in sustainable energy sectors.	Roper, S., & Xie, C. (2017). Sustainable R&D in global manufacturing: Insights from General Electric. Journal of Engineering and Technology

Company	Sector	Sustainability R&D Focus	Investment (USD)	Business Expansion Result	Academic reference
					Management, 43, 12-26.
Daimler AG (Mercedes-Benz)	Automotive	Electric vehicle development, hydrogen fuel technology	€60 billion (2021-2026)	Daimler expanded its electric and hydrogen vehicle lineup, gaining substantial market share in the European EV sector and positioning itself as a zero-emission leader.	Kirchherr, J., & Wills, P. (2021). Daimler's strategy in electric mobility. Journal of Automotive Engineering, 49(7), 123-13

However, the global landscape presents significant disparities in R&D investments. Developing nations often struggle to keep up with the R&D spending of wealthier countries, which can hinder their ability to achieve sustainability targets. As a result, these countries tend to depend more on technology transfers and external partnerships to improve their sustainability capabilities.

2.2.4.2 European perspective

Europe's sustainability efforts are heavily influenced by the Environmental Kuznets Curve (EKC) theory, which posits that economic growth initially leads to environmental degradation but, beyond a certain point, fosters cleaner technologies through R&D investments (Dinda, 2004). More specifically, the Environmental Kuznets Curve proposes that economic development initially leads to environmental degradation, but as economies grow, societies eventually address these issues, leading to a reduction in environmental harm. This suggests that economic growth can ultimately benefit the environment. However, critics argue that there is no assurance that economic growth will naturally result in environmental improvements. In fact, it is often the reverse. At a minimum, specific policies and proactive attitudes are needed to ensure that economic growth aligns with environmental sustainability.

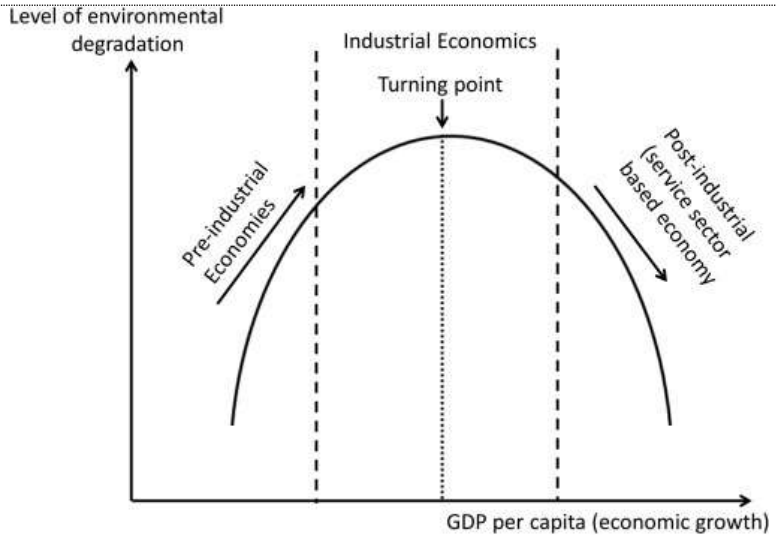


Figure 17: Environmental Kuznets Curve [11]

In this context, European policymakers have embraced this theory by promoting policies that stimulate R&D for clean technologies while supporting economic growth (Horbach, 2016). The EU's Horizon Europe program, which allocates €95.5 billion for R&D across various sectors, places a strong emphasis on sustainability, aiming to foster innovations that contribute to climate neutrality, resource efficiency, and biodiversity preservation. The European Green Deal further demonstrates the EU's commitment to environmental sustainability, with R&D investments at the core of initiatives to decarbonize industries, promote circular economies, and transition to renewable energy sources. Empirical evidence from Europe supports the effectiveness of these investments. Countries such as Germany, Sweden, and Denmark have made significant advancements in renewable energy technologies, particularly in wind and solar power. Germany's "Energiewende" (energy transition) policy, underpinned by substantial R&D funding, has enabled the country to increase its renewable energy capacity and reduce its reliance on coal and nuclear power (Jacobsson & Lauber, 2006) .Likewise, Scandinavian countries have pioneered sustainable forestry practices, waste management systems, and innovations in energy efficiency, all of which have been driven by sustained R&D investments (Horbach, 2016).

[11] https://www.sciencedirect.com/topics/earth-and-planetary-sciences/environmental-kuznets-curve

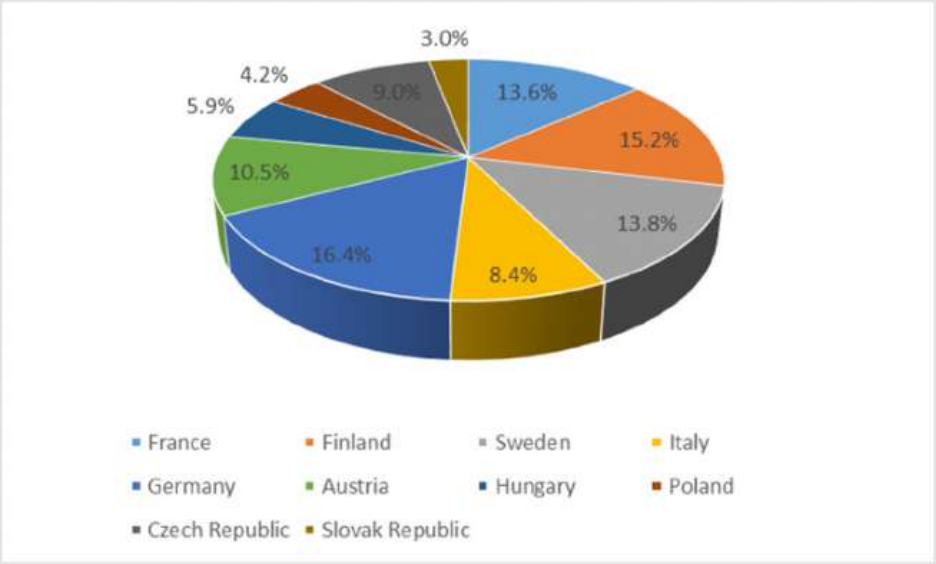


Figure 18: Graphical interpretation of Average Eco-innovation inputs (2017-2021).[12]

Table 7: R&D Investments in Sustainability by leading EU companies and their impact on business expansion

Company	**R&D Investment in Sustainability**	**Impact on business expansion**	**Academic reference**
Siemens (Germany)	€1.1 billion annually in sustainable technologies, including electrification and automation	Siemens expanded into the smart infrastructure market, especially in energy-efficient and renewable energy systems. Increased market presence in smart cities and digitalization.	PwC. (2022). The role of sustainability in European R&D investment.
Volkswagen (Germany)	€73 billion investment in e-mobility, hybrid, and battery technologies (2022-2026)	Volkswagen's heavy investment in electric vehicles (EVs) contributed to the company's rapid expansion in the global EV market, especially in Europe and China.	Perez, R., & Cerdá, E. (2020). Electric mobility and business growth in the automotive sector. Journal of Sustainable Business.

[12] https://www.researchgate.net/publication/367180092_Evaluation_of_Eco-Innovation_and_Green_Economy_in_EU_Countries

Company	R&D Investment in Sustainability	Impact on business expansion	Academic reference
Iberdrola (Spain)	€10 billion investment in renewable energy technologies (2022-2025)	Iberdrola has become a global leader in renewable energy, particularly in wind and solar power. Expansion into US and Latin American markets.	European Commission. (2021). The transition to renewable energy in global corporations.
Enel (Italy)	€190 million in R&D towards clean energy and digitalization of energy systems	Enel's focus on renewable energy, especially solar and wind, has significantly expanded its presence in Europe and Latin America.	Del Rio, P., & Cerdá, E. (2021). Clean energy investments and corporate expansion in Europe. Energy Policy.
Schneider Electric (France)	€1.3 billion investment in energy efficiency and green technologies	Schneider Electric expanded its business in smart energy management and eco-friendly solutions, leading to increased global market share in energy-efficient infrastructure.	Berkley, R., & Anderson, P. (2021). Sustainability innovation in European corporations. European Journal of Innovation Management.
BASF (Germany)	€2 billion in sustainability-focused R&D, including eco-friendly chemicals and materials	BASF's investment in green chemicals and sustainable solutions has expanded its reach in industries focused on reducing carbon footprints, such as automotive and construction sectors.	Helmers, C., & Rogers, M. (2019). R&D, sustainability, and corporate growth in the chemical industry. Journal of Environmental Economics and Management.
Novozymes (Denmark)	€400 million in sustainable biotechnology and enzymes for reducing waste and pollution	Novozymes' focus on sustainability has led to growth in bio-based industries, such as biofuels and sustainable agriculture, increasing its market share.	Milbradt, D., Garcia, R., & Pacheco, M. (2021). Green biotechnology and market expansion: Insights from leading corporations. Biotechnology Advances.

Company	R&D Investment in Sustainability	Impact on business expansion	Academic reference
Vestas (Denmark)	€2 billion in R&D towards wind energy technologies (2021-2025)	Vestas has significantly expanded its business in the renewable energy sector, becoming a global leader in wind turbine manufacturing and solutions.	Pacheco, M., Perez, R., & Cerdá, E. (2020). Wind energy investment and global market growth. Renewable Energy Journal.
TotalEnergies (France)	€1.5 billion annual investment in clean energy technologies, including solar and hydrogen	TotalEnergies' pivot towards renewable energy sources such as solar and hydrogen has diversified its portfolio and expanded its presence in the global clean energy market.	Garcia, R., & Calantone, R. (2022). Energy transition and business expansion in European oil companies. Energy Economics.
Airbus (France)	€2.5 billion in R&D for sustainable aviation technologies, including hydrogen-powered aircraft	Airbus is leading the development of sustainable aviation, expanding its market for cleaner and more fuel-efficient aircraft, positioning itself as a leader in sustainable aerospace.	Jacobson, M. (2021). Sustainability in aviation and its impact on corporate growth. Aerospace Technology Review.

Despite Europe's leadership in environmental R&D, challenges remain. One of the primary barriers is the unequal distribution of R&D capacity across the continent. While Western and Northern Europe are frontrunners in green innovation, Southern and Eastern European countries lag behind due to lower levels of investment and weaker innovation ecosystems(Crescenzi et al., 2015). This disparity complicates efforts to achieve EU-wide environmental goals, such as carbon neutrality by 2050, as the success of these initiatives depends on broad-based participation and innovation across all member states.

2.2.4.3 Greek perspective

Greece, as part of the European Union, has increasingly focused on aligning its R&D activities with the EU's broader goals for environmental sustainability. Historically, Greece has invested less in R&D compared to other EU nations, which has limited its capacity to innovate and adopt environmentally

friendly technologies at the same rate as its European counterparts[13]. However, in recent years, there has been a shift toward prioritizing sustainability, particularly in key sectors such as renewable energy and agriculture, which are essential for the country's economic future and environmental commitments.

One significant area of progress has been in the renewable energy sector. Thanks to its geographical advantages, with high levels of solar irradiance and wind, Greece is well-positioned to capitalize on renewable energy technologies. By 2022, renewable energy accounted for over 40% of Greece's electricity generation, largely due to advancements in solar and wind power.[14] This achievement has been supported by both national R&D initiatives and collaborations with EU programs like Horizon Europe, which have equipped Greece with the necessary technological expertise. Major projects, including large-scale solar farms on the mainland and wind farms in the Aegean Islands, have played a pivotal role in helping Greece meet its renewable energy targets and reduce its reliance on fossil fuels.

In agriculture, Greece has made significant strides through increased R&D aimed at promoting sustainability. The agricultural sector in Greece is particularly vulnerable to the impacts of climate change, including more frequent droughts and shifting weather patterns. To address these challenges, research institutions and agricultural enterprises have focused on precision farming technologies, drought-resistant crops, and organic farming practices. These innovations have been crucial in helping Greek farmers reduce their environmental footprint while maintaining productivity Precision farming has helped farmers optimize the use of water and fertilizers, which is increasingly important in areas facing water scarcity, such as Thessaly and Crete.

Despite this progress, Greece still faces significant barriers to fully utilizing R&D for environmental sustainability. The economic crisis that began in 2009 and the more recent impacts of the COVID-19 pandemic have severely limited both public and private sector investments in R&D, slowing the country's green innovation capacity. As of 2022, Greece's R&D spending remained below the EU average, reflecting the long-term effects of the financial crisis on the country's innovation potential[15]. Furthermore, Greece faces bureaucratic and regulatory hurdles that complicate the implementation of green technologies, particularly in the renewable energy sector. Lengthy and complex permit processes have deterred investment and delayed the rollout of new energy technologies.

To address these challenges, Greece has increasingly aligned its sustainability goals with broader EU initiatives, such as the European Green Deal and the REPowerEU plan. These initiatives provide essential funding and policy support to promote sustainable development, reduce dependence on

[13] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en

[14] International Energy Agency. (2022). Greece energy policy review 2022. Paris: IEA.

[15] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=R%26D_expenditure

fossil fuels, and accelerate the transition to clean energy. Greece's participation in these programs has allowed the country to access financial resources and collaborate with other EU members on innovative projects aimed at improving energy efficiency and cutting greenhouse gas emissions. The EU's Innovation Fund, for instance, has supported numerous Greek projects focused on expanding renewable energy capacity and contributing to the green transition.

In addition to the efforts in renewable energy and agriculture, leading Greek companies have been making significant R&D investments in sustainability. For instance, companies like Metlen, Public Power Corporation (PPC), and Titan Cement Group have spearheaded innovations in green energy, carbon-neutral technologies, and sustainable construction materials. These investments not only contribute to Greece's sustainability goals but also drive business expansion by positioning these companies as leaders in the international market. Table 8 provides an overview of these companies' R&D investments and the corresponding impact on both sustainability and business growth.

Table 8: R&D Investments in sustainability by leading Greek companies and their impact on business expansion

Company	**Sector**	**R&D Investment**	**Impact on sustainability**	**Impact on business expansion**	**References**
METLEN ENERGY & METALS S.A	Energy, Infrastructure	Renewable energy, low-emission tech	Major investments in solar power and wind farms, reducing CO2 emissions significantly	Expanded into international energy markets, positioning as a leader in green energy exports	Chatzinikolaou & Papadopoulos (2022); Mytilineos (2023)
Public Power Corporation (PPC)	Energy, Utilities	Green energy, digital transformation	Shifted from lignite-based to renewable energy, achieving higher sustainability metrics	Expansion into renewable energy projects across the Mediterranean	Eurostat (2022); Georgiou (2023)
Titan Cement Group	Cement, Construction	Circular economy, carbon-neutral technologies	Focus on reducing carbon footprint through alternative materials in cement production	Positioned as a global leader in sustainable construction materials	OECD (2022); Titan Cement Group (2023)

Company	Sector	R&D Investment	Impact on sustainability	Impact on business expansion	References
Motor Oil Hellas	Oil and Gas	Renewable energy and hydrogen technologies	Investment in green hydrogen and biofuels to reduce dependence on fossil fuels	Expansion into alternative energy markets and diversification of product lines	Konstantopoulou et al. (2023); Motor Oil Hellas (2023)
TERNA Energy	Renewable Energy	Wind farms, hydroelectric power, storage solutions	Large-scale renewable energy projects, focus on wind and hydroelectric power	Expanded renewable energy capacity and leadership in energy storage solutions across Europe	European Commission (2023); TERNA Energy (2022)

By addressing the challenges of investment and regulatory barriers, and continuing to engage with EU programs, Greece is poised to further enhance its R&D contributions to sustainability. Increased focus on green technologies and streamlined regulatory processes will not only benefit Greece's environmental objectives but also support long-term business growth and economic resilience in the face of climate change.

2.2.4.3.1 Greece's Strategic Framework for green Innovation

Greece, in its effort to align with the European Union's broader environmental sustainability objectives, has implemented a series of strategic incentives to promote research and development (R&D) in green technologies and sustainability-oriented projects. These incentives are designed to foster innovation in key sectors such as renewable energy, agriculture, and energy efficiency, and to support the country's green transition. Given the historical underinvestment in R&D compared to other EU nations, these initiatives are critical for enhancing Greece's capacity for technological innovation and sustainable development (OECD, 2022). Some key incentives and programs that support R&D in sustainable projects in Greece are the following.

1. National Recovery and Resilience Plan

As part of the EU's Recovery and Resilience Facility, the Greek government has allocated substantial funds to green and digital transformation projects. Greece 2.0 prioritizes investments in renewable energy, sustainable mobility, and energy efficiency, among others. It is estimated that around 38% of the plan's total budget is devoted to climate objectives. This includes R&D support for green

technologies, with a focus on sustainable energy and circular economy projects[16]. The plan also includes targeted support for small and medium enterprises (SMEs) engaged in sustainability-focused innovation, offering them funding and technical assistance to boost their R&D activities in line with EU sustainability goals. In 2024, new R&D grants have been extended, specifically focusing on renewable energy storage solutions, hydrogen technologies, and the development of smart grids. The updated plan prioritizes the digital transformation of energy systems and encourages collaboration between research institutions and the private sector to develop scalable, sustainable technologies.

2. European funding programs

Horizon Europe& Innovation Fund

Greek companies continue to benefit from Horizon Europe[17], with a renewed focus on sustainability in 2024. This EU program supports research in cutting-edge green technologies, with priority funding for renewable energy, waste reduction technologies, and climate-resilient agriculture. Additionally, the Innovation Fund[18] has increased its grants for projects focusing on carbon capture and storage, low-carbon hydrogen production, and large-scale renewable energy initiatives (European Commission, 2024). These programs significantly bolster Greece's R&D ecosystem, promoting sustainable growth and innovation.

REPowerEU and the European Green Deal[19]

Greece's alignment with EU-wide initiatives such as the European Green Deal and the REPowerEU plan has played a critical role in promoting R&D for sustainable projects. The Green Deal provides a comprehensive policy framework for transforming Europe's economy to achieve climate neutrality by 2050. Greece's involvement in these initiatives provides access to financial resources, technical expertise, and collaborative opportunities with other EU nations. The REPowerEU plan, which seeks to reduce the EU's reliance on fossil fuels, also provides funding for renewable energy infrastructure and innovation, further supporting Greece's green transition.

3. R&D Superdeduction

According to Article 22A of L.4172/2013, most operating expenses incurred in R&D activities undertaken in Greece qualify for a 200% tax super deduction[20]. Capital expenditure related to R&D (R&D equipment, instruments & software) is subject to a three-year accelerated depreciation equal to 40% per year, which also is eligible for the 200% tax super deduction. If the company cannot utilize

[16] https://greece20.gov.gr/en/

[17] https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

[18] https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund_en

[19] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

[20] https://gsri.gov.gr/en/protovoulies-draseis/certification-of-rd-expenditure/

the tax benefit in the current year, it may be carried forward for five years. Companies engaged in R&D, particularly those focusing on renewable energy, energy efficiency, and eco-friendly technologies, are eligible. This expanded tax policy aims to reduce the financial barriers for companies investing in innovative environmental projects, boosting participation from both SMEs and large enterprises.

4. CAPEX tax incentives for energy efficiency water saving and climate change mitigation

CAPEX costs related to energy efficiency (i.e. building thermal insulation, heating/cooling systems, RES own production, lighting, BMS) or water conservation are depreciated at the tax depreciation rates (% per tax year), incremented by 100%. If the initial depreciation rate is higher than 10%, the increased rate cannot exceed 10 percentage points. The amounts of increased depreciation are deducted from the net taxable income of the tax year in which they relate. Their calculation shall start from the following month in which the expenditure related to energy efficiency or water saving is identified as falling under these provisions.

5. Support for Sustainable Agriculture and Precision Farming

The Greek government continues to focus on sustainable agriculture, with new R&D incentives introduced in 2024 to address climate change impacts. These incentives include grants for research into drought-resistant crops, organic farming practices, and precision farming technologies that optimize resource use, particularly water and fertilizers. This R&D focus is particularly relevant for regions such as Thessaly and Crete, which are prone to water scarcity (Greek Research and Technology Network, 2024).

Greece's R&D incentives for sustainability reflect a deepened commitment to its green transition. Through tax incentives, grants, and participation in EU-wide programs, the country is strengthening its capacity for innovation in critical sectors like renewable energy, agriculture, and energy efficiency. As Greece continues to address economic and regulatory challenges, these R&D incentives will be key to achieving its sustainability goals and contributing to the EU's broader climate objectives.

2.2.5 Case Study: R&D investments, sustainability and business growth

2.2.5.1 Hellenic Dairies S.A

Hellenic Dairies S.A., a prominent player in Greece's dairy sector, serves as a compelling case study on how strategic investments in R&D, focused on sustainability, can fuel business growth. The company, known for its popular brands Olympus and Tyras, has made substantial strides in transforming its operations to prioritize environmental sustainability. This transformation has not only improved its ecological footprint but has also driven the company's business expansion, both domestically and internationally.

R&D Investments in sustainability

Hellenic Dairies has actively pursued sustainability through its R&D initiatives, primarily in areas such as energy efficiency, waste reduction, and sustainable agriculture. These efforts have been critical in ensuring that the company meets modern environmental standards while also staying competitive in the global dairy market.

I. Energy efficiency and renewable energy

A key component of Hellenic Dairies' sustainability strategy is its focus on energy efficiency. The company operates one of the largest solar panel installations in Greece's dairy sector, significantly reducing its reliance on fossil fuels. This solar energy initiative powers a substantial portion of the company's production facilities, decreasing overall energy consumption and lowering carbon emissions (Hellenic Dairies, 2023). Additionally, the company has invested in energy-efficient cooling systems and production lines, further optimizing its operations for sustainability.

II. Waste management and circular economy

Hellenic Dairies has implemented advanced waste management systems, focusing on the recycling and reuse of by-products generated during dairy production. One notable example is the recycling of whey, a by-product of cheese production, which is repurposed as animal feed or for use in other commercial products. This approach aligns with the principles of the circular economy, ensuring that waste is minimized, and resources are utilized efficiently. The company has also reduced water consumption through innovative wastewater recycling systems, further contributing to its sustainability goals.

III. Sustainable agriculture and animal welfare

The company collaborates closely with local farmers, providing them with support to implement sustainable farming practices. This includes optimizing animal feed and ensuring higher welfare standards, which are key elements in reducing the overall environmental impact of dairy farming. Hellenic Dairies' commitment to sustainable agriculture is also evident in its promotion of organic dairy products, meeting the rising consumer demand for more environmentally friendly and ethically produced goods.

Business growth driven by sustainability

The investments in sustainability have not only improved the company's environmental performance but have also driven substantial business growth. This growth has been evident in several key areas:

- **Expansion into international markets:** By incorporating sustainability into its operations, Hellenic Dairies has been able to expand its market presence internationally. The company now exports its products to over 40 countries, including high-demand regions in Europe, North America, and Asia (Hellenic Dairies, 2023). Its focus on eco-friendly production has enhanced its reputation in these markets, where consumers and retailers increasingly prioritize environmentally sustainable products.

- **Product diversification:** Hellenic Dairies has successfully diversified its product portfolio to include organic and plant-based alternatives, capitalizing on the growing trend of health-conscious and environmentally aware consumers. This diversification has not only strengthened the company's market position but has also opened new revenue streams, allowing it to compete in the rapidly growing segment of dairy alternatives.
- **Strengthened brand reputation:** The company's commitment to sustainability has enhanced its brand image, both in Greece and internationally. As consumer awareness of environmental issues continues to grow, Hellenic Dairies has positioned itself as a responsible and forward-thinking brand. This focus on sustainability has resulted in stronger consumer loyalty and greater market differentiation, giving the company a competitive advantage.

Financial and operational benefits of sustainability initiatives

Hellenic Dairies has also seen direct financial benefits from its sustainability investments. By adopting renewable energy technologies and reducing waste, the company has significantly lowered its operational costs. For example, its energy efficiency measures and reliance on solar power have resulted in substantial savings on energy expenses, which in turn has improved its profitability. Additionally, the reduction in waste through circular economy practices has helped cut down on waste disposal costs and has contributed to a more sustainable supply chain.

Support from government and EU programs

Hellenic Dairies has leveraged various Greek and European Union (EU) incentives aimed at supporting sustainable development. The company has benefited from Horizon Europe and other EU funding programs that support innovation in sustainable agriculture and green technologies. These funds have enabled Hellenic Dairies to accelerate its R&D efforts and stay at the forefront of sustainable dairy production. Furthermore, Greek government incentives, such as tax super deduction for R&D expenditures and grants for renewable energy projects, have supported the company's transition towards sustainability (OECD, 2024).

Hellenic Dairies has successfully utilized R&D investments in sustainability to enhance its business growth. By focusing on renewable energy, waste reduction, and sustainable farming, the company has strengthened its market position, expanded internationally, and built a strong, eco-conscious brand. These efforts have positioned it as a leader in both sustainability and profitability in the dairy industry.

Figure 19: Hellenic Dairies S.A Sustainability Report 2022[21]

[21] https://www.hellenicdairies.com/en/sustainability-report/

3. PROBLEM STATEMENT & RESERARCH QUESTIONS

Problem statement

Sustainable development has become a core strategic priority for businesses today, driven by escalating environmental degradation and increasing social expectations. In response, organizations are under growing pressure to incorporate Environmental, Social, and Governance (ESG) values into their core operations to ensure long-term competitiveness and resilience.

While there is substantial research addressing ESG practices, green marketing, and sustainable development individually, their combined and interactive impact—particularly when considered alongside R&D investments and sustainable innovation—remains insufficiently explored. This gap is especially critical in understanding how environmental and social initiatives can be effectively aligned with business growth objectives.

Green marketing has emerged as a key strategy for firms striving to position their brands in line with sustainability goals. However, much of the existing literature emphasizes short-term, tactical elements—such as eco-labeling or green advertising—while paying limited attention to the strategic and internal dimensions necessary for long-term impact. At the same time, organizations often face significant challenges in harmonizing green marketing with the investments in research and innovation needed to enhance ESG outcomes.

Although previous studies have investigated various sustainability-related strategies and their influence on business performance, few have examined how green marketing, sustainable innovation, and ESG performance collectively shape organizational growth. This thesis aims to fill that gap by exploring the interplay between these components and their contribution to business expansion.

To achieve this, the study adopts a quantitative approach, utilizing data collected via a structured questionnaire distributed across multiple industries in Greece. It seeks to uncover the interrelationships among sustainable development practices, ESG performance, green marketing orientation, R&D investment, and sustainable innovation—ultimately providing empirical insights into how firms can strategically integrate these dimensions to drive sustainable growth and competitive advantage.

Research Questions

1. To what extent do companies' sustainable development practices influence their long-term business strategies and growth outcomes?
2. How do R&D project participation and the presence of R&D departments affect sustainable innovation and ESG performance across different firm sizes and sectors?
3. What is the impact of strategic, tactical, and internal green marketing orientations (SGMO, TGMO, IGMO) on ESG performance and sustainable business performance?

4. Are there significant differences in the components of sustainable performance—Economic Pillar (EP), Sustainable Business Performance (SBP), and Sustainable Competitive Advantage (SCA)—based on company size and industry sector?
5. How are internal and external ESG performance indicators associated with green marketing, sustainable innovation, and business expansion outcomes?
6. To what extent do composite sustainability variables serve as predictors of sustainable business performance across firms?

4. METHODOLOGY

4.1 RESEARCH DESIGN

This study employs a quantitative research design to investigate how companies integrate green marketing strategies, R&D investments, and sustainable innovation to enhance ESG performance and support business growth. Data were gathered through a structured online questionnaire distributed to a broad cross-section of firms across different industries in Greece.

A quantitative approach was chosen to capture measurable, comparable data across organizations, enabling the use of statistical methods to identify patterns and test relationships among key constructs. These include green marketing orientation, ESG performance, innovation capability, and firm-level growth.

The use of a structured questionnaire ensured consistency in responses, strengthening the reliability and comparability of the dataset. Conducting the survey online allowed for broad geographic reach, cost-effectiveness, and minimized interviewer bias—factors that likely encouraged more candid participation.

This design also supported the use of advanced statistical tools such as correlation analysis, regression models, ANOVA, and factor analysis, providing a robust framework to examine how sustainability strategies interact and contribute to organizational outcomes.

Although online surveys can limit opportunities for clarification, this was mitigated through clear instructions and dedicated contact support. The chosen methodology offers a rigorous and practical approach to understanding how sustainability practices can be strategically aligned with business performance.

4.1.1 Research methodology

The research will be conducted using a survey-based methodology. The questionnaire is designed to capture data on the following key areas:

- Sustainable development practices within companies.
- Green marketing efforts across strategic, tactical, and internal dimensions.
- R&D investments and their role in driving sustainable innovation.
- Sustainable performance in terms of economic health, competitive positioning, and stakeholder relationships.
- Enterprise ESG performance, including environmental reporting, stakeholder engagement, and social contributions.

This approach will facilitate a comprehensive understanding of how these variables interact to foster business expansion and competitiveness.

4.1.2 Population

The target population for this study includes professionals from a wide range of departments within companies operating across various industries in Greece. Rather than focusing solely on individuals in sustainability-specific roles, the study draws responses from employees in areas such as marketing, procurement, operations, finance, HR, and strategic management. This broad inclusion allows for a more comprehensive view of how sustainability practices are understood and implemented across different organizational functions.

Participants were selected regardless of their level of direct involvement in sustainability efforts. This approach captures not only technical execution but also organizational perceptions and alignment around initiatives like green marketing, R&D, innovation, and ESG performance.

Companies of different sizes—from small firms to large multinationals—were included to reflect diverse capacities and approaches to sustainable business practices. The sample spans sectors such as manufacturing, services, technology, and renewable energy, offering a cross-sectional perspective on how various industries are responding to sustainability demands within the Greek business landscape.

4.1.3 Data collection

The data collection for this study was conducted using an online questionnaire distributed via the Google Forms platform. The survey remained open for over three months, providing participants ample time to respond, especially given the summer period. The questionnaire link was shared via email with professionals from various departments across multiple industries in Greece, ensuring broad representation from the target population. The link for questionnaire was the following: (https://docs.google.com/forms/d/1kKNOhFFB5PaWZsV13lm4jdA3H69uPi1815PsP2QjL0s/edit).

The email provided a clear explanation of the dissertation topic and the research objectives, inviting recipients to participate and share their insights on the role of sustainability in business growth. Participants were assured that their responses would remain confidential and be used solely for academic purposes.

The data collection yielded a total of 84 responses to the online questionnaire, despite the survey being available for over three months. Several factors likely contributed to the limited number of participants. One key reason is that the data collection period overlapped with the summer months, a time when many professionals may have been on vacation or less inclined to engage with surveys. Additionally, the specialized focus of the study—exploring topics such as ESG, green marketing, R&D investments, and sustainable innovation—may have narrowed the pool of potential respondents. Many individuals may not have felt sufficiently informed or directly involved in these areas to participate, potentially limiting the response rate. Despite these challenges, the 84 responses still provide valuable insights into how professionals across industries perceive and implement sustainability practices in their organizations.

4.1.4 Questionnaire structure

The questionnaire, presented in Appendix A was specifically developed to gather primary data for examining the relationship between sustainable practices and business expansion. Drawing inspiration from established studies on sustainability and business performance, including Bafas et al.'s examination of Greek businesses' sustainable strategies (2023) Papadas et al.'s green marketing orientation framework (2017) and Zhao et al.'s work on ESG and digital transformation (2023) this questionnaire integrates essential themes from these sources. Together, these influences have shaped a tool designed to capture insights on sustainable development, green marketing, R&D, business expansion and ESG improvements.

More specifically, the questionnaire is divided into five major sections:

1. Demographics and professional background
2. Sustainable development,
3. Green marketing,
4. Sustainable performance,
5. ESG performance

The questionnaire incorporates a predominantly closed-ended design, supplemented by a few open-ended questions. Closed-ended questions are primarily formatted as multiple-choice items and 5-point Likert scale statements, ranging from "Strongly Disagree" to "Strongly Agree." These closed-ended questions streamline the collection of quantitative data, allowing for efficient statistical analysis and easy comparison of responses across various topics, such as sustainable practices, green marketing, and ESG performance. By using these structured formats, the questionnaire can capture nuanced degrees of agreement and assess a wide array of attitudes and behaviors.

Open-ended questions, though limited in number, add depth to the demographic section by asking respondents to provide specific information such as their exact age and current job. These open-ended items give participants the flexibility to provide more individualized responses that fall outside predefined categories, thereby enriching the dataset with qualitative insights. The combination of open- and closed-ended questions enables the questionnaire to balance breadth with depth, capturing both detailed personal information and scalable quantitative data.

Questionnaire sections

Section A: Basic information

The first part of the study gathers background information about participants, focusing on key demographic and professional details, including their age, level of education, years of work experience, and the industry they are involved in. This data plays an essential role in classifying responses and assessing how these personal and professional factors shape views on sustainability.

Section B: Sustainable development

Influenced by Bafas et al.'s[22] study on sustainable development strategies among Greek companies, this section delves into respondents' understanding and valuation of sustainable practices within their organization. Questions address familiarity with sustainable development concepts, perceived implementation challenges, and the importance of sustainability metrics. This section further examines specific sustainability actions, such as reducing environmental impact through eco-friendly processes, aligning with the principles of the Triple Bottom Line (social, environmental, and economic value).

Section C: Green marketing

Following the framework outlined by Papadas et al.[23] on green marketing orientations, this section is organized into three dimensions:

- **Strategic green marketing** assesses long-term commitments, such as investments in low-carbon technologies, environmental criteria for partnerships, and efforts to target eco-conscious consumers. These questions explore the degree to which green initiatives shape the company's overarching strategy.
- **Tactical green marketing** focuses on shorter-term actions like promoting digital communication, using recycled materials, and minimizing paper use. These activities represent more immediate efforts to integrate eco-friendly practices into marketing functions.
- **Internal green marketing** evaluates the extent to which environmental values are ingrained within organizational culture, including incentives for eco-friendly behavior, environmental considerations in recruitment, and employee engagement in sustainable practices. This internal dimension assesses the depth of environmental commitment within the workforce.

Section D: Sustainable performance

This section examines the impact of sustainable practices on business outcomes, using categories such as the Economic Pillar (EP), Sustainable Business Performance (SBP), and Sustainable Competitive Advantage (SCA). Building on findings from the exploratory study by Bafas et al.[24], which highlighted the connection between sustainability and competitive advantage, this section seeks to determine how sustainability translates into financial gains, resilience, and market positioning. Questions assess metrics like profitability growth, customer satisfaction, and organizational adaptability during crises, providing a snapshot of sustainability's tangible benefits.

[22] https://www.mdpi.com/2673-7116/3/3/27

[23] https://www.sciencedirect.com/science/article/abs/pii/S0148296317301777

[24] https://www.mdpi.com/2673-7116/3/3/27

Section E: Sustainable performance

Inspired by Zhao et al.'s research[25] this section evaluates how companies implement ESG principles. Topics range from environmental initiatives (carbon footprint, resource management) to social and governance responsibilities (employee welfare, data privacy, and ethical conduct). The ESG framework emphasizes comprehensive integration, from environmental accountability to governance standards, reflecting how these practices contribute to long-term competitiveness and sustainability.

Table 9: Overview of question types and their purpose in each questionnaire section

Section	Type of questions	Purpose
A. Basic Information	Multiple-choice and open-ended (age, job title, major)	Capture demographics (age, education, job role, industry) and specific job details
B.Sustainable development	Closed-ended (5-point Likert scale)	Assess familiarity and attitudes toward sustainable practices.
C.Green marketing	Closed-ended (5-point Likert scale)	Evaluate green marketing practices and orientation within the organization.
D.Sustainable performance	Closed-ended (5-point Likert scale)	Measure perceptions of business performance in sustainability.
E.Enterprise ESG performance	Closed-ended (5-point Likert scale)	Gather insights on ESG practices and organizational compliance.

After the completion of the questionnaire, responses were downloaded from Google Forms and thoroughly checked for consistency to ensure data quality. No inconsistencies were detected, likely due to the professional nature of the respondents, who provided careful and attentive answers. The data was then prepared for analysis in SPSS.

[25] https://www.mdpi.com/2071-1050/15/13/9998

5. RESUSLTS

This analysis includes descriptive statistics to summarize the dataset, reliability checks for survey items, and advanced statistical methods such as correlation, regression, and ANOVA to examine relationships and group differences. The findings provide empirical insights into how sustainability-focused actions influence business outcomes, supporting the hypotheses of this research.

5.1.1 Statistical analysis of basic information questions

Question 1: What is your age?

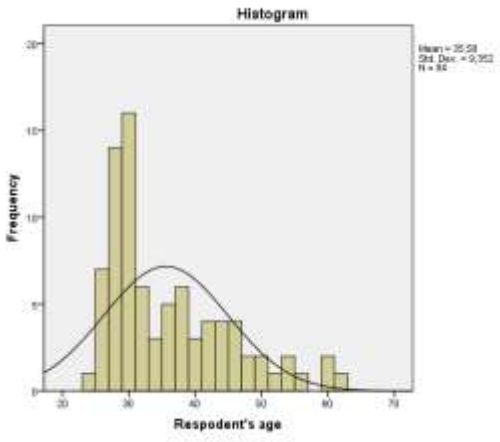
A total of 84 respondents participated in the survey, with ages ranging from 24 to 62 years. The mean age of the respondents is 35.58 years, indicating that most participants are in their mid-thirties. The standard deviation of 9.352 highlights a moderate spread of ages, suggesting a diverse sample.

Table 10: Descriptive statistics of Respondents' age

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Respodent's age	84	24	62	35,58	9,352
Valid N (listwise)	84				

Moreover, the following histogram provides a clear visualization of the age distribution. The peak of the distribution is observed in the late 20s, specifically at ages 28 and 29. As the age increases, the frequency gradually decreases, creating a right-skewed distribution. This pattern aligns with the mean and standard deviation, which highlight moderate variability while centering around mid-thirties professionals. The histogram vividly illustrates the demographic diversity of the sample, capturing both younger and older participants.



Statistics

Respodent's age

N	Valid	84
	Missing	0
Mean		35,58
Median		32,00
Mode		29

Figure 20: Histogram of respondents' age distribution

The analysis of respondents' age underscores the demographic diversity of the sample. The majority of participants are young to mid-career professionals, with a smaller yet meaningful representation of older, experienced individuals. This balanced distribution enhances the validity of the study, as it incorporates insights from professionals at varying stages of their careers. The inclusion of both younger and older respondents ensures that the findings reflect a comprehensive range of perspectives, enriching the impact of the research.

Question 2: What is your gender identity?

The gender distribution of the survey respondents is shown in the pie chart above. Women comprise the largest group, representing 58.33% of the sample, followed by men at 39.29%. A small portion of respondents (2.38%) opted for "Prefer not to answer." The following chart highlights a balanced demographic composition between male and female participants, ensuring the inclusion of diverse viewpoints in the analysis.

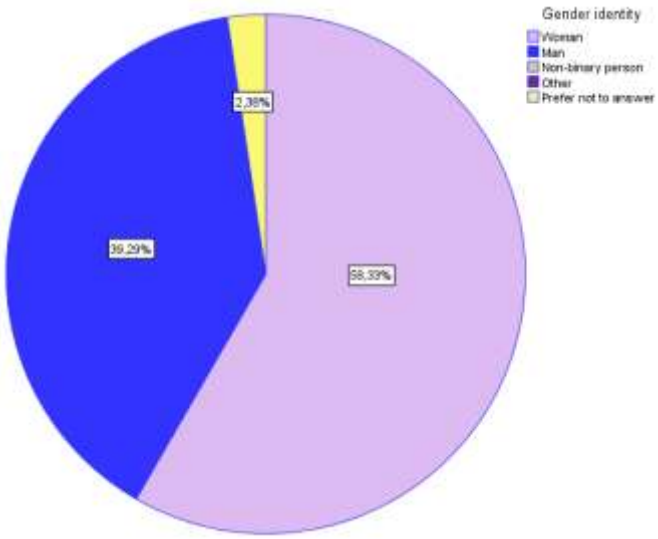


Figure 21: Gender identity distribution of survey respondents

Question 3: What is your level of education?

The educational background of respondents is clearly depicted in the pie chart above, providing insights into their academic qualifications. The majority of respondents (67.86%) hold a Master's degree, highlighting the advanced educational attainment of the sample. Participants with a Bachelor's degree account for 21.43%, representing a substantial portion with strong foundational qualifications. A smaller percentage (5.95%) have attained a Ph.D. degree, reflecting the presence of highly specialized expertise in the sample. Additionally, 3.57% of respondents reported having a high school or college diploma, ensuring a broader representation of educational levels. Only 1.19% of participants opted for "Prefer not to say," respecting their privacy and choice. This distribution

ensures that the survey findings are informed by a well-educated group with varied academic and professional insights.

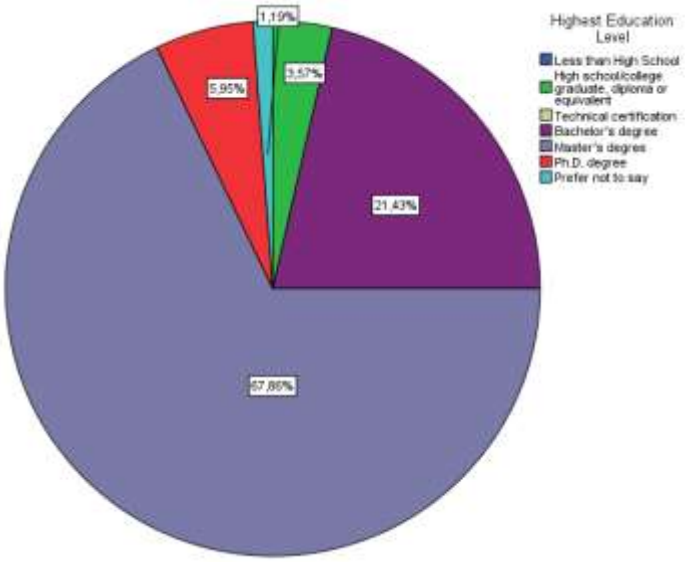


Figure 22: Level of education distribution of survey respondents

Question 4: What is your major?

The table below highlights the diverse academic backgrounds of the survey respondents. Engineering is the most represented field, accounting for 48.8% of the sample, which underscores the strong technical focus of nearly half of the participants. This is followed by Management, Economics, and Marketing, representing 38.1%, reflecting the relevance of business and organizational expertise in the study.

Smaller proportions of respondents come from Science fields (6.0%), Social Sciences (excluding Economics/Management) (3.6%), and Other fields (3.6%), contributing additional diversity to the dataset. While fields such as Computer Science and Health Sciences were not explicitly represented in the survey responses, their absence may reflect the specific demographic or professional focus of the participants. Including these fields in future studies could further enrich the dataset and provide a more comprehensive understanding of diverse academic perspectives.

Table 11: Frequency distribution of respondents' field of study

Field of study

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Engineering	41	48,8	48,8	48,8
	Management/Economics/Marketing	32	38,1	38,1	86,9
	Science (e.g., Physics, Chemistry, and Biology)	5	6,0	6,0	92,9
	Social Science other than Economics/Management	3	3,6	3,6	96,4
	Other	3	3,6	3,6	100,0
	Total	84	100,0	100,0	

Question 5: How many years of professional experience do you have?

The distribution of respondents by years of professional experience is summarized in the table below, highlighting the diverse career stages represented in the survey:

Table 12: Distribution of respondents by years of professional experience

Years of professional experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 3 years	8	9,5	9,5	9,5
	3–5	25	29,8	29,8	39,3
	6–8	13	15,5	15,5	54,8
	9–11	5	6,0	6,0	60,7
	12–14	10	11,9	11,9	72,6
	15-17	5	6,0	6,0	78,6
	18-20	5	6,0	6,0	84,5
	More than 20 years	13	15,5	15,5	100,0
	Total	84	100,0	100,0	

The most common category is 3–5 years of experience, representing 29.8% of the sample, hig lighting the strong presence of early-career professionals. Respondents with 6–8 years and more than 20 years of experience each account for 15.5%, reflecting a mix of mid-career and highly experienced professionals. A notable proportion (11.9%) have 12–14 years of experience, indicating individuals in senior or well-established roles.

Smaller groups with 9–11 years, 15–17 years, and 18–20 years of experience each make up 6.0%, contributing additional mid- to advanced-career perspectives. Finally, 9.5% of respondents have less than 3 years of experience, capturing the views of entry-level professionals at the beginning of their careers.

The Cumulative percent column further illustrates how these categories build on each other, with 39.3% of respondents having 5 or fewer years of experience and 54.8% having 8 or fewer years. By the 12–14 years category, nearly 72.6% of respondents are accounted for, reflecting that a significant portion of the sample is early- to mid-career professionals. The distribution reaches 100% with the inclusion of respondents with more than 20 years of experience.

This diverse distribution ensures the inclusion of insights from individuals across all career stages, enriching the study with a wide range of professional perspectives and making the findings relevant to varied experience levels.

Question 6: What is the sector of activities of your company?

The figures below summarize the sectors in which respondents' companies operate, showing a wide range of industries.

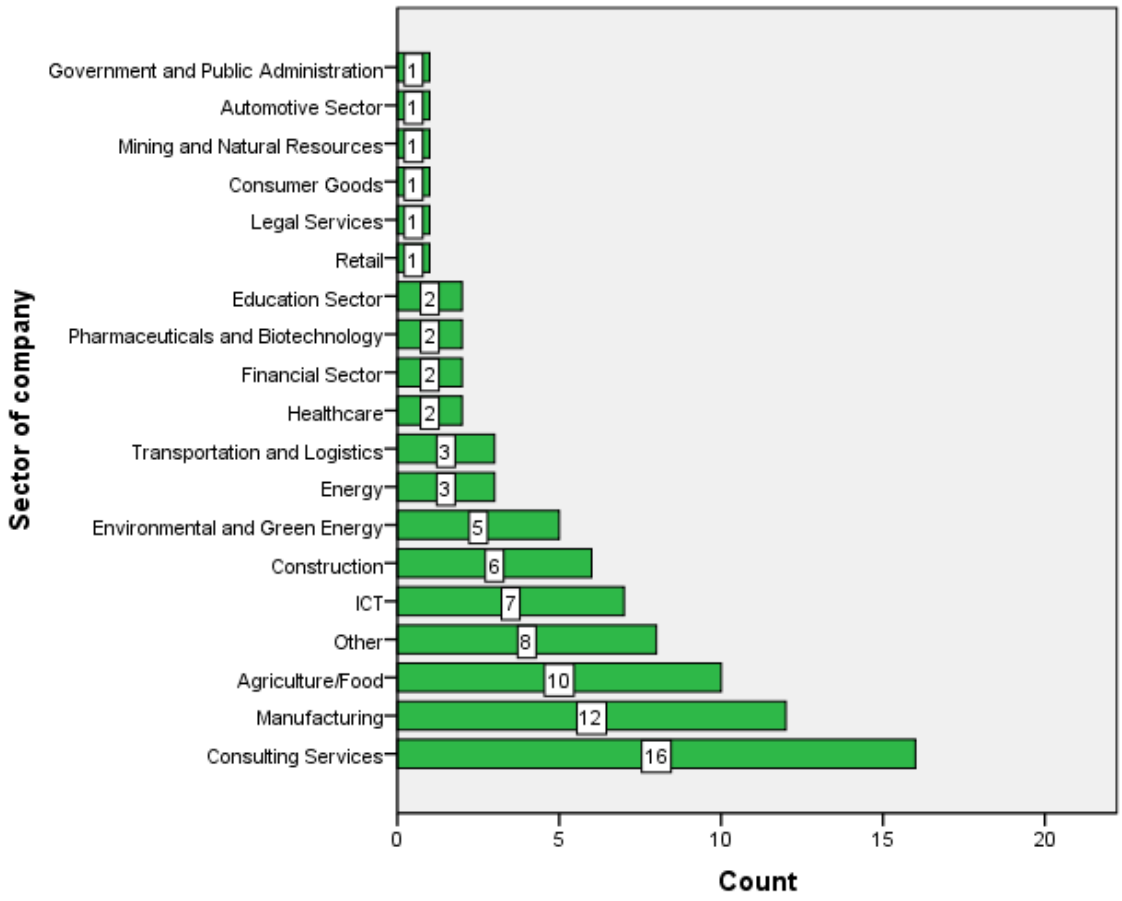


Figure 23: Answers of respondents by company sector of activities

Table 13: Distribution of respondents by company sector of activities

Sector of company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agriculture/Food	10	11,9	11,9	11,9
	Mining and Natural Resources	1	1,2	1,2	13,1
	Manufacturing	12	14,3	14,3	27,4
	Construction	6	7,1	7,1	34,5
	Energy	3	3,6	3,6	38,1
	ICT	7	8,3	8,3	46,4
	Financial Sector	2	2,4	2,4	48,8
	Healthcare	2	2,4	2,4	51,2
	Retail	1	1,2	1,2	52,4
	Transportation and Logistics	3	3,6	3,6	56,0
	Education Sector	2	2,4	2,4	58,3
	Government and Public Administration	1	1,2	1,2	59,5
	Consulting Services	16	19,0	19,0	78,6
	Automotive Sector	1	1,2	1,2	79,8
	Consumer Goods	1	1,2	1,2	81,0
	Environmental and Green Energy	5	6,0	6,0	86,9
	Pharmaceuticals and Biotechnology	2	2,4	2,4	89,3
	Legal Services	1	1,2	1,2	90,5
	Other	8	9,5	9,5	100,0
	Total	84	100,0	100,0	

Consulting Services emerges as the most represented sector, accounting for 19.0% of respondents. This strong presence underscores the importance of strategic and advisory roles within the participant pool. Manufacturing follows with 14.3%, reflecting the relevance of industrial production and operations. Additionally, Agriculture/Food represents 11.9% of the sample, showcasing the contribution of this vital sector to the survey findings. Moderately represented sectors include ICT (8.3%) and Environmental and Green Energy (6.0%), which highlight the growing importance of technology-

driven industries and sustainability-focused fields. Other notable sectors include Construction (7.1%) and Transportation and Logistics (3.6%), emphasizing the relevance of infrastructure development and supply chain management in the survey context.

Smaller but significant contributions come from Healthcare, Education, Financial Sector, and Pharmaceuticals and Biotechnology, each accounting for 2.4% of respondents. These sectors provide specialized insights that enrich the overall data. Additionally, fields such as Mining and Natural Resources, Retail, Automotive, and Legal Services, each with 1.2%, reflect niche perspectives from specific industries. The Other category, representing 9.5% of respondents, ensures the inclusion of sectors not explicitly listed, adding further diversity to the sample. However, sectors such as Real Estate, Hospitality and Tourism, Nonprofit and Social Services, Entertainment and Media, Aerospace and Defense and Insurance were not represented in the responses, highlighting areas for potential exploration in future studies.

The Cumulative Percent column indicates that over 50% of respondents belong to the top six sectors, including Agriculture/Food, ICT, and Consulting Services. By the inclusion of Consulting Services, 78.6% of the sample is accounted for, highlighting the concentration of responses in key economic activities. The remaining sectors provide additional, though smaller, contributions, ensuring a well-rounded dataset.

Although a higher number of responses from the Manufacturing sector would have been ideal, the insights provided by the Consulting sector are particularly valuable. Consulting professionals often play a pivotal role in guiding sustainability strategies and implementing best practices.

In conclusion, the distribution of company sectors demonstrates a robust representation of critical industries, such as consulting, manufacturing, and agriculture, while also incorporating insights from technology-driven, sustainability-focused, and specialized fields. This diversity enhances the study's relevance and ensures a comprehensive understanding of organizational activities across a wide array of economic domains.

Question 7: What type of market does your current company primarily operate in?

The following pie chart illustrates the market orientation of respondents' companies, revealing that the majority (53.57%) operate in the Business-to-Business (B2B) segment. This significant proportion underscores the dominance of inter-organizational trade and professional partnerships within the sample. Additionally, 33.33% of respondents indicate that their companies operate in both B2B and B2C markets, showcasing flexibility and the ability to address the needs of both organizational clients and individual consumers. A smaller yet meaningful 13.10% of respondents represent companies focused exclusively on the Business-to-Consumer (B2C) market, highlighting the importance of consumer-driven strategies.

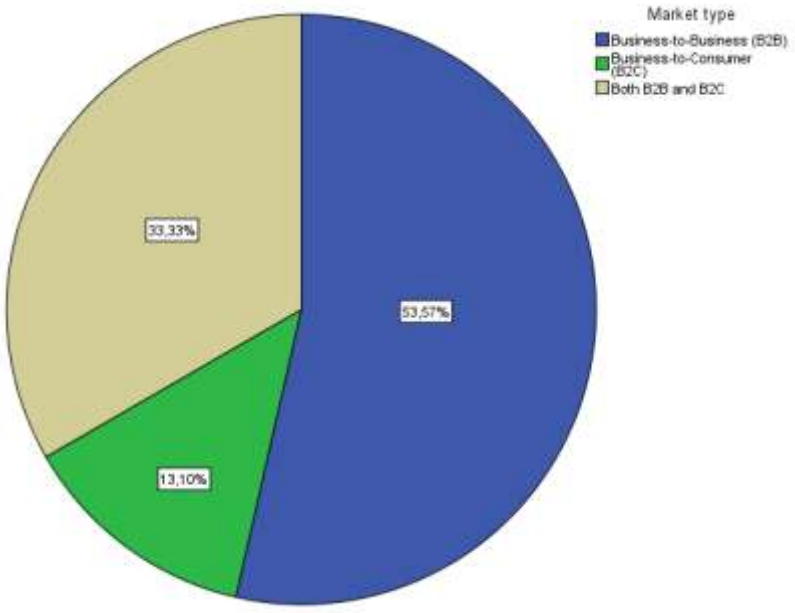


Figure 24: Market orientation of respondents' companies

Question 8: How many employees does your current company have?

The analysis of respondents' organizations by the number of employees is summarized in the table below. Most respondents (63.1%) work in large companies with over 250 employees, reflecting strong representation from complex, corporate environments. Mid-sized firms (51–250 employees) make up 22.6% of the sample, while smaller companies with fewer than 50 employees account for 14.3%. This mix ensures a balanced perspective, capturing insights from both large-scale operations and more agile, entrepreneurial settings.

Table 14: Distribution of respondents by company size

Number of employee

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-10 employees	5	6,0	6,0	6,0
	11-50 employees	7	8,3	8,3	14,3
	51-250 employees	19	22,6	22,6	36,9
	250+ employees	53	63,1	63,1	100,0
	Total	84	100,0	100,0	

Question 9: What is the closest representation to your role within the organization?

The table below shows a diverse range of professional roles among respondents. Most participants (21.4%) hold executive or managerial positions, followed by professionals in technical

(17.9%) and finance/accounting roles (16.7%). Notably, 10.7% work in research and development, reflecting a strong innovation focus. Other roles include operations, marketing, IT, and support functions, each contributing unique perspectives. Less represented areas like HR, design, and legal still add valuable insights. Fields such as education, healthcare, and public relations were not represented, suggesting opportunities for broader inclusion in future studies.

Table 15: Distribution of respondents by organizational role

Role within organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Executive/Managerial	18	21,4	21,4	21,4
	Professional/Technical	15	17,9	17,9	39,3
	Administrative/Support	2	2,4	2,4	41,7
	Sales/Marketing	5	6,0	6,0	47,6
	Operations/Production	6	7,1	7,1	54,8
	Customer Service	1	1,2	1,2	56,0
	IT/Computing	4	4,8	4,8	60,7
	Human Resources	1	1,2	1,2	61,9
	Finance/Accounting	14	16,7	16,7	78,6
	Research and Development	9	10,7	10,7	89,3
	Design	1	1,2	1,2	90,5
	Legal	1	1,2	1,2	91,7
	Other	7	8,3	8,3	100,0
	Total	84	100,0	100,0	

Question 10: Please specify your current job title.

The job titles reported by respondents show a wide variety of roles, spanning different levels of seniority and areas of expertise. Many hold leadership positions—such as CEOs, general managers, and project managers—highlighting strong participation from decision-makers. Technical roles, including engineers and R&D professionals, are also well represented, emphasizing the sample's focus on innovation and expertise. Finance roles like CFOs and accountants add further depth, reflecting the importance of strategic planning and oversight. Other functions—such as IT, sales, operations, consulting, and legal—round out the sample, offering a broad view of how sustainability is understood across departments. While some roles are more niche, like environmental engineers or warehouse specialists, their inclusion adds richness and relevance to the data.

Question 11: Do you work in the field of ESG or in the field of impact investments?

The following pie chart shows the share of respondents working in ESG (Environmental, Social, and Governance) or impact investments. A clear majority, 75%, do not work in these areas, while 25% are actively engaged in ESG-related roles. Although this group is smaller, their input brings essential insights into sustainability practices and highlights the growing importance of ESG in today's business landscape. While most respondents are not directly involved in ESG, this underrepresentation signals an opportunity for companies to further embrace sustainability initiatives. The presence of ESG professionals in the survey ensures that valuable perspectives on corporate responsibility and sustainable practices are included, offering a more comprehensive view of current trends and future opportunities in fostering sustainable business strategies.

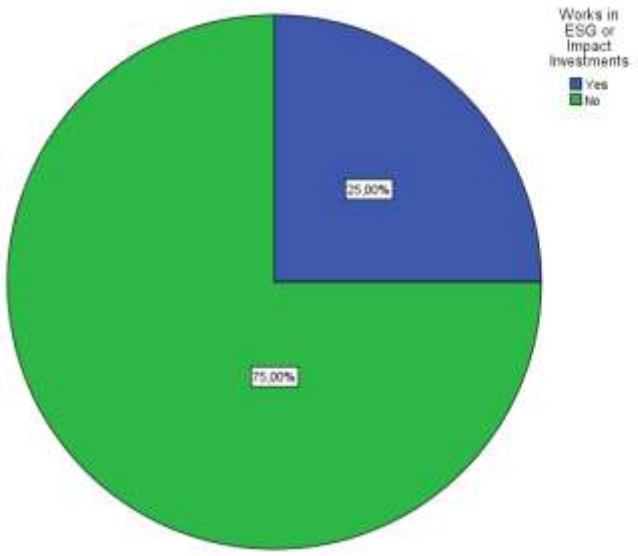


Figure 25: Distribution of respondents working in ESG or impact investments

Question 12: Does your current company have a dedicated Research and Development (R&D) Department?

The following bar chart illustrates whether respondents' companies have a dedicated Research and Development (R&D) department. A majority of 51.19% reported that their company has a distinct R&D department, indicating a strong organizational focus on innovation and development. Conversely, 41.67% of respondents stated that their companies do not have a separate R&D department, suggesting that R&D efforts might be integrated into other business functions or are less prioritized. Additionally, 7.14% of respondents were unsure about the presence of an R&D department, reflecting a possible lack of clarity or communication within their organizations regarding innovation initiatives.

These results highlight the varying levels of commitment to R&D across companies, with a significant portion prioritizing innovation while others may be missing opportunities to formally structure their research and development efforts.

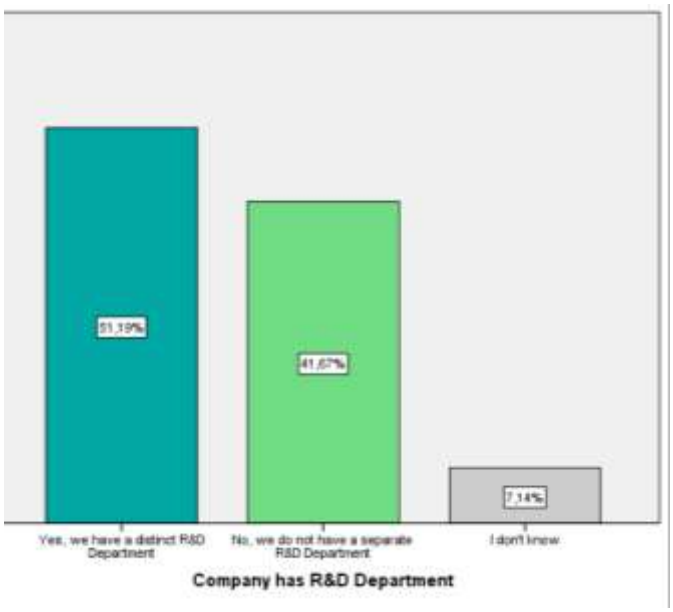


Figure 26: Presence of a dedicated R&D Department

Question 13: In your current role to what extent do you participate in Research and Development (R&D) projects?

Respondents reported varying levels of involvement in R&D projects. A small but notable group (16.7%) lead or directly conduct R&D, while 21.4% collaborate in a supporting role. Others (14.3%) contribute occasionally, and 13.1% have minimal involvement. The largest portion (34.5%) said R&D doesn't apply to their role at all. This range highlights how R&D plays a central role for some professionals but remains peripheral or irrelevant for others, reflecting the diverse nature of organizational responsibilities.

Table 16: Level of participation in Research and Development (R&D) projects

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Actively involved in leading or conducting R&D projects	14	16,7	16,7	16,7
	Collaborate with R&D teams but not directly involved in project leadership	18	21,4	21,4	38,1
	Occasionally contribute insights to ongoing R&D initiatives	12	14,3	14,3	52,4
	Limited involvement or no participation in R&D projects	11	13,1	13,1	65,5
	Not applicable - I am not currently engaged in professional activities with R&D components	29	34,5	34,5	100,0
	Total	84	100,0	100,0	

The statistical analysis of basic information's questions shows a diverse group of respondents from various organizational settings. Most are young to mid-career professionals, slightly more women than men, and highly educated—mainly in technical or business fields. They tend to work in large, B2B-focused companies and hold leadership, technical, or finance roles. R&D involvement is more common in larger firms and certain sectors, while ESG participation is balanced by gender but varies with company size and industry.

To further investigate relationships between respondent characteristics and organizational contexts, a series of cross-tabulation analyses were conducted. These analyses explored potential associations between variables such as gender, organizational role, ESG involvement, sector, company size, and the presence of R&D departments. While most associations were not statistically significant, some notable patterns emerged. For example, women appeared more frequently in administrative and creative roles, while men were more prevalent in technical and financial positions. Larger firms were more likely to maintain dedicated R&D departments, and consulting and environmentally focused sectors showed relatively higher engagement with ESG practices. The detailed statistical outputs, including Chi-Square tests and Fisher's Exact Tests, are provided in Appendix B.

5.1.2 Statistical analysis of sustainable development

The Sustainable Development section provides a comprehensive assessment of the respondents' awareness, adoption, and challenges related to sustainability practices. This analysis focuses on interpreting the data to derive actionable insights that address the thesis objectives: understanding the interplay between sustainable development and business growth. Detailed frequency tables, descriptive statistics, and test results are included in Appendix C, key findings are summarized here to contextualize the data within the broader research objectives.

Descriptive statistics

The descriptive statistics in Table 17 reveal that awareness of sustainable development scored a high mean of 4.13 (SD = 0.773), with most respondents agreeing or strongly agreeing. This widespread awareness demonstrates a solid foundation for further engagement. Similarly, the value of sustainable practices (Mean = 4.05, SD = 0.904) reflects the recognition of sustainability as a key driver of business success. However, variability in scores for the complexity of implementing sustainability (Mean = 3.61, SD = 0.994) highlights organizational challenges, such as resource constraints and operational difficulties.

Table 17: Key descriptive statistics for sustainable development related variables

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Awareness of sustainable development	84	1	5	4,13	,773
Value of sustainable practices	84	1	5	4,05	,904
Complexity of implementing sustainability	84	1	5	3,61	,994
Use of sustainability metrics	84	1	5	3,86	,838
Adoption of systems to reduce environmental impact	84	1	5	4,33	,826
Focus on environmental issues	84	1	5	3,88	,937
Focus on social issues	84	1	5	3,75	,943
Focus on financial issues	84	1	5	3,99	1,000
Consideration of social welfare	84	1	5	3,85	,925
HR processes exceed legal requirements	84	1	5	3,27	1,155
Sustainable development as advertising	84	1	5	3,57	1,112
Sustainability for market survival	84	1	5	3,62	1,005
Sustainability known in market	84	1	5	3,55	,884
Use of sustainable performance systems	84	1	5	3,89	,695
Stakeholder encouragement to go green	84	1	5	3,54	,975
Competitors' environmental protection	84	1	5	3,35	1,024
Valid N (listwise)	84				

Frequency distribution

Key frequency distributions reinforce these findings. For instance, 87% of participants expressed agreement or strong agreement with statements about their awareness of sustainable development Similarly, strong positive responses were observed in the use of sustainability metrics and performance systems However, when asked whether sustainable development is primarily used for advertising or driven by stakeholders, respondents showed a greater degree of neutrality, indicating some skepticism or underutilization of external influence (see **Appendix C**).

Reliability testing

The Reliability Statistics show a Cronbach's Alpha of 0.885 across the 16 survey items. This high reliability indicates that the questions are internally consistent and effectively measure the various dimensions of sustainable development engagement, including awareness, value, implementation challenges, and stakeholder involvement. This strong reliability supports the validity of the survey, ensuring that the collected data provides a solid basis for deeper statistical analyses, such as correlations and regressions. It confirms that the instrument effectively captures the interconnected aspects of sustainable development, making it a robust foundation for assessing organizational strategies and practices in sustainability.

Table 18 : Case processing summary and reliability statistics for sustainable development variables

Case Processing Summary

		N	%
Cases	Valid	84	100,0
	Excluded[a]	0	,0
	Total	84	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,885	16

Correlation analysis

Correlation analysis further revealed meaningful relationships. Awareness correlates significantly with other key variables, including the value placed on sustainable practices ($r = 0.560$, $p < 0.01$) and the use of sustainable performance systems ($r = 0.408$, $p < 0.01$). This suggests that higher awareness tends to be accompanied by action.

Adoption of environmental systems is linked with measurable performance tools ($r = 0.609$, $p < 0.01$), supporting the idea that organizations committed to sustainability are also more likely to track it rigorously. Interestingly, stakeholder pressure and competitor behavior show robust correlations ($r = 0.645$, $p < 0.01$), underlining the importance of external drivers in shaping internal strategy. Full correlation results are presented in Appendix C.

Factor analysis

To explore the underlying patterns in sustainable development practices, a factor analysis was conducted. This analysis aimed to simplify the dataset by identifying key dimensions that explain how organizations perceive and implement sustainability. The analysis revealed five distinct components, together accounting for 68.80% of the total variance, indicating a robust model that captures the majority of variability in organizational sustainability practices.

Table 19: Total variance explained by extracted components (sustainable development variables)

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6,133	38,330	38,330	6,133	38,330	38,330	2,627	16,422	16,422
2	1,387	8,670	47,000	1,387	8,670	47,000	2,470	15,439	31,860
3	1,348	8,424	55,424	1,348	8,424	55,424	2,391	14,941	46,801
4	1,117	6,979	62,403	1,117	6,979	62,403	1,843	11,519	58,321
5	1,024	6,400	68,803	1,024	6,400	68,803	1,677	10,482	68,803
6	,882	5,511	74,314						
7	,768	4,803	79,117						
8	,607	3,794	82,911						
9	,520	3,251	86,162						
10	,455	2,845	89,007						
11	,438	2,737	91,744						
12	,346	2,164	93,908						
13	,301	1,880	95,788						
14	,266	1,664	97,452						
15	,212	1,325	98,777						
16	,196	1,223	100,000						

Extraction Method: Principal Component Analysis.

These components include:

- External influence and market dynamics
- Operational metrics and awareness
- Social and financial integration
- Strategic branding and market survival
- Human resource practices and social welfare

One important observation is the low communality of the variable "Complexity of Implementing Sustainability" (0.291). This suggests that, while recognized as a challenge, this factor stands somewhat apart from the other identified dimensions, hinting at its unique and perhaps context-specific nature. This insight warrants further exploration in both academic and practical settings, as it may represent a barrier that requires targeted strategies outside the established sustainability frameworks.

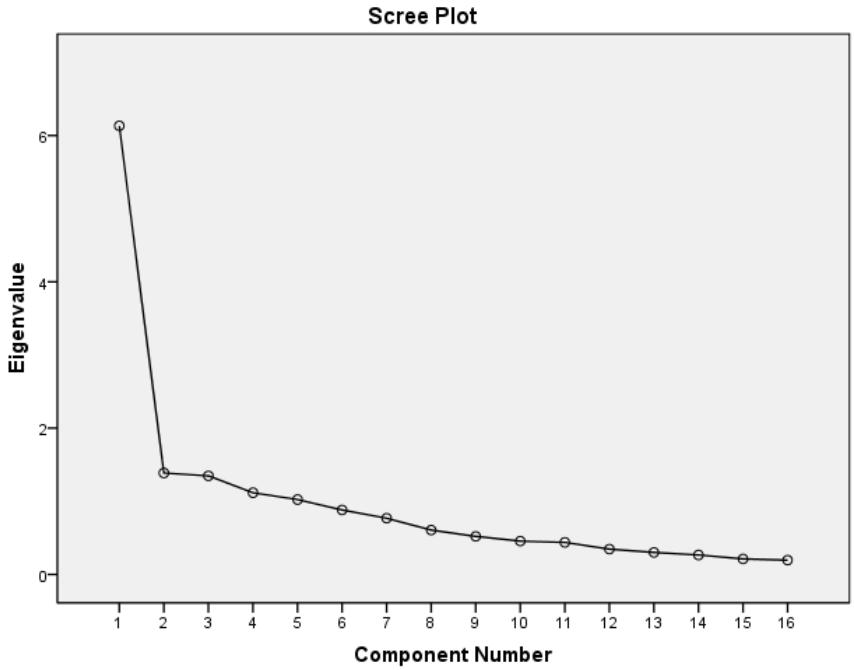


Figure 27: Scree Plot of Component Eigenvalues (sustainable development variables)

The rotated component matrix further clarified the structure of these dimensions (Table 20). The Varimax rotation improved interpretability by ensuring the components remain statistically orthogonal (uncorrelated), enabling clearer thematic groupings.

Table 20: Component transformation matrix for sustainable development variables

Component Transformation Matrix

Component	1	2	3	4	5
1	,521	,511	,504	,365	,283
2	,106	-,409	-,408	,479	,652
3	-,798	,384	,158	,047	,435
4	,221	-,137	,163	-,776	,550
5	-,178	-,637	,727	,181	-,048

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Key observations from the rotated matrix include:

- Component 1 primarily reflects external pressures and competitive dynamics, with strong loadings from variables such as stakeholder encouragement and visibility of sustainability efforts in the market.
- Component 2 clusters variables related to operational systems, metrics, and awareness, highlighting the role of internal tools in enabling sustainability adoption.
- Component 3 captures the interplay between social, financial, and environmental focus, underscoring the integrated nature of sustainability across these pillars.
- Component 4 reflects strategic branding and survival, illustrating how sustainability is leveraged as a marketing tool and a means to secure long-term competitiveness
- Component 5 centers on internal organizational efforts, particularly HR practices that go beyond compliance and emphasize social welfare.

An important finding is that some variables, such as "Competitors' Environmental Protection" and "Value of Sustainable Practices", exhibit cross-loadings across multiple components. This reflects their relevance to several sustainability dimensions and underscores the need for integrated strategies that cut across different organizational functions. Rather than being addressed in isolation, these areas should be viewed as central levers for fostering sustainable business models.

In summary, the factor analysis confirms the multidimensional and interconnected nature of sustainability practices in organizations. It highlights the influence of both internal systems and external market pressures, while also drawing attention to softer dimensions such as human resource practices and branding. The refined five-component model provides a solid analytical framework for understanding how organizations approach sustainability and can inform strategic decision-making aimed at embedding sustainability into core business operations.

Full communalities, factor loadings, and the component transformation matrix are provided in Appendix C, ensuring transparency and traceability of the analysis.

Multivariate analysis of sustainable development dimensions across sectors

To explore how sustainable development practices vary across sectors, a Multivariate Analysis of Variance (MANOVA) was performed, focusing on four key dimensions: awareness of sustainable development, complexity of implementation, use of sustainability metrics, and stakeholder encouragement to go green.

Although the MANOVA did not yield statistically significant results across sectors ($p > 0.05$), the descriptive statistics and effect sizes provided nuanced sectoral patterns that are valuable from a managerial and theoretical perspective. These patterns, which are detailed in Appendix C revealed interesting contrasts in sustainability engagement.

For example, sectors such as Retail, Financial Services, and Government/Public Administration consistently recorded the highest awareness levels (Mean = 5.00), suggesting a high degree of alignment with sustainability principles, possibly driven by public scrutiny or regulatory frameworks. Conversely, the Automotive and Construction sectors scored among the lowest on awareness and stakeholder engagement dimensions, suggesting a need for targeted awareness and stakeholder involvement initiatives within these industries.

Moreover, while Retail and Consumer Goods sectors reported the lowest perceived complexity of implementing sustainability (Mean = 1.00 and 5.00 respectively), they simultaneously led in the use of sustainability metrics, suggesting a potential maturity in embedding sustainability within operational processes. Construction and Automotive sectors, in contrast, scored lower across most dimensions, pointing toward industry-specific barriers or cultural challenges that warrant further attention.

Although the MANOVA results (confirmed the absence of significant multivariate differences, the between-subjects effects (Appendix C) showed that stakeholder encouragement to go green demonstrated the highest partial eta squared ($\eta^2 = 0.251$), suggesting a moderate, albeit not statistically significant, sectoral influence on this dimension.Levene's tests for equality of variances were all non-significant ($p > 0.05$), supporting the robustness of the MANOVA assumptions (Appendix C).

In summary, while statistical significance was not established, the descriptive trends suggest important sector-specific opportunities and challenges for sustainability adoption. These findings highlight the importance of tailoring strategies to sector characteristics, supporting Institutional Theory, which emphasizes the role of industry norms and pressures in shaping organizational behaviors.

Multivariate analysis of sustainable development dimensions across company sizes

A second MANOVA was conducted to examine whether company size, categorized by number of employees, influences the same four dimensions of sustainable development.

Similarly to the sectoral analysis, the results did not show statistically significant differences across company size groups ($p > 0.05$). Nonetheless, the descriptive data (Appendix C) revealed distinct patterns that offer practical and theoretical insights.

Larger organizations (250+ employees) reported higher awareness (Mean = 4.17) and greater use of sustainability metrics (Mean = 3.94), likely reflecting the availability of more structured systems and resources. In contrast, micro businesses (1–10 employees) reported the lowest awareness (Mean = 3.60) and stakeholder encouragement (Mean = 2.60), pointing to a potential gap in sustainability capabilities and external pressures faced by smaller firms.

Moreover, medium-sized organizations (51–250 employees) reported the highest stakeholder encouragement to go green (Mean = 3.68), suggesting that this segment might be particularly sensitive to supply chain expectations, consumer demands, or industry standards.

The between-subjects effects (Appendix C) indicated that while no individual dimension reached statistical significance ($p > 0.05$), stakeholder encouragement to go green exhibited the largest effect size ($\eta^2 = 0.080$), hinting at a possible moderate influence of company size on this dimension. Again, Levene's test confirmed the assumption of homogeneity of variances across all groups (Appendix C) supporting the credibility of the analysis. While the data do not support strong statistical differences, the observed trends suggest actionable areas for policy and managerial focus, particularly the need to provide targeted support to smaller organizations and to leverage the unique stakeholder dynamics of medium-sized companies.

Key findings

The above statistical analysis of sustainable development practices reveals a multifaceted landscape, highlighting both strengths and challenges in organizational efforts toward sustainability. High levels of awareness and perceived value, coupled with moderate adoption of sustainability metrics, align with the principles of the TBL framework, which emphasizes the integration of environmental, social, and economic dimensions. This alignment underscores that businesses increasingly view sustainability as integral to long-term success and competitiveness.

The analysis also demonstrates the critical role of external pressures, as highlighted by stakeholder theory. Sectors with higher stakeholder engagement exhibit stronger adoption of green practices and sustainability metrics, suggesting that external advocacy and market expectations significantly influence organizational behavior. This finding reinforces the need for businesses to actively collaborate with stakeholders, including customers, regulators, and supply chain partners, to advance sustainability goals.

Institutional theory provides further context, as the observed sectoral and size-based trends reflect varying levels of institutional pressures and resources. Larger companies and those in sustainability-driven sectors like energy and ICT exhibit greater alignment with sustainable practices, likely due to stronger regulatory frameworks and resource availability. Conversely, sectors with lower scores, such as construction and automotive, may require targeted interventions to overcome barriers and integrate sustainability into their core operations.

Addressing the complexity of implementing sustainability, as revealed in the data, necessitates streamlined frameworks and tools. Businesses must balance short-term operational challenges with the long-term benefits of sustainability, leveraging performance measurement systems to track and enhance progress. Moreover, adopting a holistic approach that integrates environmental, social, and financial goals can amplify the impact of sustainability initiatives.

In conclusion, this analysis provides actionable insights for policymakers, businesses, and stakeholders. Enhancing stakeholder engagement, simplifying implementation processes, and fostering sector-specific strategies can accelerate the adoption of sustainable practices. By grounding these efforts in established theories such as TBL, stakeholder theory, and institutional theory, organizations

can create resilient, innovative, and competitive strategies that contribute to both business growth and global sustainability.

5.1.3 Statistical analysis of Green Marketing

5.1.3.1 Strategic green marketing orientation

The concept of Strategic Green Marketing Orientation (SGMO) is critical for firms seeking competitive differentiation through sustainability initiatives. This study assesses the degree to which companies adopt strategic green marketing practices, examining their investment in sustainable technologies, market orientation towards eco-conscious consumers, and engagement in environmental networks.

Descriptive statistics of SGMO variables

To facilitate this analysis, a series of descriptive statistics and frequency distributions were computed for key SGMO variables, shedding light on organizational commitment to sustainability and potential areas of strategic improvement. Table 21 presents the descriptive statistics for the SGMO indicators, outlining the mean, standard deviation, minimum, and maximum values for each variable.

Table 21: Descriptive statistics for strategic green marketing orientation variables

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Investment in low-carbon technologies	84	1	5	3,50	,963
Environmental policy for partner selection	84	1	5	3,32	,946
R&D investment for eco-friendly products	84	1	5	3,38	1,097
Use of renewable energy	84	1	5	3,75	1,040
Department for environmental issues	84	1	5	3,25	1,370
Participation in environmental business networks	84	1	5	3,54	1,156
Stakeholder dialogue on environmental issues	84	1	5	3,54	1,035
Market research for green needs	84	1	5	3,40	1,019
Targeting eco-conscious consumers	84	1	5	3,35	1,024
Valid N (listwise)	84				

The findings suggest that firms demonstrate the highest level of commitment to renewable energy adoption (M = 3.75, SD = 1.04), indicating that the transition to sustainable energy sources remains a strategic priority. Additionally, participation in environmental business networks (M = 3.54, SD = 1.16) and engagement in stakeholder dialogue on environmental issues (M = 3.54, SD = 1.04) reflect a moderate level of activity in fostering industry collaboration and corporate responsibility. However, the establishment of dedicated environmental departments exhibits the greatest variability (M = 3.25, SD = 1.37), suggesting that while some firms have integrated formal governance structures to oversee sustainability efforts, others have yet to prioritize this aspect in their organizational framework.

Frequency distributions of SGMO indicators

To further investigate the distribution of responses, frequency analysis was conducted for each SGMO variable.

Corporate commitment to strategic green marketing practices

The results indicate inconsistent levels of commitment across different dimensions.

Investment in low-carbon technologies (Table 22) shows 47.7% of firms agree or strongly agree with adopting these technologies, whereas 52.4% remain neutral or disagree. This suggests that while some companies actively pursue low-carbon solutions, others remain hesitant or have not yet integrated such technologies into their operations. Similarly, the application of environmental policies in partner selection (Table 23) remains partially embedded, with 46.4% of firms considering environmental criteria, while 36.9% remain neutral, highlighting the need for further institutionalization of sustainability in supply chain management.

The level of investment in R&D for eco-friendly products (Table 24) reflects a moderate but insufficient commitment, with only 44% of firms allocating resources for sustainable product development, while 34.5% remain neutral. Given the fundamental role of R&D in sustainability innovation, these findings suggest that many firms lack a structured, long-term investment strategy in eco-friendly product development.

Furthermore, the adoption of renewable energy (Table 25) stands out as the most widely implemented initiative, with 65.5% of firms supporting renewable energy integration. This strong commitment underscores the growing recognition of energy transition as a critical component of corporate sustainability strategies, driven by both regulatory requirements and market expectations.

However, corporate sustainability governance remains inconsistent. Table 26 highlights that 48.8% of firms remain neutral or disagree with establishing dedicated environmental departments, reflecting a lack of formalized sustainability governance across organizations. This polarization indicates that while some companies have embedded sustainability within their operational frameworks, others continue to treat it as an auxiliary function.

Table 22: Frequency Distribution for investment in low-carbon technologies

Investment in low-carbon technologies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	8	9,5	9,5	11,9
	Neither Agree nor Disagree	34	40,5	40,5	52,4
	Agree	26	31,0	31,0	83,3
	Strongly Agree	14	16,7	16,7	100,0
	Total	84	100,0	100,0	

Table 23: Frequency distribution for environmental policy in partner selection

Environmental policy for partner selection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	4,8	4,8	4,8
	Disagree	10	11,9	11,9	16,7
	Neither Agree nor Disagree	31	36,9	36,9	53,6
	Agree	33	39,3	39,3	92,9
	Strongly Agree	6	7,1	7,1	100,0
	Total	84	100,0	100,0	

Table 24: Frequency distribution for R&D investment for eco-friendly products

R&D investment for eco-friendly products

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,6	3,6	3,6
	Disagree	15	17,9	17,9	21,4
	Neither Agree nor Disagree	29	34,5	34,5	56,0
	Agree	21	25,0	25,0	81,0
	Strongly Agree	16	19,0	19,0	100,0
	Total	84	100,0	100,0	

Table 25: Frequency distribution for the use of renewable energy

Use of renewable energy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,6	3,6	3,6
	Disagree	7	8,3	8,3	11,9
	Neither Agree nor Disagree	19	22,6	22,6	34,5
	Agree	34	40,5	40,5	75,0
	Strongly Agree	21	25,0	25,0	100,0
	Total	84	100,0	100,0	

Table 26: Frequency distribution for establishing departments for environmental issues

Department for environmental issues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	14	16,7	16,7	16,7
	Disagree	10	11,9	11,9	28,6
	Neither Agree nor Disagree	19	22,6	22,6	51,2
	Agree	23	27,4	27,4	78,6
	Strongly Agree	18	21,4	21,4	100,0
	Total	84	100,0	100,0	

Collaboration and stakeholder engagement in sustainability

Industry collaboration appears to be gaining traction, as Table 27 demonstrates that 58.3% of firms participate in environmental business networks, reinforcing the importance of partnerships in advancing corporate sustainability goals. Similarly, stakeholder dialogue on environmental issues (Table 28) is prioritized by 58.4% of organizations, suggesting an increased focus on corporate social responsibility (CSR) and transparent sustainability communication.

However, market-oriented sustainability remains an underutilized opportunity. Table 29 indicates that while 52.4% of firms conduct market research to identify green consumer needs, a considerable 31% remain neutral, implying that a significant portion of firms do not actively leverage sustainability as a market-driven advantage. Similarly, only 48.8% of firms actively target eco-conscious consumers (Table 30), signaling a gap between sustainable production efforts and consumer-focused sustainability initiatives.

Table 27: Frequency distribution for participation in environmental business networks

Participation in environmental business networks

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	7	8,3	8,3	8,3
	Disagree	7	8,3	8,3	16,7
	Neither Agree nor Disagree	21	25,0	25,0	41,7
	Agree	32	38,1	38,1	79,8
	Strongly Agree	17	20,2	20,2	100,0
	Total	84	100,0	100,0	

Table 28: Frequency distribution for stakeholder dialogue on environmental issues

Stakeholder dialogue on environmental issues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	4,8	4,8	4,8
	Disagree	9	10,7	10,7	15,5
	Neither Agree nor Disagree	22	26,2	26,2	41,7
	Agree	36	42,9	42,9	84,5
	Strongly Agree	13	15,5	15,5	100,0
	Total	84	100,0	100,0	

Table 29: Frequency distribution for market research to identify green needs

Market research for green needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6,0	6,0	6,0
	Disagree	9	10,7	10,7	16,7
	Neither Agree nor Disagree	26	31,0	31,0	47,6
	Agree	35	41,7	41,7	89,3
	Strongly Agree	9	10,7	10,7	100,0
	Total	84	100,0	100,0	

Table 30: Frequency distribution for targeting eco-conscious consumers

Targeting eco-conscious consumers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	7,1	7,1	7,1
	Disagree	8	9,5	9,5	16,7
	Neither Agree nor Disagree	29	34,5	34,5	51,2
	Agree	33	39,3	39,3	90,5
	Strongly Agree	8	9,5	9,5	100,0
	Total	84	100,0	100,0	

The findings suggest that while strategic green marketing orientation is moderately adopted, there is significant variability across different dimensions. The strongest commitments are observed in renewable energy adoption and environmental collaborations, reflecting an industry-wide transition toward sustainability-driven partnerships and regulatory alignment. However, weaknesses in dedicated governance structures, R&D investment, and supply chain sustainability highlight areas requiring further strategic focus.

While firms recognize the importance of sustainable practices, many have yet to fully integrate sustainability into their core strategic planning. Addressing these gaps by enhancing R&D efforts, institutionalizing supply chain sustainability, and increasing engagement with eco-conscious consumers will be essential for businesses aiming to leverage sustainability as a competitive advantage in an evolving global market.

Reliability testing (Cronbach's Alpha)

To assess the internal consistency and reliability of the SGMO scale, a Cronbach's Alpha reliability test was conducted. The results of the reliability analysis are presented in the Case Processing Summary and Reliability Statistics tables. As shown in the Case Processing Summary, all 84 cases were included in the analysis, with no missing values or exclusions, confirming the completeness of the dataset.The Cronbach's Alpha coefficient for the nine SGMO items was calculated at 0.919, indicating excellent internal consistency (Table 31). A Cronbach's Alpha value above 0.9 suggests that the items exhibit a high degree of interrelatedness, meaning that the SGMO scale is a reliable measure of firms' strategic green marketing practices.

Table 31: Reliability statistics for strategic green marketing orientation

Case Processing Summary

		N	%
Cases	Valid	84	100,0
	Excluded[a]	0	,0
	Total	84	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,919	9

A Cronbach's Alpha score in this range demonstrates that the survey items collectively measure the intended construct with a high level of reliability. This suggests that SGMO practices, such as investment in low-carbon technologies, environmental policy adoption, R&D in eco-friendly products, and market targeting of eco-conscious consumers, are strongly interrelated and consistently assessed within the scale. Given the high reliability score, no modifications or eliminations of survey items are necessary. The results confirm that the SGMO construct can be used confidently in further statistical analyses, including factor analysis, correlation analysis, and regression modeling, to explore relationships between green marketing practices and business performance outcomes.

Exploratory Factor Analysis (EFA) for SGMO

To evaluate the underlying structure of Strategic Green Marketing Orientation (SGMO), an Exploratory Factor Analysis (EFA) was conducted using Principal Component Analysis (PCA). The objective was to determine whether SGMO comprises multiple distinct dimensions or functions as a single unified construct. The analysis examined the communalities of each variable, the total variance explained, and factor loadings, ultimately revealing a single-factor solution.

The communalities in Table 32 represent the proportion of variance in each variable that is accounted for by the extracted factor. The results indicate that all variables exhibit moderate to high communalities, ranging from 0.517 to 0.754, confirming that each variable shares a significant amount of variance with the extracted component. This suggests that the measured indicators strongly relate to the same underlying construct of SGMO.

Table 32: Communalities of SGMO variables

Communalities

	Initial	Extraction
Investment in low-carbon technologies	1,000	,599
Environmental policy for partner selection	1,000	,517
R&D investment for eco-friendly products	1,000	,565
Use of renewable energy	1,000	,536
Department for environmental issues	1,000	,583
Participation in environmen-tal business networks	1,000	,727
Stakeholder dialogue on en-vironmental issues	1,000	,754
Market research for green needs	1,000	,656
Targeting eco-conscious consumers	1,000	,609

Extraction Method: Principal Component Analysis.

The highest communalities are observed for Stakeholder Dialogue on Environmental Issues (0.754) and Participation in Environmental Business Networks (0.727), suggesting that these elements play a dominant role in defining SGMO. Conversely, Environmental Policy for Partner Selection (0.517) exhibits the lowest communality, indicating that while it is part of the total construct, it shares a relatively lower proportion of variance with the extracted factor.

The Total Variance Explained (Table 33) reveals that the first component has an Eigenvalue of 5.545, explaining 61.61% of the total variance in the dataset. Given that only one factor has an Eigenvalue greater than 1.0, the results confirm that SGMO functions as a unidimensional construct, encapsu-lating various aspects of strategic environmental engagement into a single underlying factor.

Table 33: Total Variance Explained (SGMO variables)

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,545	61,609	61,609	5,545	61,609	61,609
2	,894	9,936	71,545			
3	,610	6,772	78,317			
4	,544	6,043	84,360			
5	,441	4,899	89,259			
6	,333	3,696	92,955			
7	,247	2,747	95,703			
8	,216	2,404	98,106			
9	,170	1,894	100,000			

Extraction Method: Principal Component Analysis.

The fact that only one component was extracted suggests that the strategic green marketing orientation variables are highly correlated and effectively measure the same overarching construct. The cumulative variance of 61.61% exceeds the conventional threshold of 60%, further confirming that a single component sufficiently explains the dataset.

Table 34 presents the Component Matrix, displaying the loadings of each variable onto the single extracted factor. All variables exhibit strong factor loadings above 0.70, indicating their substantial contribution to the SGMO construct.

Table 34: Component matrix for SGMO variables

Component Matrix[a]

	Component
	1
Stakeholder dialogue on environmental issues	,868
Participation in environmental business networks	,852
Market research for green needs	,810
Targeting eco-conscious consumers	,780
Investment in low-carbon technologies	,774
Department for environmental issues	,764
R&D investment for eco-friendly products	,751
Use of renewable energy	,732
Environmental policy for partner selection	,719

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

The highest loadings are observed for Stakeholder Dialogue on Environmental Issues (0.868) and Participation in Environmental Business Networks (0.852), reinforcing their strong influence on the SGMO construct. The lowest loading, though still strong, belongs to Environmental Policy for Partner Selection (0.719), indicating that while it contributes to SGMO, its impact is slightly lower than other variables.

As only one factor was extracted, rotation was not applicable, as indicated in the Rotated Component Matrix output. This further supports the unidimensional nature of SGMO, meaning that all elements of strategic green marketing align under a single framework rather than forming multiple independent sub-dimensions.

Table 35:Rotated Component Matrix (SGMO variables)

Rotated Component Matrix[a]

a. Only one component was extracted. The solution cannot be rotated.

The results of the Exploratory Factor Analysis (EFA) confirm that SGMO is a unidimensional construct, meaning that firms' engagement in green marketing practices, stakeholder collaboration, and sustainability initiatives function as a single integrated strategy rather than separate independent factors.

The high communalities and factor loadings indicate that all variables contribute significantly to the construct, with Stakeholder Dialogue on Environmental Issues and Participation in Environmental Business Networks emerging as the most defining components. The strong single-factor solution, accounting for 61.61% of total variance, demonstrates that the survey items effectively measure a cohesive concept of strategic green marketing engagement.

These findings imply that organizations approaching sustainability through strategic marketing efforts tend to integrate various environmental, technological, and stakeholder-driven initiatives into a singular comprehensive framework.

Regression analysis for SGMO and R&D department presence

To assess whether SGMO influences the existence of a dedicated Research and Development (R&D) department, a multiple regression analysis was performed. The goal was to examine whether companies engaging in various green marketing strategies are more likely to have an established R&D department.

Table 36: SGMO variables entered and removed in regression analysis

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Targeting eco-conscious consumers, Use of renewable energy, Environmental policy for partner selection, Department for environmental issues, R&D investment for eco-friendly products, Market research for green needs, Investment in low-carbon technologies, Participation in environmental business networks, Stakeholder dialogue on environmental issues[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Company has R&D Department

The Model Summary (Table 37) provides key regression statistics. The R-value (0.489) indicates a moderate correlation between the SGMO variables and the existence of an R&D department. The R^2 value (0.239) suggests that 23.9% of the variance in the presence of an R&D department can be explained by the strategic green marketing variables. The Adjusted R^2 value (0.147) accounts for model complexity and indicates a moderate explanatory power after adjustments. The F-statistic (2.589, $p = 0.012$) confirms that the model is statistically significant, meaning that at least one of the SGMO predictors significantly influences whether a firm has an R&D department.

Table 37:Model summary(SGMO variables)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,489[a]	,239	,147	,580	,239	2,589	9	74	,012

a. Predictors: (Constant), Targeting eco-conscious consumers, Use of renewable energy, Environmental policy for partner selection, Department for environmental issues, R&D investment for eco-friendly products, Market research for green needs, Investment in low-carbon technologies, Participation in environmental business networks, Stakeholder dialogue on environmental issues

b. Dependent Variable: Company has R&D Department

The ANOVA table (Table 38) confirms that the model significantly predicts the existence of an R&D department. The F-value (2.589, p = 0.012) indicates that the independent variables collectively contribute to explaining the variance in the dependent variable.

Table 38: ANOVA Results (SGMO variables)

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7,832	9	,870	2,589	,012[a]
	Residual	24,871	74	,336		
	Total	32,702	83			

a. Predictors: (Constant), Targeting eco-conscious consumers, Use of renewable energy, Environmental policy for partner selection, Department for environmental issues, R&D investment for eco-friendly products, Market research for green needs, Investment in low-carbon technologies, Participation in environmental business networks, Stakeholder dialogue on environmental issues

b. Dependent Variable: Company has R&D Department

The regression coefficients (Table 39) indicate the relative contribution of each SGMO variable in predicting the existence of an R&D department.

- R&D investment for eco-friendly products (B = -0.281, p = 0.002) is statistically significant, but its negative coefficient suggests an inverse relationship. This might imply that firms investing in green R&D may not always have a dedicated R&D department, potentially because sustainability-driven innovation is embedded within different organizational units.

- Targeting eco-conscious consumers (B = -0.199, p = 0.040) is also statistically significant with a negative coefficient, suggesting that firms that focus on green consumer markets may structure their innovation differently.
- Other variables, such as investment in low-carbon technologies, environmental policy for partner selection, and use of renewable energy, are not statistically significant (p > 0.05), meaning they do not strongly predict whether a firm has an R&D department.

Variance Inflation Factors (VIFs) range between 2.016 and 3.872, indicating no severe multicollinearity issues. The highest VIFs are observed for stakeholder dialogue on environmental issues (3.872) and participation in environmental business networks (3.432), suggesting some correlation between these predictors but still within an acceptable range.

Table 39: Regression coefficients(SGMO variables)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	2,191	,294		7,441	,000	1,604	2,777		
	Investment in low-carbon technologies	-,147	,104	-,225	-1,405	,164	-,354	,061	,401	2,493
	Environmental policy for partner selection	,069	,102	,103	,671	,504	-,135	,272	,432	2,312
	R&D investment for eco-friendly products	-,281	,087	-,491	-3,231	,002	-,454	-,108	,445	2,245
	Use of renewable energy	,061	,087	,101	,700	,486	-,112	,234	,496	2,016
	Department for environmental issues	-,036	,072	-,079	-,501	,618	-,181	,108	,411	2,432
	Participation in environmental business networks	,129	,102	,238	1,267	,209	-,074	,332	,291	3,432
	Stakeholder dialogue on environmental issues	,157	,121	,259	1,301	,197	-,084	,398	,258	3,872
	Market research for green needs	,043	,116	,069	,368	,714	-,188	,273	,291	3,440
	Targeting eco-conscious consumers	-,199	,095	-,324	-2,087	,040	-,388	-,009	,426	2,345

a. Dependent Variable: Company has R&D Department

Table 40 assesses multicollinearity among predictors. The condition index ranges from 1.000 to 26.193, indicating moderate collinearity in some variables, particularly stakeholder dialogue, business networks, and market research. While some correlation exists, no severe multicollinearity is detected, ensuring the regression model remains valid for interpretation.

Table 40: Collinearity diagnostics(SGMO variables)

Collinearity Diagnostics[a]

Model	Dimension			Variance Proportions									
		Eigenvalue	Condition Index	(Constant)	Investment in low-carbon technologies	Environmental policy for partner selection	R&D investment for eco-friendly products	Use of renewable energy	Department for environmental issues	Participation in environmental business networks	Stakeholder dialogue on environmental issues	Market research for green needs	Targeting eco-conscious consumers
1	1	9,635	1,000	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00
	2	,095	10,065	,08	,01	,02	,04	,01	,34	,02	,00	,00	,00
	3	,066	12,080	,00	,04	,06	,01	,03	,18	,00	,03	,09	,11
	4	,051	13,720	,32	,00	,02	,36	,05	,03	,04	,00	,00	,00
	5	,041	15,308	,01	,01	,25	,12	,34	,00	,01	,01	,01	,09
dimension0	dimension1 6	,032	17,274	,44	,17	,00	,04	,06	,01	,19	,00	,00	,20
	7	,027	18,909	,04	,24	,00	,09	,04	,10	,03	,03	,15	,48
	8	,021	21,573	,09	,05	,09	,29	,42	,28	,44	,04	,01	,01
	9	,018	23,138	,02	,36	,40	,03	,05	,00	,19	,37	,00	,10
	10	,014	26,193	,01	,12	,15	,03	,01	,06	,08	,52	,73	,02

a. Dependent Variable: Company has R&D Department

The residual statistics (Table 41) confirm that the regression model produces a reasonable spread of predicted values, with standardized residuals mostly within ±2 standard deviations, indicating no major outliers.

Table 41: Residuals statistics (SGMO variables)

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	,81	2,35	1,56	,307	84
Residual	-,919	1,751	,000	,547	84
Std. Predicted Value	-2,431	2,579	,000	1,000	84
Std. Residual	-1,584	3,020	,000	,944	84

a. Dependent Variable: Company has R&D Department

The regression analysis demonstrates that Strategic Green Marketing Orientation (SGMO) explains 23.9% of the variance in whether a company has a dedicated R&D department ($R^2 = 0.239$, $p = 0.012$). However, only R&D investment for eco-friendly products ($p = 0.002$) and targeting eco-conscious consumers ($p = 0.040$) are statistically significant predictors. Interestingly, both variables have negative coefficients, suggesting that firms already investing in green R&D or focusing on eco-conscious markets may not necessarily have a dedicated R&D department but instead integrate sustainability efforts across different business functions. These findings indicate that while SGMO plays a role in shaping corporate R&D structures, other factors such as company size, industry, and financial capacity may also influence the establishment of R&D departments. Further research could explore how external regulatory factors and competitive pressures affect sustainability-driven innovation strategies.

Key findings

The statistical analysis of SGMO reveals that while firms demonstrate a moderate commitment to green marketing, significant variability exists across different dimensions. The highest engagement is observed in renewable energy adoption and environmental collaborations, whereas dedicated governance structures, R&D investment, and supply chain sustainability require further strategic focus.

Reliability testing confirms that SGMO is a strong and cohesive construct, while factor analysis supports its unidimensional nature, indicating that firms integrate sustainability efforts under a single strategic framework. The regression analysis highlights that SGMO explains 23.9% of the variance in R&D department presence, with R&D investment and targeting eco-conscious consumers emerging as significant predictors, though with negative coefficients. These findings suggest that firms engaged in green R&D and eco-conscious markets may structure innovation differently, potentially decentralizing R&D efforts.

In conclusion, while SGMO contributes to corporate sustainability, firms must further institutionalize green practices, enhance R&D efforts, and strengthen market-driven sustainability strategies to achieve a competitive advantage in an evolving global market.

5.1.3.2 Tactical green marketing orientation

The concept of Tactical Green Marketing Orientation (TGMO) plays a crucial role in enhancing a firm's operational sustainability and short-term competitive positioning. This study examines the extent to which companies implement eco-friendly business practices, focusing on the adoption of digital communication strategies, paperless operations, sustainable materials, and cost absorption for environmental initiatives. By assessing these tactical green marketing efforts, this research aims to evaluate how organizations integrate practical, immediate sustainability measures into their daily operations and customer engagement strategies.

Descriptive statistics of TGMO variables

The descriptive statistics for Tactical Green Marketing Orientation (TGMO) variables provide insights into the extent of adoption of various sustainability practices among firms. As shown in Table 42, the highest level of commitment is observed in the paperless procurement policy (M = 4.06, SD = 0.998), suggesting that most companies have integrated digital and paperless processes into their procurement strategies. Similarly, the use of recycled materials (M = 3.92, SD = 0.984) and preference for eco-friendly digital communication (M = 3.86, SD = 1.008) indicate a strong inclination towards minimizing environmental impact through sustainable operations.

However, eco-friendly e-commerce encouragement (M = 3.35, SD = 1.000) and absorption of extra environmental costs (M = 3.54, SD = 1.011) exhibit more moderate levels of adoption, suggesting that while firms acknowledge the importance of sustainability in sales channels and financial strategies, implementation remains variable. The standard deviations across all variables remain close to 1, indicating moderate variability in responses.

Table 42: Descriptive statistics for tactical green marketing orientation variables

Statistics

		Eco-friendly E-commerce encouragement	Preference for eco-friendly digital communication	Paperless procurement policy	Use of recycled materials	Absorption of extra environmental costs
N	Valid	84	84	84	84	84
	Missing	0	0	0	0	0
Mean		3,35	3,86	4,06	3,92	3,54
Std. Deviation		1,000	1,008	,998	,984	1,011
Minimum		1	1	1	1	1
Maximum		5	5	5	5	5

Frequency distributions of TGMO indicators

To further investigate the distribution of responses, frequency analysis was conducted for each TGMO variable. The distribution (Figure 28) shows that while 39.3% of respondents agree or strongly agree that their organization encourages e-commerce due to its environmental benefits, a significant portion (46.4%) remains neutral. This suggests that while some firms recognize e-commerce as a sustainability strategy, many have yet to fully embrace it.

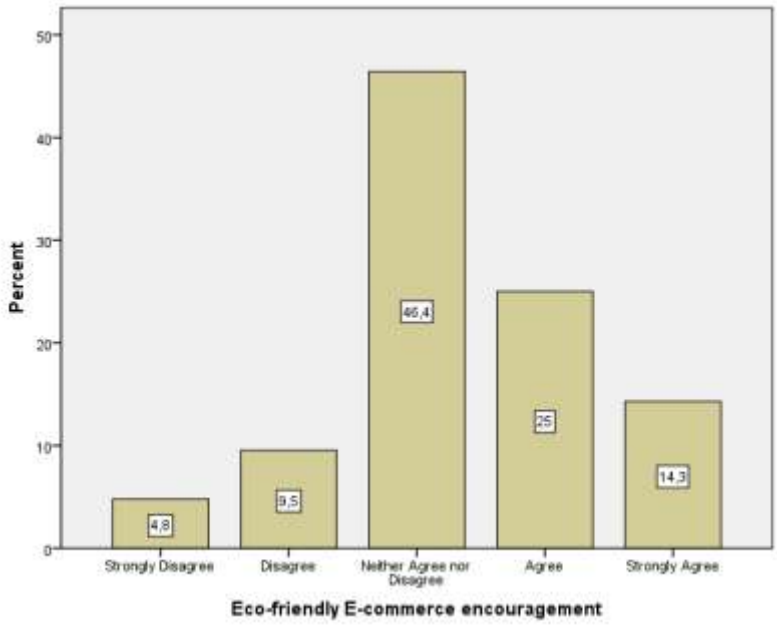


Figure 28: Frequency distribution of eco-friendly e-commerce encouragement

A strong preference for digital communication is evident (Figure 29), with 38.1% agreeing and 29.8% strongly agreeing to prioritizing digital over traditional communication methods. This reflects a widespread transition to paperless operations, aligning with modern sustainability initiatives.

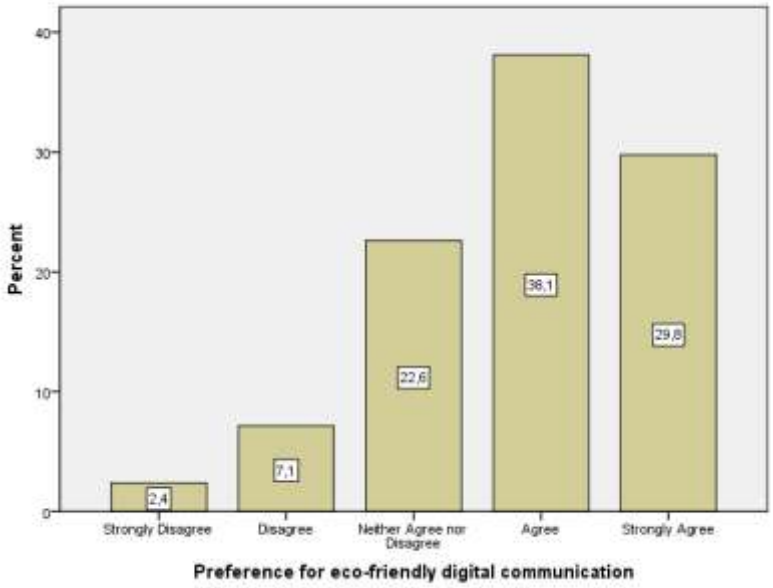


Figure 29: Frequency distribution of preference for eco-friendly digital communication

The highest level of commitment among TGMO variables is seen in paperless procurement **(**Figure 30), where 40.5% agree and 38.1% strongly agree that their firms actively implement paperless policies. This suggests that digitalization in procurement is a well-established sustainability practice across businesses.

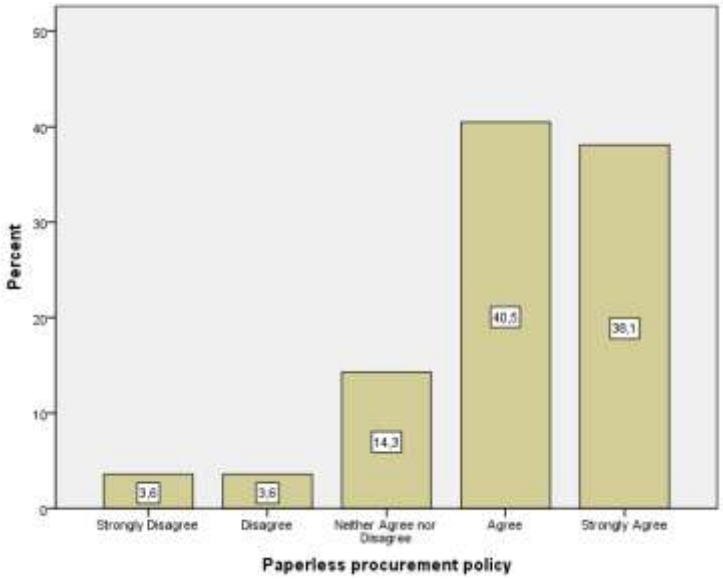


Figure 30: Frequency distribution of paperless procurement policy adoption

A strong adoption of recycled or reusable materials is observed (Figure 31), with 39.3% agreeing and 31% strongly agreeing**.** However, 23.8% of respondents remain neutral, indicating that while many firms integrate recycled materials into their products**,** some organizations still face challenges in fully adopting this practice**.**

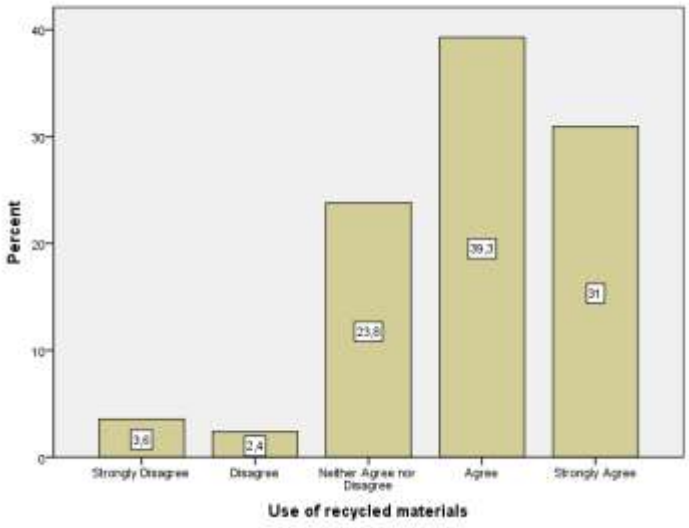


Figure 31: Frequency distribution of use of recycled materials in products/services

The frequency distribution (Figure 32) highlights greater hesitation in cost absorption for environmental initiatives, with 45.2% of respondents neutral and only 20.2% strongly agreeing to absorbing additional costs for sustainable products/services. This suggests that while firms acknowledge the importance of sustainability, financial constraints may limit full commitment to environmental cost absorption.

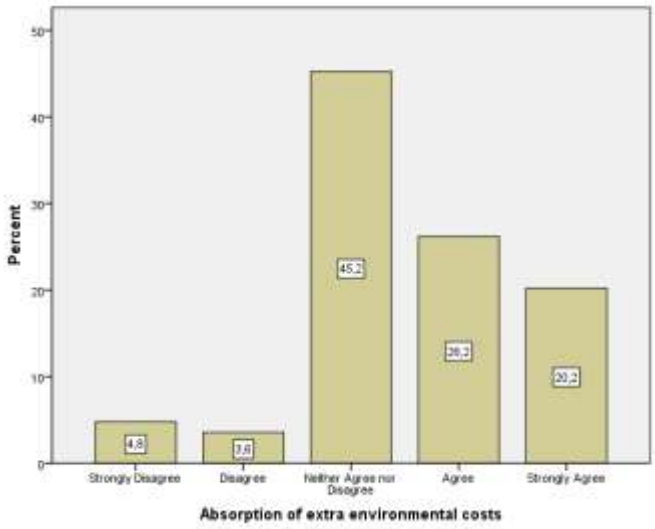


Figure 32: Frequency distribution of absorption of extra environmental costs

Reliability testing (Cronbach's Alpha)

To assess the internal consistency and reliability of the Tactical Green Marketing Orientation (TGMO) scale, a Cronbach's Alpha reliability test was conducted. The Case Processing Summary confirms that all 84 cases were included in the analysis, with no missing values or exclusions, ensuring the completeness of the dataset. The Cronbach's Alpha coefficient for the five TGMO items was calculated at 0.781, indicating acceptable internal consistency (Table 43). A Cronbach's Alpha value above 0.7 suggests that the items are moderately interrelated, meaning that the TGMO scale provides a reliable measure of firms' tactical green marketing practices. While the reliability level is not as high as that of SGMO, it remains sufficient for further statistical analysis.

Table 43: Reliability statistics for tactical green marketing orientation

Case Processing Summary

		N	%
Cases	Valid	84	100,0
	Excluded[a]	0	,0
	Total	84	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,781	5

Exploratory Factor Analysis (EFA) for TGMO

To assess the underlying structure of tactical green marketing orientation (TGMO), an Exploratory Factor Analysis (EFA) was conducted using Principal Component Analysis (PCA) as the extraction method. The objective was to determine whether TGMO practices form distinct dimensions or operate as a single unified construct. The analysis included sampling adequacy testing (KMO and Bartlett's test), communalities, total variance explained, component matrix, and rotated component matrix, followed by the interpretation of the extracted components.

Before proceeding with factor extraction, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity were performed to assess the suitability of the data for factor analysis (Table 44).

- The KMO value of 0.726 indicates a moderate level of sampling adequacy, suggesting that the dataset is suitable for factor analysis. Values above 0.6 are considered acceptable, while values above 0.8 indicate a strong factorability of the data.
- Bartlett's Test of Sphericity was statistically significant ($\chi^2 = 133.260$, $p < 0.001$), confirming that the correlation matrix is not an identity matrix, further supporting the suitability of factor analysis.

These results validate the use of Principal Component Analysis (PCA) to extract latent factors in TGMO variables.

Table 44: KMO and Bartlett's test for tactical green marketing orientation variables

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,726
Bartlett's Test of Sphericity	Approx. Chi-Square	133,260
	df	10
	Sig.	,000

The communalities of the TGMO variables (Table 45) indicate the proportion of variance explained by the extracted factors. The results show that all variables have relatively high communalities, meaning they are well represented by the extracted components.

- Absorption of extra environmental costs (0.837) and use of recycled materials (0.820) have the highest communalities, suggesting they are strongly related to the extracted components.
- Eco-friendly e-commerce encouragement (0.650) has the lowest communality, indicating that while it contributes to the factor structure, it shares less variance with other TGMO items.

These findings suggest that TGMO variables contribute significantly to the extracted factors, making them reliable for further analysis.

Table 45: Communalities of TGMO variables

Communalities

	Initial	Extraction
Eco-friendly E-commerce encouragement	1,000	,650
Preference for eco-friendly digital communication	1,000	,713
Paperless procurement policy	1,000	,746
Use of recycled materials	1,000	,820
Absorption of extra environ-mental costs	1,000	,837

Extraction Method: Principal Component Analysis.

The Total Variance Explained (Table 46) indicates that two principal components were extracted, explaining a total of 75.34% of the variance in TGMO practices.

- The first component accounts for 53.67% of the total variance, while
- The second component accounts for an additional 21.67% of the variance.

The retention of two factors (eigenvalues >1.0) suggests that TGMO is not a single construct but consists of two distinct dimensions.

Table 46: Total variance explained for tactical green marketing orientation (TGMO) variables

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,684	53,672	53,672	2,684	53,672	53,672	2,009	40,170	40,170
2	1,083	21,666	75,337	1,083	21,666	75,337	1,758	35,167	75,337
3	,500	10,003	85,341						
4	,421	8,414	93,755						
5	,312	6,245	100,000						

Extraction Method: Principal Component Analysis.

The Component Matrix (Table 47) and Rotated Component Matrix (Table 48) were examined to interpret the extracted factors. A Varimax rotation was used to clarify the factor structure, ensuring that each variable aligns more distinctly with one of the two extracted components.

- **Component 1 (Operational Digital Sustainability)**
  - ✓ Eco-friendly e-commerce encouragement (0.754)
  - ✓ Preference for eco-friendly digital communication (0.778)
  - ✓ Paperless procurement policy (0.864)

This component represents digital sustainability efforts, such as reducing environmental impact through e-commerce, digital communication, and paperless policies. These practices align with a technological approach to sustainability, emphasizing digital transformation as a green marketing tactic.

- **Component 2 (Material & Cost Sustainability)**
  - ✓ Use of recycled materials (0.860)
  - ✓ Absorption of extra environmental costs (0.910)

This component reflects financial and material sustainability, including cost absorption for environmental initiatives and the use of recycled materials. It highlights firms' commitment to resource efficiency and environmental responsibility in product design and financial decision-making.

The rotated factor loadings indicate clear differentiation between digital sustainability initiatives and material/cost sustainability measures, supporting the two-factor solution.

Table 47: Component matrix for tactical green marketing orientation (TGMO) variables

Component Matrix[a]

	Component	
	1	2
Eco-friendly E-commerce encouragement	,759	-,271
Preference for eco-friendly digital communication	,805	-,255
Paperless procurement policy	,648	-,571
Use of recycled materials	,774	,470
Absorption of extra environmental costs	,663	,630

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Table 48: Rotated component matrix for tactical green marketing orientation (TGMO) variables

Rotated Component Matrix[a]

	Component	
	1	2
Eco-friendly E-commerce encouragement	,754	,287
Preference for eco-friendly digital communication	,778	,329
Paperless procurement policy	,864	-,014
Use of recycled materials	,283	,860
Absorption of extra environmental costs	,095	,910

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

The Component Transformation Matrix (Table 49) confirms that the extracted components are independent and well-separated, with a transformation coefficient of 0.760 between the two factors. This further supports the distinctiveness of the two dimensions of Tactical Green Marketing Orientation.

Table 49: Component transformation matrix for tactical green marketing orientation (TGMO) variables

Component Transformation Matrix

Component	1	2
1	,760	,649
2	-,649	,760

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

The EFA reveals that TGMO is represented by two distinct dimensions:

1. Operational Digital Sustainability Firms prioritize eco-friendly digital solutions, including e-commerce, digital communication, and paperless policies, to minimize environmental impact.
2. Material & Cost Sustainability Companies implement sustainable material usage (e.g., recycled products) and absorb additional costs associated with environmental efforts.

These findings suggest that tactical green marketing efforts are multidimensional, requiring both digital innovation and financial investment to be fully effective. Businesses should align their sustainability strategies by integrating technology-driven green marketing practices while also addressing cost-related barriers to sustainability adoption.

This two-factor structure provides a framework for further research and strategic planning, offering insights into how firms can enhance their green marketing efforts to achieve competitive advantage and environmental responsibility.

Regression analysis for tactical green marketing

To examine the relationship between TGMO factors and company size, a multiple regression analysis was conducted. The two extracted TGMO factors:Digital Sustainability and Material & Cost Sustainability were used as independent variables, while company size (measured by number of employees) served as the dependent variable. The goal of this analysis was to determine whether businesses that implement tactical green marketing strategies tend to be larger or smaller in scale.

As shown in Table 50, the regression model included both TGMO factors (Digital Sustainability and Material & Cost Sustainability) without removing any variables. This ensures that the analysis captures the full extent of their potential influence on company size.

Table 50: Variables entered and removed in regression analysis for TGMO factors and employee size

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Material & Cost Sustainability, Digital Sustainability[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Number of employee

The model summary (Table 51) provides an overview of the regression model's explanatory power. The R-value (0.030) suggests a very weak correlation between TGMO factors and company size. Additionally, the R^2 value (0.001) indicates that only 0.1% of the variance in company size can be

explained by TGMO factors, implying that these variables do not have a meaningful impact on how large a company grows in terms of employee numbers.

More critically, the adjusted R^2 (-0.024) suggests that the model has no predictive power, meaning that TGMO does not contribute to explaining company size. The F-statistic (0.037, p = 0.964) further confirms that the overall model is not statistically significant. These findings indicate that tactical green marketing strategies are not associated with differences in company size.

Table 51: Model summary for regression analysis of TGMO factors and employee size

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,030[a]	,001	-,024	,892	,001	,037	2	81	,964

a. Predictors: (Constant), Material & Cost Sustainability, Digital Sustainability

Table 52 presents the ANOVA results, reinforcing the lack of statistical significance in the regression model.

- The total sum of squares (64.571) represents the total variability in company size.
- The residual sum of squares (64.513) shows that nearly all the variance remains unexplained by TGMO factors.
- The F-statistic (0.037, p = 0.964) further confirms that the independent variables (TGMO factors) do not significantly predict company size.

These results indicate that while tactical green marketing strategies may provide sustainability benefits, they do not appear to be a major determinant of company size in terms of the number of employees.

Table 52: ANOVA results for regression analysis of TGMO factors and employee size

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,058	2	,029	,037	,964[a]
	Residual	64,513	81	,796		
	Total	64,571	83			

a. Predictors: (Constant), Material & Cost Sustainability, Digital Sustainability

b. Dependent Variable: Number of employee

The regression coefficients in Table 53 provide insights into the individual effects of each TGMO factor on company size:

- Digital Sustainability (B = -0.026, p = 0.790)

- ✓ The negative coefficient suggests a very weak inverse relationship, implying that firms emphasizing eco-friendly digital communication, e-commerce and paperless policies might have slightly smaller company sizes.
- ✓ However, the p-value (0.790) is not statistically significant, meaning this relationship is likely due to random variation rather than a true effect.

- Material & Cost Sustainability (B = 0.004, p = 0.965)
  - ✓ This factor shows an almost zero effect on company size, with a near-zero regression coefficient.
  - ✓ The p-value (0.965) confirms that this relationship is not statistically significant, indicating that absorbing environmental costs and using recycled materials do not correlate with company size.

Additionally, the correlation values (zero-order, partial, and part correlations) are extremely small, reinforcing the conclusion that TGMO factors do not significantly influence company size.

Table 53: Regression coefficients for TGMO factors and employee size

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Correlations		
		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part
1	(Constant)	3,429	,097		35,210	,000			
	Digital Sustainability	-,026	,098	-,030	-,267	,790	-,030	-,030	-,030
	Material & Cost Sustainability	,004	,098	,005	,044	,965	,005	,005	,005

a. Dependent Variable: Number of employee

The findings of this analysis indicate that tactical green marketing practices do not directly impact company size. While Digital Sustainability and Material & Cost Sustainability are essential for environmental responsibility and competitive differentiation, they do not appear to drive company expansion. Several possible explanations exist for this result:

- Efficiency gains from digitalization: Firms adopting paperless policies, e-commerce, and digital communication may become more operationally efficient, reducing the need for a larger workforce.
- Sustainability vs. business Growth: While sustainable material usage and cost absorption contribute to environmental responsibility, they may not directly influence company size in terms of employee count.

- Industry-Specific Differences: The impact of green marketing practices on company size may depend on industry type, with manufacturing firms potentially experiencing different effects compared to service-based businesses.

While TGMO is a valuable strategy for sustainability, it does not appear to be a primary determinant of company growth in terms of workforce expansion. Future research could explore how tactical green marketing impacts other business outcomes, such as profitability, brand perception, or market competitiveness.

Key findings

The statistical analysis of TGMO revealed two key dimensions: Operational Digital Sustainability and Material & Cost Sustainability. Descriptive statistics showed that firms prioritize paperless procurement and digital communication, while the adoption of recycled materials and cost absorption for sustainability remains more variable.

Factor analysis confirmed that TGMO is a multidimensional construct, distinguishing between technology-driven sustainability initiatives and material/resource-based efforts. However, regression analysis indicated that TGMO factors do not significantly impact company size, as measured by the number of employees. This suggests that while tactical green marketing efforts enhance sustainability, they do not necessarily drive business expansion or workforce growth. This aligns with existing literature on green marketing, which emphasizes environmental responsibility over direct economic gains (Papadas et al., 2017). Prior research has shown that green marketing is more strongly linked to brand differentiation, regulatory compliance, and stakeholder engagement rather than company size (Leonidou et al., 2013).

These findings suggest that tactical green marketing initiatives, while beneficial for sustainability and regulatory alignment, may not be sufficient to influence organizational growth metrics like workforce size. Instead, firms should consider integrating strategic green marketing practices, which are more closely associated with long-term competitive advantage and financial performance. Future research should explore how TGMO interacts with profitability, market competitiveness, and consumer preferences to provide a more comprehensive understanding of its business implications.

5.1.3.3 Internal green marketing orientation

The concept of Internal Green Marketing Orientation (IGMO) is essential for embedding sustainability within an organization's culture. IGMO reflects the extent to which companies engage employees in green initiatives, recognize environmentally responsible behavior, and integrate sustainability into internal operations. This analysis assesses how organizations implement employee-focused green marketing strategies, including rewarding environmental behavior, promoting eco-conscious recruitment, organizing sustainability training, and forming environmental committees.

Descriptive statistics of IGMO variables

The descriptive statistics for IGMO provide critical insights into how organizations incorporate sustainability into their internal policies and employee engagement strategies. Table 54 presents the mean, standard deviation, and range for each IGMO indicator, offering a detailed examination of the degree to which firms actively promote green behavior, eco-conscious recruitment, and employee participation in environmental initiatives.

The data indicate moderate adoption of internal green marketing practices across the surveyed firms. The highest mean score is observed for employee belief in environmental values (M = 3.60, SD = 0.933), suggesting that employees generally align with and support their organization's sustainability initiatives. Similarly, encouragement of eco-friendly product use (M = 3.54, SD = 1.069) and rewarding environmental behavior (M = 3.51, SD = 0.963) reflect a strong commitment to fostering a sustainable workplace culture.

Conversely, the lowest adoption levels are reported for internal environmental prize competitions (M = 2.76, SD = 1.071) and environmental committees for audits (M = 2.95, SD = 1.140). This suggests that while companies recognize the importance of green marketing within their workforce, formalized internal sustainability initiatives, such as structured competitions or committees, are not yet widely implemented.

An important variation in standard deviations across IGMO variables indicates differing levels of commitment among firms. Environmental bonus in recruitment (M = 3.06, SD = 0.986) and presentations on green marketing strategies (M = 3.19, SD = 1.146) exhibit greater variability, implying that some organizations have embraced green talent acquisition and sustainability training, while others have yet to integrate these practices systematically.

The findings suggest that while organizations demonstrate a commitment to internal sustainability, there is significant room for improvement in formalizing sustainability-driven recruitment, employee incentives, and environmental governance structures.

Table 54: Descriptive statistics for internal green marketing orientation variables

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Rewarding environmental behavior	84	1	5	3,51	,963
Environmental bonus in recruitment	84	1	5	3,06	,986
Environmental prize competitions	84	1	5	2,76	1,071
Committees for environmental audits	84	1	5	2,95	1,140
Presentations on green marketing strategy	84	1	5	3,19	1,146
Encouragement of eco-friendly product use	84	1	5	3,54	1,069
Employee belief in environ-mental values	84	1	5	3,60	,933
Valid N (listwise)	84				

Frequency distributions of IGMO indicators

To further investigate the distribution of responses, frequency analysis was conducted for each TGMO variable.

The rewarding of environmental behavior (Table 55) is a moderately adopted practice, with 51.2% of respondents agreeing or strongly agreeing that such efforts are acknowledged within their organizations. However, a considerable portion (35.7%) remains neutral, indicating that while some firms recognize sustainability efforts internally, others lack structured reward systems. This suggests that incentivizing eco-friendly behavior could be further institutionalized to enhance employee participation in corporate sustainability goals.

Table 55: Frequency distribution of rewarding environmental behavior

Rewarding environmental behavior

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	9	10,7	10,7	13,1
	Neither Agree nor Disagree	30	35,7	35,7	48,8
	Agree	30	35,7	35,7	84,5
	Strongly Agree	13	15,5	15,5	100,0
	Total	84	100,0	100,0	

The integration of environmental awareness in recruitment (Table 56) shows a lower level of adoption compared to other IGMO dimensions. While only 26.2% of firms actively consider sustainability as a hiring criterion, a majority (50%) remain neutral, suggesting that environmental commitment is not yet a key determinant in recruitment decisions. This finding aligns with prior research, which suggests that while organizations value sustainability, they prioritize technical expertise and industry experience over environmental responsibility during hiring processes.

Table 56: Frequency distribution of environmental bonus in recruitment

Environmental bonus in recruitment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6,0	6,0	6,0
	Disagree	15	17,9	17,9	23,8
	Neither Agree nor Disagree	42	50,0	50,0	73,8
	Agree	14	16,7	16,7	90,5
	Strongly Agree	8	9,5	9,5	100,0
	Total	84	100,0	100,0	

Moreover, the results indicate that internal competitions to promote sustainability (Table 57) are among the least implemented IGMO practices, with 40.5% of firms disagreeing or strongly disagreeing that such initiatives exist. While only 21.4% of firms actively organize environmental competitions, the majority (38.1%) remain neutral, further emphasizing a lack of widespread adoption of structured sustainability incentives within corporate culture. Given the positive impact of gamification and reward-based motivation on employee engagement, firms could benefit from developing structured sustainability competitions to encourage participation.

Table 57: Frequency distribution of environmental prize competitions

Environmental prize competitions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	10	11,9	11,9	11,9
	Disagree	24	28,6	28,6	40,5
	Neither Agree nor Disagree	32	38,1	38,1	78,6
	Agree	12	14,3	14,3	92,9
	Strongly Agree	6	7,1	7,1	100,0
	Total	84	100,0	100,0	

The formation of environmental committees for internal audits (Table 58) remains underdeveloped, with 34.5% of firms reporting no such initiatives and only 33.3% agreeing that they exist. The relatively high neutral response (32.1%) suggests that while some organizations have formalized environmental governance structures, many still lack dedicated internal oversight mechanisms. This highlights a gap in corporate sustainability governance, suggesting that firms should consider establishing structured committees to oversee internal environmental performance and compliance.

Table 58: Frequency distribution of committees for environmental audits

Committees for environmental audits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	10	11,9	11,9	11,9
	Disagree	19	22,6	22,6	34,5
	Neither Agree nor Disagree	27	32,1	32,1	66,7
	Agree	21	25,0	25,0	91,7
	Strongly Agree	7	8,3	8,3	100,0
	Total	84	100,0	100,0	

Informational sessions about green marketing strategy (Table 59) show mixed adoption, with 42.9% of firms conducting employee presentations and 26.2% reporting a lack of such efforts. This suggests that while some organizations actively educate employees on sustainability policies, others lack structured communication channels for promoting green marketing strategies. Given the importance of employee awareness in sustainability implementation, firms should consider enhancing internal communication strategies to reinforce green marketing objectives.

Table 59: Frequency distribution of presentations on green marketing strategy

Presentations on green marketing strategy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	8	9,5	9,5	9,5
	Disagree	14	16,7	16,7	26,2
	Neither Agree nor Disagree	26	31,0	31,0	57,1
	Agree	26	31,0	31,0	88,1
	Strongly Agree	10	11,9	11,9	100,0
	Total	84	100,0	100,0	

In addition, encouraging employees to use eco-friendly products and services (Table 60) is one of the most widely adopted IGMO initiatives, with 63.1% of firms agreeing or strongly agreeing to implementing such encouragement. Only 17.9% of firms oppose this practice, suggesting that organizations are actively promoting sustainability in employee consumption habits. However, 19% of respondents remain neutral, indicating that some firms may not enforce clear policies on eco-friendly product usage.

Table 60: Frequency distribution of encouragement of eco-friendly product use

Encouragement of eco-friendly product use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6,0	6,0	6,0
	Disagree	10	11,9	11,9	17,9
	Neither Agree nor Disagree	16	19,0	19,0	36,9
	Agree	41	48,8	48,8	85,7
	Strongly Agree	12	14,3	14,3	100,0
	Total	84	100,0	100,0	

The strongest IGMO indicator is employee belief in corporate environmental values (Table 61), with 60.7% of respondents agreeing or strongly agreeing that employees align with their company's sustainability principles. This suggests that despite variability in the adoption of IGMO initiatives, employees generally support their organization's green marketing efforts. However, the neutral response rate (28.6%) suggests that some employees remain indifferent, possibly due to a lack of direct engagement with sustainability initiatives.

Table 61: Frequency distribution of employee belief in environmental values

Employee belief in environmental values

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,6	3,6	3,6
	Disagree	6	7,1	7,1	10,7
	Neither Agree nor Disagree	24	28,6	28,6	39,3
	Agree	40	47,6	47,6	86,9
	Strongly Agree	11	13,1	13,1	100,0
	Total	84	100,0	100,0	

The findings suggest that IGMO is acknowledged but inconsistently applied. Organizations aiming to strengthen internal green marketing orientation should focus on formalizing reward systems, integrating sustainability into recruitment, and establishing structured governance mechanisms to enhance corporate sustainability practices.

Reliability testing (Cronbach's Alpha)

A Cronbach's Alpha reliability test was conducted to evaluate the internal consistency of the Internal Green Marketing Orientation (IGMO) scale. The Case Processing Summary confirms that all 84 cases were included, with no missing values, ensuring a complete dataset.

The Cronbach's Alpha coefficient of 0.876 (Table 62) indicates high reliability, demonstrating that the IGMO scale effectively measures employee engagement in sustainability practices. The strong α-value (>0.8) confirms that the items—rewarding environmental behavior, eco-conscious hiring, internal committees, and training initiatives—are highly interrelated, ensuring consistency in assessing internal green marketing efforts. No item removal is required, validating the scale's suitability for further statistical analyses, including factor analysis and regression modeling.

Table 62: Reliability statistics for internal green marketing orientation

Case Processing Summary

		N	%
Cases	Valid	84	100,0
	Excluded[a]	0	,0
	Total	84	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,876	7

Exploratory Factor Analysis (EFA) for IGMO

The Exploratory Factor Analysis (EFA) was conducted using Principal Component Analysis (PCA) to identify the underlying structure of IGMO and assess whether it consists of distinct components. The results confirm a two-factor solution, explaining 73.81% of the total variance, suggesting that IGMO can be categorized into two distinct dimensions.

The communalities (Table 63) show that all variables exhibit strong relationships with the extracted factors, with values ranging from 0.577 to 0.869. The highest communalities are found in presentations on green marketing strategy (0.869), encouragement of eco-friendly product use (0.829), and environmental bonus in recruitment (0.836), indicating that these items strongly contribute to the IGMO construct.

Table 63: Communalities of internal green marketing orientation (IGMO) variables

Communalities

	Initial	Extraction
Rewarding environmental behavior	1,000	,682
Environmental bonus in recruitment	1,000	,836
Environmental prize competitions	1,000	,577
Committees for environmental audits	1,000	,709
Presentations on green marketing strategy	1,000	,869
Encouragement of eco-friendly product use	1,000	,829
Employee belief in environmental values	1,000	,665

Extraction Method: Principal Component Analysis.

The Total Variance Explained (Table 64) confirms that the first component accounts for 57.51% of the variance, while the second explains an additional 16.30%, reinforcing the existence of two separate dimensions within IGMO. These findings suggest that IGMO is not a unidimensional construct but rather composed of two distinct yet interrelated aspects of internal green marketing efforts.

Table 64: Total variance explained for internal green marketing orientation (IGMO) variables

Total Variance Explained

Component		Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
dimension0	1	4,026	57,513	57,513	4,026	57,513	57,513	2,882	41,165	41,165
	2	1,141	16,297	73,810	1,141	16,297	73,810	2,285	32,644	73,810
	3	,733	10,476	84,285						
	4	,367	5,249	89,535						
	5	,330	4,717	94,252						
	6	,239	3,412	97,664						
	7	,164	2,336	100,000						

Extraction Method: Principal Component Analysis.

Table 65: Component matrix for internal green marketing orientation (IGMO) variables

Component Matrix[a]

	Component	
	1	2
Rewarding environmental behavior	,609	,558
Environmental bonus in recruitment	,724	,559
Environmental prize competitions	,715	,256
Committees for environmental audits	,840	-,055
Presentations on green marketing strategy	,884	-,294
Encouragement of eco-friendly product use	,750	-,516
Employee belief in environmental values	,754	-,310

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

The Rotated Component Matrix (Table 66) clarifies the factor structure after applying Varimax rotation for better interpretability. The results suggest the presence of two primary factors:

1. Employee Engagement & Training (Factor 1) :Includes presentations on green marketing strategy (0.872), encouragement of eco-friendly product use (0.908), employee belief in environmental values (0.781) and committees for environmental audits (0.687). These variables reflect internal sustainability training, employee awareness, and governance structures that reinforce green marketing within the organization.
2. Incentives & Rewards (Factor 2) : Includes rewarding environmental behavior (0.817), environmental bonus in recruitment (0.890), and environmental prize competitions (0.649). This factor captures the organization's use of incentives, rewards and recruitment policies to encourage environmental behavior among employees.

Table 66: Rotated component matrix for internal green marketing orientation (igmo) variables

Rotated Component Matrix[a]

	Component	
	1	2
Rewarding environmental behavior	,122	,817
Environmental bonus in recruitment	,210	,890
Environmental prize competitions	,395	,649
Committees for environmental audits	,687	,486
Presentations on green marketing strategy	,872	,328
Encouragement of eco-friendly product use	,908	,071
Employee belief in environmental values	,781	,234

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

The Component Transformation Matrix (Table 67) confirms that these two factors are well-separated and independent, with transformation coefficients of 0.777 and 0.630, reinforcing the robustness of the two-factor model.

Table 67: Component transformation matrix for internal green marketing orientation (IGMO) variables

Component Transformation Matrix

Component	1	2
1	,777	,630
2	-,630	,777

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

The identification of two distinct IGMO dimensions suggests that organizations adopt both motivational and structural approaches to promote internal sustainability. While some firms emphasize awareness-building and training, others focus on monetary and non-monetary incentives to drive eco-conscious behavior. These findings offer valuable insights into how firms can optimize their internal green marketing strategies. Companies should balance employee training programs with well-structured incentive mechanisms to enhance sustainability commitment at all levels. This two-factor structure also provides a strong foundation for further correlation and regression analyses, examining how IGMO influences business performance, employee engagement, and sustainability outcomes.

ANOVA for internal green marketing

The ANOVA results (Table 68) provide insights into the relationship between Internal Green Marketing Orientation (IGMO) variables and company size, measured by the number of employees. Significant differences were observed in committees for environmental audits ($F = 4.061$, $p = 0.010$), presentations on green marketing strategy ($F = 6.369$, $p = 0.001$), encouragement of eco-friendly product use ($F = 6.397$, $p = 0.001$), and employee belief in environmental values ($F = 5.456$, $p = 0.002$). These findings suggest that larger firms are more likely to institutionalize environmental committees, promote internal green marketing initiatives, and foster a stronger belief in sustainability among employees. Conversely, non-significant results for rewarding environmental behavior ($p = 0.226$), environmental bonus in recruitment ($p = 0.267$), and environmental prize competitions ($p = 0.121$) indicate that these practices are not necessarily influenced by firm size.

Table 68: ANOVA results for Internal Green Marketing Orientation (IGMO) variables

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Rewarding environmental behavior	Between Groups	4,054	3	1,351	1,482	,226
	Within Groups	72,934	80	,912		
	Total	76,988	83			
Environmental bonus in recruitment	Between Groups	3,861	3	1,287	1,340	,267
	Within Groups	76,841	80	,961		
	Total	80,702	83			
Environmental prize competitions	Between Groups	6,641	3	2,214	1,999	,121
	Within Groups	88,597	80	1,107		
	Total	95,238	83			
Committees for environmental audits	Between Groups	14,250	3	4,750	4,061	,010
	Within Groups	93,560	80	1,169		
	Total	107,810	83			
Presentations on green marketing strategy	Between Groups	21,005	3	7,002	6,369	,001
	Within Groups	87,947	80	1,099		
	Total	108,952	83			
Encouragement of eco-friendly product use	Between Groups	18,359	3	6,120	6,397	,001
	Within Groups	76,534	80	,957		
	Total	94,893	83			
Employee belief in environmental values	Between Groups	12,270	3	4,090	5,456	,002
	Within Groups	59,968	80	,750		
	Total	72,238	83			

Post-hoc comparisons using Tukey HSD (Tables 69-76) further highlight how IGMO adoption varies across different company sizes. Notably, significant differences emerged in committees for environmental audits and presentations on green marketing strategy between smaller firms (1–10 employees) and larger firms (250+ employees). This suggests that larger organizations have greater capacity to implement structured environmental governance mechanisms and internal sustainability awareness programs. Encouragement of eco-friendly product use and employee belief in environmental values also showed significant differences, reinforcing the notion that sustainability-oriented culture is more pronounced in larger firms.

However, IGMO elements such as rewarding environmental behavior and environmental incentives in recruitment did not show significant variation across company sizes. This may indicate that sus-

tainability-related incentives are not yet deeply embedded in hiring and employee recognition strategies, regardless of firm size. Smaller firms may lack the resources to implement structured sustainability incentives, while larger firms may rely on broader corporate sustainability policies rather than individualized incentives.

Table 69: Multiple Comparisons (Tukey HSD) for IGMO Variables by Company Size

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) Number of employee	(J) Number of employee		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Rewarding environmental behavior	dimension2	1-10 employees	dimension3	11-50 employees	,400	,559	,891	-1,07	1,87
				51-250 employees	-,442	,480	,794	-1,70	,82
				250+ employees	-,072	,447	,999	-1,24	1,10
		11-50 employees		1-10 employees	-,400	,559	,891	-1,87	1,07
				51-250 employees	-,842	,422	,199	-1,95	,27
				250+ employees	-,472	,384	,611	-1,48	,54
		51-250 employees		1-10 employees	,442	,480	,794	-,82	1,70
				11-50 employees	,842	,422	,199	-,27	1,95
				250+ employees	,370	,255	,472	-,30	1,04
		250+ employees		1-10 employees	,072	,447	,999	-1,10	1,24
				11-50 employees	,472	,384	,611	-,54	1,48
				51-250 employees	-,370	,255	,472	-1,04	,30
Environmental bonus in recruitment	dimension2	1-10 employees	dimension3	11-50 employees	-,314	,574	,947	-1,82	1,19
				51-250 employees	-,863	,493	,304	-2,16	,43

			250+ employees	-,694	,459	,434	-1,90	,51
		11-50 employees	1-10 employees	,314	,574	,947	-1,19	1,82
			51-250 employees	-,549	,433	,587	-1,69	,59
			250+ employees	-,380	,394	,770	-1,41	,65
		51-250 employees	1-10 employees	,863	,493	,304	-,43	2,16
			11-50 employees	,549	,433	,587	-,59	1,69
			250+ employees	,169	,262	,917	-,52	,86
		250+ employees	1-10 employees	,694	,459	,434	-,51	1,90
			11-50 employees	,380	,394	,770	-,65	1,41
			51-250 employees	-,169	,262	,917	-,86	,52
Environmental prize competitions		1-10 employees	11-50 employees	-,143	,616	,996	-1,76	1,47
			51-250 employees	-,947	,529	,285	-2,34	,44
			250+ employees	-,849	,492	,318	-2,14	,44
	dimension2	11-50 employees	1-10 employees	,143	,616	,996	-1,47	1,76
			51-250 employees	-,805	,465	,316	-2,03	,42
			250+ employees	-,706	,423	,347	-1,82	,40
		51-250 employees	1-10 employees	,947	,529	,285	-,44	2,34
			11-50 employees	,805	,465	,316	-,42	2,03

			250+ employees	,098	,281	,985	-,64	,84
		250+ employees	1-10 employees	,849	,492	,318	-,44	2,14
			11-50 employees	,706	,423	,347	-,40	1,82
			51-250 employees	-,098	,281	,985	-,84	,64
Committees for environmental audits		1-10 employees	11-50 employees	-,343	,633	,949	-2,00	1,32
			51-250 employees	-1,095	,544	,191	-2,52	,33
			250+ employees	-1,389*	,506	,037	-2,72	-,06
		11-50 employees	1-10 employees	,343	,633	,949	-1,32	2,00
			51-250 employees	-,752	,478	,400	-2,01	,50
			250+ employees	-1,046	,435	,084	-2,19	,10
	dimension2	51-250 employees	1-10 employees	1,095	,544	,191	-,33	2,52
			11-50 employees	,752	,478	,400	-,50	2,01
			250+ employees	-,294	,289	,740	-1,05	,46
		250+ employees	1-10 employees	1,389*	,506	,037	,06	2,72
			11-50 employees	1,046	,435	,084	-,10	2,19
			51-250 employees	,294	,289	,740	-,46	1,05
Presentations on green marketing strategy		1-10 employees	11-50 employees	-,343	,614	,944	-1,95	1,27
			51-250 employees	-1,411*	,527	,044	-2,79	-,03

			250+ employees	-1,653*	,491	,006	-2,94	-,37
		11-50 employees	1-10 employees	,343	,614	,944	-1,27	1,95
			51-250 employees	-1,068	,464	,106	-2,28	,15
			250+ employees	-1,310*	,422	,014	-2,42	-,20
		51-250 employees	1-10 employees	1,411*	,527	,044	,03	2,79
			11-50 employees	1,068	,464	,106	-,15	2,28
			250+ employees	-,242	,280	,823	-,98	,49
		250+ employees	1-10 employees	1,653*	,491	,006	,37	2,94
			11-50 employees	1,310*	,422	,014	,20	2,42
			51-250 employees	,242	,280	,823	-,49	,98
Encouragement of eco-friendly prod-uct use		1-10 employees	11-50 employees	-1,000	,573	,307	-2,50	,50
			51-250 employees	-1,368*	,492	,033	-2,66	-,08
			250+ employees	-1,811*	,458	,001	-3,01	-,61
	dimension2	11-50 employees	1-10 employees	1,000	,573	,307	-,50	2,50
			51-250 employees	-,368	,432	,829	-1,50	,77
			250+ employees	-,811	,393	,174	-1,84	,22
		51-250 employees	1-10 employees	1,368*	,492	,033	,08	2,66
			11-50 employees	,368	,432	,829	-,77	1,50

			250+ employees	-,443	,262	,334	-1,13	,24
	250+ employees	dimension3	1-10 employees	1,811*	,458	,001	,61	3,01
			11-50 employees	,811	,393	,174	-,22	1,84
			51-250 employees	,443	,262	,334	-,24	1,13
Employee belief in environmental values	1-10 employees	dimension3	11-50 employees	-1,229	,507	,081	-2,56	,10
			51-250 employees	-1,274*	,435	,023	-2,42	-,13
			250+ employees	-1,592*	,405	,001	-2,66	-,53
	11-50 employees	dimension3	1-10 employees	1,229	,507	,081	-,10	2,56
			51-250 employees	-,045	,383	,999	-1,05	,96
			250+ employees	-,364	,348	,724	-1,28	,55
dimension2	51-250 employees	dimension3	1-10 employees	1,274*	,435	,023	,13	2,42
			11-50 employees	,045	,383	,999	-,96	1,05
			250+ employees	-,319	,232	,517	-,93	,29
	250+ employees	dimension3	1-10 employees	1,592*	,405	,001	,53	2,66
			11-50 employees	,364	,348	,724	-,55	1,28
			51-250 employees	,319	,232	,517	-,29	,93

*. The mean difference is significant at the 0.05 level.

Table 70: Tukey HSD Post Hoc Comparisons for Rewarding Environmental Behavior by Company Size

Rewarding environmental behavior

Tukey HSD[a,b]

Number of employee	N	Subset for alpha = 0.05
		1
11-50 employees	7	3,00
1-10 employees	5	3,40
250+ employees	53	3,47
51-250 employees	19	3,84
Sig.		,221

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,654.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 71: Tukey HSD Post Hoc Comparisons for Environmental Bonus in Recruitment by Company Size

Environmental bonus in recruitment

Tukey HSD[a,b]

Number of employee	N	Subset for alpha = 0.05
		1
1-10 employees	5	2,40
11-50 employees	7	2,71
250+ employees	53	3,09
51-250 employees	19	3,26
Sig.		,222

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,654.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 72: Tukey HSD Post Hoc Comparisons for Environmental Prize Competitions by Company Size

Environmental prize competitions

Tukey HSD[a,b]

Number of employee	N	Subset for alpha = 0.05
		1
1-10 employees	5	2,00
11-50 employees	7	2,14
250+ employees	53	2,85
51-250 employees	19	2,95
Sig.		,205

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,654.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 73: Tukey HSD Post Hoc Comparisons for Committees for Environmental Audits by Company Size

Committees for environmental audits

Tukey HSD[a,b]

Number of employee	N	Subset for alpha = 0.05	
		1	2
1-10 employees	5	1,80	
11-50 employees	7	2,14	2,14
51-250 employees	19	2,89	2,89
250+ employees	53		3,19
Sig.		,126	,154

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,654.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 74: Tukey HSD Post Hoc Comparisons for Presentations on Green Marketing Strategy by Company Size

Presentations on green marketing strategy

Tukey HSD[a,b]

Number of employee	N	Subset for alpha = 0.05		
		1	2	3
1-10 employees	5	1,80		
11-50 employees	7	2,14	2,14	
51-250 employees	19		3,21	3,21
250+ employees	53			3,45
Sig.		,889	,122	,957

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,654.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 75: Tukey HSD Post Hoc Comparisons for Encouragement of Eco-Friendly Product Use by Company Size

Encouragement of eco-friendly product use

Tukey HSD[a,b]

Number of employee	N	Subset for alpha = 0.05	
		1	2
1-10 employees	5	2,00	
11-50 employees	7	3,00	3,00
51-250 employees	19		3,37
250+ employees	53		3,81
Sig.		,120	,271

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,654.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 76: Tukey HSD Post Hoc Comparisons for Employee Belief in Environmental Values by Company Size

Employee belief in environmental values

Tukey HSD[a,b]

Number of employee	N	Subset for alpha = 0.05	
		1	2
1-10 employees	5	2,20	
11-50 employees	7		3,43
51-250 employees	19		3,47
250+ employees	53		3,79
Sig.		1,000	,792

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,654.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

The findings suggest that larger firms tend to have more structured internal sustainability practices, such as environmental committees and green marketing education initiatives, possibly due to better resource availability and compliance with regulatory requirements. This aligns with prior research emphasizing the role of firm size in sustainability adoption (Leonidou et al., 2013). Smaller firms, on the other hand, may engage in green marketing initiatives informally but lack the formal mechanisms observed in larger enterprises.

From a strategic perspective, companies aiming to strengthen their internal green marketing orientation should focus on formalizing sustainability structures, regardless of firm size. Smaller firms may benefit from adopting scalable environmental policies, while larger firms should ensure that sustainability efforts extend beyond compliance to foster genuine employee engagement. Additionally, the absence of significant differences in environmental recruitment and incentive-based programs highlights an opportunity for firms to integrate sustainability into their talent acquisition and employee motivation strategies.

While company size influences the adoption of certain IGMO practices, key sustainability-driven HR policies remain underutilized across firms of all sizes. Future research could explore the impact of industry-specific factors and regulatory frameworks on IGMO implementation, as well as the long-term effects of internal sustainability programs on organizational performance.

Regression analysis for internal green marketing

The regression analysis examines the relationship between IGMO dimensions—Employee Engagement & Training and Incentives & Rewards—and company size, measured by the number of employees.

Table 77: Variables entered and removed in regression analysis for igmo and company size

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Incentives & Rewards , Employee Engagement & Training [a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Number of employee

The regression model (Table 78) demonstrates a moderate relationship between IGMO dimensions and company size, with an R-value of 0.479. This suggests a weak to moderate correlation between IGMO practices and firm size. The R-squared value (0.230) indicates that 23.0% of the variance in company size can be explained by the two IGMO dimensions. The adjusted R-squared value (0.211) suggests that, after adjusting for the number of predictors, the model still accounts for approximately 21.1% of the variability in firm size.

While this level of explained variance is moderate, it implies that other external factors likely contribute more significantly to company growth, reinforcing findings in prior literature that green marketing practices are more influential in brand positioning, employee satisfaction, and regulatory compliance rather than directly impacting business expansion (Leonidou et al., 2013).

Table 78: Model summary for igmo regression analysis

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,479[a]	,230	,211	,784

a. Predictors: (Constant), Incentives & Rewards , Employee Engagement & Training

b. Dependent Variable: Number of employee

The ANOVA results (Table 79) indicate that the overall regression model is statistically significant ($F = 12.076$, $p < 0.001$). This confirms that IGMO variables collectively have a meaningful impact on company size. However, further analysis of individual predictor significance is required to assess their unique contributions.

Table 79: ANOVA results for IGMO and company size

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14,831	2	7,415	12,076	,000[a]
	Residual	49,740	81	,614		
	Total	64,571	83			

a. Predictors: (Constant), Incentives & Rewards , Employee Engagement & Training

b. Dependent Variable: Number of employee

The regression coefficients (Table 80) provide insights into the influence of each IGMO factor:

1. **Employee Engagement & Training (B = 0.422, p < 0.001)**
   - This predictor exhibits a statistically significant positive effect on company size.
   - A one-unit increase in Employee Engagement & Training is associated with a 0.422-unit increase in company size (measured by the number of employees), holding other factors constant.

- This finding suggests that organizations actively engaging employees in environmental sustainability, providing training, and fostering eco-conscious behavior tend to have larger workforces. Larger firms may have the resources to invest in structured environmental education and integrate sustainability into their corporate culture, making them more attractive to a broader talent pool.

2. **Incentives & Rewards (B = 0.021, p = 0.807)**
   - This predictor is not statistically significant, indicating that monetary or non-monetary environmental incentives do not significantly impact company size.
   - The very low standardized Beta value (0.024) further suggests that IGMO incentives do not contribute meaningfully to firm expansion.
   - This aligns with previous research indicating that incentives may improve employee engagement but do not necessarily lead to workforce growth, as hiring decisions are driven more by market demand, financial performance, and operational needs rather than green reward structures (Papadas et al., 2017).

These findings suggest that while employee engagement in sustainability is positively linked to firm size, rewards-based sustainability incentives have no significant impact. This distinction underscores the importance of internal environmental education and training in driving workforce expansion, whereas incentive-based approaches may be more effective for improving employee retention and morale rather than scaling up workforce size.

Table 80: Regression coefficients for igmo and company size

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	3,429	,086		40,100	,000	3,258	3,599
	Employee Engagement & Training	,422	,086	,479	4,908	,000	,251	,593
	Incentives & Rewards	,021	,086	,024	,245	,807	-,150	,192

a. Dependent Variable: Number of employee

The residuals statistics (Table 81) and the Partial Regression Plots (Figures 33 and 34) help evaluate the assumptions of linear regression:

Partial Regression Plot for Employee Engagement & Training (Figure 33)

Shows a moderate linear trend, confirming that firms with stronger engagement in environmental training and awareness tend to have larger employee bases. However, the presence of some scattered residuals suggests potential heteroskedasticity, meaning that the effect may not be uniform across all company sizes.

Partial Regression Plot for Incentives & Rewards (Figure 34)

Reveals a scattered, non-linear distribution, further reinforcing that IGMO incentives do not systematically affect company size.The lack of pattern suggests that green incentives are applied inconsistently across firms, possibly depending on sector, industry norms, or company policy priorities.

Table 81: Residuals Statistics for IGMO Regression Model

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2,22	4,13	3,43	,423	84
Residual	-2,279	1,780	,000	,774	84
Std. Predicted Value	-2,860	1,669	,000	1,000	84
Std. Residual	-2,908	2,272	,000	,988	84

a. Dependent Variable: Number of employee

Figure 33: Partial Regression Plot for Employee Engagement & Training and Company Size

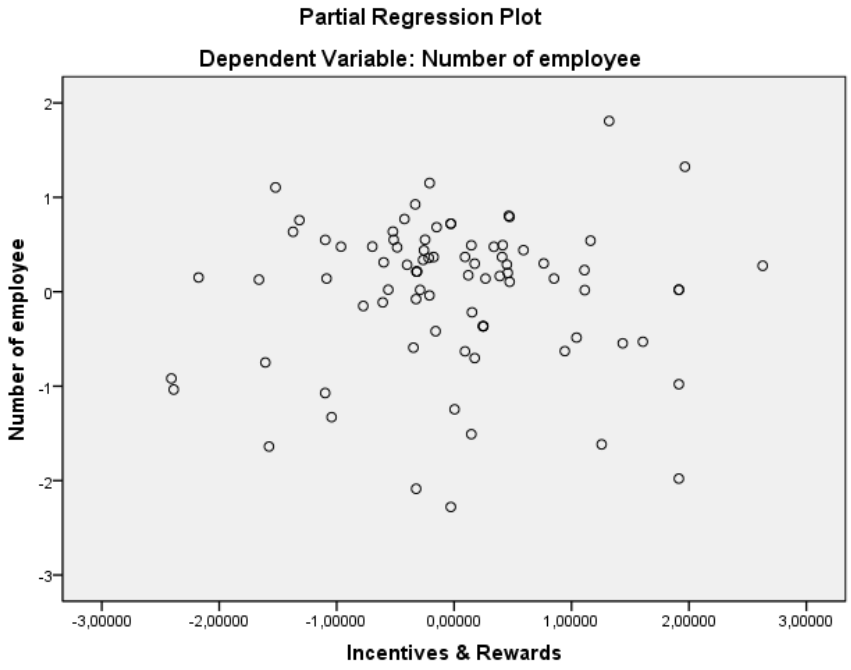


Figure 34: Partial Regression Plot for Incentives & Rewards and Company Size

The regression analysis confirms that Employee Engagement & Training has a significant positive impact on company size, whereas Incentives & Rewards do not contribute meaningfully to workforce expansion. These findings reinforce the importance of internal sustainability education over purely reward-based initiatives. Companies aiming to scale their workforce while strengthening green marketing orientation should prioritize structured environmental engagement programs, ensuring that sustainability becomes an integral part of corporate identity and employee development.

Key findings

The findings of this study reinforce the argument that employee engagement and training are critical for strengthening IGMO, while monetary incentives and rewards do not significantly influence company size. This aligns with Papadas et al. (2017), who emphasized that effective green marketing requires both strategic and cultural integration rather than isolated financial incentives. Their study suggested that sustainability efforts are most impactful when embedded into organizational processes rather than treated as standalone reward mechanisms. Moreover, the results support Papadas et al.'s assertion that larger firms are more likely to institutionalize green policies, but smaller firms may struggle due to resource constraints. Both studies indicate that while green marketing adoption is growing, employee-driven sustainability engagement remains a stronger predictor of organizational commitment than extrinsic rewards. Future research should explore how industry-specific factors mediate IGMO effectiveness and whether sustained engagement efforts translate into long-term business growth and competitive advantage.

5.1.4 Sustainable performance

The statistical results provide insights into the extent to which organizations integrate sustainability across economic performance, competitive advantage, and financial growth.

Descriptive statistics

The mean values for most variables range between 3.06 and 3.81, indicating a moderate to high level of adoption of sustainability-related practices. The highest mean is observed for "Improvement in Company Image" (M = 3.81, SD = 0.719), suggesting that organizations recognize sustainability as a strategic tool for enhancing their reputation. On the other hand, supplier involvement in product development (M = 3.06, SD = 0.782) shows the lowest mean, indicating limited engagement with suppliers in sustainable innovation.

The skewness and kurtosis values suggest a relatively normal distribution, with slight deviations in specific areas. Notably, profitability compared to competitors (Kurtosis = 1.429) shows the highest positive kurtosis, indicating a concentration of responses around the mean.

Table 82: Descriptive statistics for sustainable performance variables

Statistics

		Involvement of suppliers in new product development	Informing suppliers of organizational changes	Providing information to customers	Increase in net profit margin	Outstanding profitability growth	Profitability compared to competitors	Improvement in company image	Customer satisfaction compared to competitors	Employee satisfaction compared to competitors	Market presence during crisis	Sales increase compared to competitors
N	Valid	84	84	83	84	84	84	84	84	84	84	84
	Missing	0	0	1	0	0	0	0	0	0	0	0
Mean		3,06	3,27	3,45	3,45	3,38	3,29	3,81	3,46	3,40	3,58	3,39
Median		3,00	3,00	3,00	3,00	3,00	3,00	4,00	3,00	3,00	4,00	3,00
Mode		3	3	4	3	3	3	4	3	3	3	3
Std. Deviation		,782	,869	,887	,735	,759	,769	,719	,798	,808	,732	,761
Skewness		-,260	-,455	-,369	,168	,246	,106	-,095	,411	-,174	,271	,541
Std. Error of Skewness		,263	,263	,264	,263	,263	,263	,263	,263	,263	,263	,263
Kurtosis		,787	,312	,228	-,193	-,172	1,429	-,290	-,329	,178	-,374	-,010
Std. Error of Kurtosis		,520	,520	,523	,520	,520	,520	,520	,520	,520	,520	,520
Minimum		1	1	1	2	2	1	2	2	1	2	2
Maximum		5	5	5	5	5	5	5	5	5	5	5
Sum		257	275	286	290	284	276	320	291	286	301	285

Supplier engagement in sustainability

Supplier involvement in sustainable practices remains inconsistent across firms. A majority of respondents remain neutral on actively engaging suppliers in product development (57.1%, Table 83) and informing them of organizational changes (42.9%, Table 84), indicating that supplier engagement in sustainability is still underdeveloped.

However, providing customers with sustainability-related information appears to be more established, with 39.8% of organizations agreeing that they inform customers about sustainability-related purchasing decisions (Table 85). This suggests that firms are prioritizing external transparency over internal supply chain sustainability integration.

Table 83: Frequency distribution of supplier involvement in new product development

Involvement of suppliers in new product development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,6	3,6	3,6
	Disagree	12	14,3	14,3	17,9
	Neither Agree nor Disagree	48	57,1	57,1	75,0
	Agree	19	22,6	22,6	97,6
	Strongly Agree	2	2,4	2,4	100,0
	Total	84	100,0	100,0	

Table 84: Frequency distribution of informing suppliers about organizational changes

Informing suppliers of organizational changes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,6	3,6	3,6
	Disagree	10	11,9	11,9	15,5
	Neither Agree nor Disagree	36	42,9	42,9	58,3
	Agree	31	36,9	36,9	95,2
	Strongly Agree	4	4,8	4,8	100,0
	Total	84	100,0	100,0	

Table 85: Frequency distribution of providing information to customers

Providing information to customers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	8	9,5	9,6	12,0
	Neither Agree nor Disagree	32	38,1	38,6	50,6
	Agree	33	39,3	39,8	90,4
	Strongly Agree	8	9,5	9,6	100,0
	Total	83	98,8	100,0	
Missing	System	1	1,2		
Total		84	100,0		

Financial performance and profitability

Financial performance shows a mixed trend. While 47.6% of respondents neither agree nor disagree that their net profit margin has increased, a combined 45.2% agree or strongly agree that their profitability has improved over time (Table 86). This suggests that sustainability initiatives may be positively correlated with financial resilience, though the effect is not uniformly perceived across firms. Profitability growth remains uncertain in comparison to competitors, with 61.9% of firms responding neutrally (Table 88). This finding indicates that while sustainability may contribute to financial performance, it is not necessarily translating into a distinct competitive advantage in profitability.

Table 86: Frequency distribution of Increase in net profit margin

Increase in net profit margin

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	7,1	7,1	7,1
	Neither Agree nor Disagree	40	47,6	47,6	54,8
	Agree	32	38,1	38,1	92,9
	Strongly Agree	6	7,1	7,1	100,0
	Total	84	100,0	100,0	

Table 87: Frequency distribution of outstanding profitability growth

Outstanding profitability growth

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	8	9,5	9,5	9,5
	Neither Agree nor Disagree	42	50,0	50,0	59,5
	Agree	28	33,3	33,3	92,9
	Strongly Agree	6	7,1	7,1	100,0
	Total	84	100,0	100,0	

Table 88: Frequency distribution of profitability compared to competitors

Profitability compared to competitors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	4	4,8	4,8	7,1
	Neither Agree nor Disagree	52	61,9	61,9	69,0
	Agree	20	23,8	23,8	92,9
	Strongly Agree	6	7,1	7,1	100,0
	Total	84	100,0	100,0	

Competitive advantage and market presence

One of the strongest indicators of sustainability-driven competitive advantage is "Improvement in Company Image", where 52.4% of firms agree and 15.5% strongly agree that their company image has improved due to sustainability initiatives (Table 89). This highlights the importance of sustainability as a reputational asset.

However, other competitive advantage factors, such as customer satisfaction (51.2% neutral, Table 90) and employee satisfaction (44.0% neutral, Table 91), reveal that the perceived benefits of sustainability in workforce and customer engagement are still not fully realized.

Market resilience appears to be more pronounced, with 40.5% of firms agreeing that they maintained a strong presence during crises (Table 92), reinforcing the role of sustainability in long-term business stability. However, sales growth compared to competitors remains inconclusive, with 56.0% of firms remaining neutral (Table 93), suggesting that while sustainability contributes to resilience and brand image, it does not always directly translate into revenue growth.

Table 89: Frequency distribution of improvement in company image

Improvement in company image

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	2,4	2,4	2,4
	Neither Agree nor Disagree	25	29,8	29,8	32,1
	Agree	44	52,4	52,4	84,5
	Strongly Agree	13	15,5	15,5	100,0
	Total	84	100,0	100,0	

Table 90: Frequency distribution of customer satisfaction compared to competitors

Customer satisfaction compared to competitors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	7,1	7,1	7,1
	Neither Agree nor Disagree	43	51,2	51,2	58,3
	Agree	25	29,8	29,8	88,1
	Strongly Agree	10	11,9	11,9	100,0
	Total	84	100,0	100,0	

Table 91: Frequency distribution of employee satisfaction compared to competitors

Employee satisfaction compared to competitors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1,2	1,2	1,2
	Disagree	8	9,5	9,5	10,7
	Neither Agree nor Disagree	37	44,0	44,0	54,8
	Agree	32	38,1	38,1	92,9
	Strongly Agree	6	7,1	7,1	100,0
	Total	84	100,0	100,0	

Table 92: Frequency distribution of market presence during crisis

Market presence during crisis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	3,6	3,6	3,6
	Neither Agree nor Disagree	38	45,2	45,2	48,8
	Agree	34	40,5	40,5	89,3
	Strongly Agree	9	10,7	10,7	100,0
	Total	84	100,0	100,0	

Table 93: Frequency distribution of sales increase compared to competitors

Sales increase compared to competitors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	7,1	7,1	7,1
	Neither Agree nor Disagree	47	56,0	56,0	63,1
	Agree	23	27,4	27,4	90,5
	Strongly Agree	8	9,5	9,5	100,0
	Total	84	100,0	100,0	

The findings indicate that while sustainability practices contribute positively to company reputation and resilience, their direct impact on financial performance and competitive positioning remains uncertain. Organizations may benefit from more structured supplier engagement strategies, employee sustainability initiatives, and customer-focused green marketing to enhance the tangible economic benefits of sustainability.

Reliability testing (Cronbach's Alpha)

A Cronbach's Alpha reliability test was conducted to evaluate the internal consistency of the sustainable performance scale. The Case Processing Summary confirms that 83 out of 84 cases (98.8%) were included, with only one case (1.2%) excluded due to missing values, ensuring a nearly complete dataset. The Cronbach's Alpha coefficient of 0.864 (Table 94) indicates high reliability, demonstrating that the sustainable performance scale effectively measures organizational sustainability across the Economic Pillar (EP), Sustainable Business Performance (SBP), and Sustainable Competitive Advantage (SCA). The strong α-value (>0.8) confirms that the 11 items—supplier involvement, financial performance, customer and employee satisfaction, and market resilience—are highly interrelated, ensuring consistency in assessing corporate sustainability efforts. No item removal is required, validating the scale's suitability for further statistical analyses.

Table 94: Reliability statistics for sustainable performance variables

Case Processing Summary

		N	%
Cases	Valid	83	98,8
	Excluded[a]	1	1,2
	Total	84	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,864	11

Correlation analysis

A Pearson correlation analysis was conducted to examine the relationships between Economic Pillar (EP), Sustainable Business Performance (SBP), and Sustainable Competitive Advantage (SCA). The results, (Table 95), indicate the following:

- **EP and SBP**: The correlation between EP and SBP is r = 0.126, with p = 0.255, indicating a weak and non-significant relationship. This suggests that economic engagement with suppliers and customers does not strongly predict sustainable business performance.
- **EP and SCA**: The correlation between EP and SCA is r = 0.159, with p = 0.150, which also suggests a weak and statistically non-significant relationship. This implies that supplier and customer engagement practices do not directly contribute to achieving a competitive advantage.

- **SBP and SCA**: A strong positive correlation was found between SBP and SCA ($r = 0.711$, $p < 0.001$), indicating that firms with strong sustainable business performance are more likely to maintain a competitive advantage. This result highlights the importance of financial sustainability in establishing a resilient market position.

To sum up, while the Economic Pillar (EP) does not show a direct significant correlation with business performance or competitive advantage, the strong relationship between SBP and SCA suggests that profitability and financial success play a crucial role in sustaining competitive positioning in the market.

Table 95: Pearson correlation matrix for Economic Pillar (EP), Sustainable Business Performance (SBP), and Sustainable Competitive Advantage (SCA)

Correlations

		EP	SBP	SCA
EP	Pearson Correlation	1	,126	,159
	Sig. (2-tailed)		,255	,150
	N	83	83	83
SBP	Pearson Correlation	,126	1	,711**
	Sig. (2-tailed)	,255		,000
	N	83	84	84
SCA	Pearson Correlation	,159	,711**	1
	Sig. (2-tailed)	,150	,000	
	N	83	84	84

**. Correlation is significant at the 0.01 level (2-tailed).

Multiple regression analysis

The multiple regression analysis evaluates the impact of the Economic Pillar (EP) and Sustainable Competitive Advantage (SCA) on Sustainable Business Performance (SBP).

Table 96 presents the model summary, showing an R-value of 0.710, indicating a strong positive correlation between the independent variables (EP and SCA) and SBP. The R-Square value (0.505) suggests that 50.5% of the variance in SBP is explained by EP and SCA. The Adjusted R-Square (0.492) accounts for sample size and number of predictors, confirming the model's robustness. The F-statistic (40.776, $p < 0.001$) indicates that the model is statistically significant.

Table 96: Model summary for regression analysis of SBP with EP and SCA

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,710[a]	,505	,492	,49149	,505	40,776	2	80	,000

a. Predictors: (Constant), SCA, EP

The ANOVA table (Table 97) shows that the regression model is significant ($p < 0.001$), confirming that EP and SCA collectively have a meaningful effect on SBP. The high F-value (40.776) supports the model's explanatory power, indicating a strong relationship.

Table 97: ANOVA results for sbp regression model

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19,700	2	9,850	40,776	,000[a]
	Residual	19,325	80	,242		
	Total	39,025	82			

a. Predictors: (Constant), SCA, EP

b. Dependent Variable: SBP

Table 98 presents the regression coefficients, providing insights into the individual effects of EP and SCA:

- SCA ($\beta = 0.769$, $p < 0.001$) has a strong and statistically significant positive impact on SBP. This suggests that organizations with a stronger competitive advantage experience higher sustainable business performance.
- EP ($\beta = 0.013$, $p = 0.867$) has a non-significant effect on SBP, indicating that economic engagement with suppliers and stakeholders does not directly contribute to performance in a statistically meaningful way.

Table 98: Regression coefficients for SBP as dependent variable

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	,610	,365		1,674	,098	-,115	1,336
	EP	,013	,076	,013	,169	,867	-,138	,163
	SCA	,769	,087	,708	8,887	,000	,597	,941

a. Dependent Variable: SBP

Figure 35 provides a visual representation of the relationships between EP, SBP, and SCA. The positive trend between SCA and SBP further supports the regression findings, confirming the strong relationship between sustainable competitive advantage and business performance.

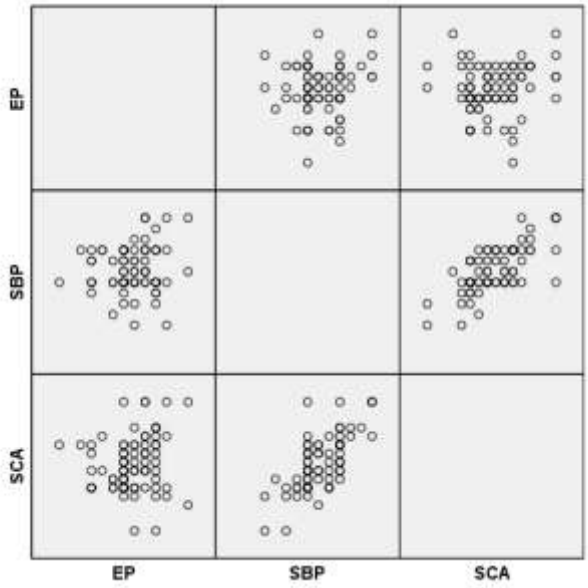


Figure 35: Scatterplot Matrix of EP, SBP, and SCA Variables

The regression analysis confirms that SCA is a critical factor for achieving SBP, while EP does not significantly contribute. Organizations aiming to enhance sustainable business performance should prioritize competitive strategies, such as improving brand perception, employee engagement, and customer satisfaction, rather than solely focusing on economic partnerships.

ANOVA

A one-way ANOVA was conducted to examine whether firm size significantly influences perceptions of the Economic Pillar (EP), Sustainable Business Performance (SBP), and Sustainable Competitive Advantage (SCA).Homogeneity of variances was first confirmed using Levene's test (Table 100), with all p-values above 0.05 (EP: p = .177, SBP: p = .335, SCA: p = .506), indicating that the assumption of equal variances across groups holds.

Economic Pillar (EP)

As shown in Table 101, the ANOVA did not reveal a statistically significant difference in EP across firm sizes (F = 1.296, p = .282). The Tukey HSD post hoc test (Table 102) confirms that no pairwise differences are statistically significant. Although larger firms (>250 employees) reported slightly higher EP scores (M = 3.34), the differences across groups remain nonsignificant, suggesting that economic sustainability practices are somewhat consistent regardless of firm size.

Sustainable Business Performance (SBP)

A significant difference in SBP was found across firm sizes (F = 3.732, p = .014; Table 148). Tukey's post hoc comparison (Table 102) identified a significant difference between mid-sized firms (51–250 employees, M = 3.00) and large firms (250+ employees, M = 3.50; p = .027), indicating that larger firms report better sustainable business performance. This suggests that scale may facilitate more efficient or impactful sustainability practices, potentially due to resource availability or institutional capacity.

Sustainable Competitive Advantage (SCA):

The ANOVA showed a marginally non-significant result for SCA across firm sizes (F = 2.301, p = .084; Table 101). However, the trend in mean values (Table 99) shows that firms with 11–50 employees reported the highest SCA (M = 3.86), while micro firms (1–10 employees) reported the lowest (M = 3.20). While the differences did not reach statistical significance, the observed trend indicates that both small and large firms may perceive greater competitive advantages through sustainability efforts than very small or mid-sized firms.

Table 99: Descriptive Statistics for Economic Pillar (EP), Sustainable Business Performance (SBP), and Sustainable Competitive Advantage (SCA) by Firm Size

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
EP	1-10 employees	5	2,7333	,68313	,30551	1,8851	3,5816	2,00	3,33
	11-50 employees	7	3,0476	1,26825	,47935	1,8747	4,2206	1,00	5,00
	51-250 employees	19	3,2632	,72503	,16633	2,9137	3,6126	2,00	5,00
	250+ employees	52	3,3397	,63139	,08756	3,1640	3,5155	1,67	4,33
	Total	83	3,2610	,72704	,07980	3,1023	3,4198	1,00	5,00
SBP	1-10 employees	5	3,0000	,84984	,38006	1,9448	4,0552	1,67	4,00
	11-50 employees	7	3,6667	,86066	,32530	2,8707	4,4626	3,00	5,00
	51-250 employees	19	3,0000	,66667	,15294	2,6787	3,3213	1,67	4,00
	250+ employees	53	3,5031	,60843	,08357	3,3354	3,6708	2,33	5,00
	Total	84	3,3730	,68919	,07520	3,2235	3,5226	1,67	5,00
SCA	1-10 employees	5	3,2000	,83666	,37417	2,1611	4,2389	2,00	4,00
	11-50 employees	7	3,8571	,75467	,28524	3,1592	4,5551	3,00	5,00
	51-250 employees	19	3,2947	,49607	,11381	3,0556	3,5338	2,60	4,20
	250+ employees	53	3,6038	,61830	,08493	3,4333	3,7742	2,00	5,00
	Total	84	3,5310	,63207	,06896	3,3938	3,6681	2,00	5,00

Table 100: Test of Homogeneity of Variances for EP, SBP, and SCA

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
EP	1,685	3	79	,177
SBP	1,148	3	80	,335
SCA	,784	3	80	,506

Table 101: One-Way ANOVA Results for EP, SBP, and SCA Across Firm Size

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
EP	Between Groups	2,033	3	,678	1,296	,282
	Within Groups	41,311	79	,523		
	Total	43,344	82			
SBP	Between Groups	4,840	3	1,613	3,732	,014
	Within Groups	34,583	80	,432		
	Total	39,423	83			
SCA	Between Groups	2,634	3	,878	2,301	,084
	Within Groups	30,526	80	,382		
	Total	33,160	83			

Table 102: Post Hoc Multiple Comparisons (Tukey HSD) for EP, SBP, and SCA across firm size

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) Number of employee	(J) Number of employee	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
EP	1-10 employees	11-50 employees	-,31429	,42342	,880	-1,4256	,7970
		51-250 employees	-,52982	,36346	,468	-1,4838	,4241
		250+ employees	-,60641	,33859	,285	-1,4951	,2822
	11-50 employees	1-10 employees	,31429	,42342	,880	-,7970	1,4256
		51-250 employees	-,21554	,31973	,907	-1,0547	,6236
		250+ employees	-,29212	,29113	,748	-1,0562	,4720
	51-250 employees	1-10 employees	,52982	,36346	,468	-,4241	1,4838
		11-50 employees	,21554	,31973	,907	-,6236	1,0547
		250+ employees	-,07659	,19385	,979	-,5854	,4322
	250+ employees	1-10 employees	,60641	,33859	,285	-,2822	1,4951
		11-50 employees	,29212	,29113	,748	-,4720	1,0562
		51-250 employees	,07659	,19385	,979	-,4322	,5854
SBP	1-10 employees	11-50 employees	-,66667	,38498	,314	-1,6768	,3435
		51-250 employees	,00000	,33047	1,000	-,8671	,8671
		250+ employees	-,50314	,30759	,365	-1,3102	,3039
	11-50 employees	1-10 employees	,66667	,38498	,314	-,3435	1,6768
		51-250 employees	,66667	,29070	,108	-,0961	1,4294
		250+ employees	,16352	,26441	,926	-,5302	,8573

		51-250 employees	1-10 employees	,00000	,33047	1,000	-,8671	,8671
			11-50 employees	-,66667	,29070	,108	-1,4294	,0961
			250+ employees	-,50314*	,17581	,027	-,9644	-,0419
		250+ employees	1-10 employees	,50314	,30759	,365	-,3039	1,3102
			11-50 employees	-,16352	,26441	,926	-,8573	,5302
			51-250 employees	,50314*	,17581	,027	,0419	,9644
	SCA	1-10 employees	11-50 employees	-,65714	,36170	,273	-1,6062	,2919
			51-250 employees	-,09474	,31048	,990	-,9094	,7199
			250+ employees	-,40377	,28899	,505	-1,1620	,3545
		11-50 employees	1-10 employees	,65714	,36170	,273	-,2919	1,6062
			51-250 employees	,56241	,27312	,176	-,1542	1,2790
			250+ employees	,25337	,24841	,738	-,3984	,9052
		51-250 employees	1-10 employees	,09474	,31048	,990	-,7199	,9094
			11-50 employees	-,56241	,27312	,176	-1,2790	,1542
			250+ employees	-,30904	,16517	,249	-,7424	,1244
		250+ employees	1-10 employees	,40377	,28899	,505	-,3545	1,1620
			11-50 employees	-,25337	,24841	,738	-,9052	,3984
			51-250 employees	,30904	,16517	,249	-,1244	,7424

*. The mean difference is significant at the 0.05 level.

Table 103: Tukey HSD Homogeneous Subsets for Economic Pillar (EP) by company size

EP

Tukey HSD[a,b]

Number of employee	N	Subset for alpha = 0.05
		1
1-10 employees	5	2,7333
11-50 employees	7	3,0476
51-250 employees	19	3,2632
250+ employees	52	3,3397
Sig.		,262

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,645.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 104: Tukey HSD Homogeneous Subsets for Sustainable Business Performance (SBP) by company size

SBP

Tukey HSD[a,b]

Number of employee	N	Subset for alpha = 0.05
		1
51-250 employees	19	3,0000
1-10 employees	5	3,0000
250+ employees	53	3,5031
11-50 employees	7	3,6667
Sig.		,125

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,654.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 105: Tukey HSD Homogeneous Subsets for Sustainable Competitive Advantage (SCA) by company size

SCA

Tukey HSD[a,b]

Number of employee	N	Subset for alpha = 0.05
		1
1-10 employees	5	3,2000
51-250 employees	19	3,2947
250+ employees	53	3,6038
11-50 employees	7	3,8571
Sig.		,098

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,654.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

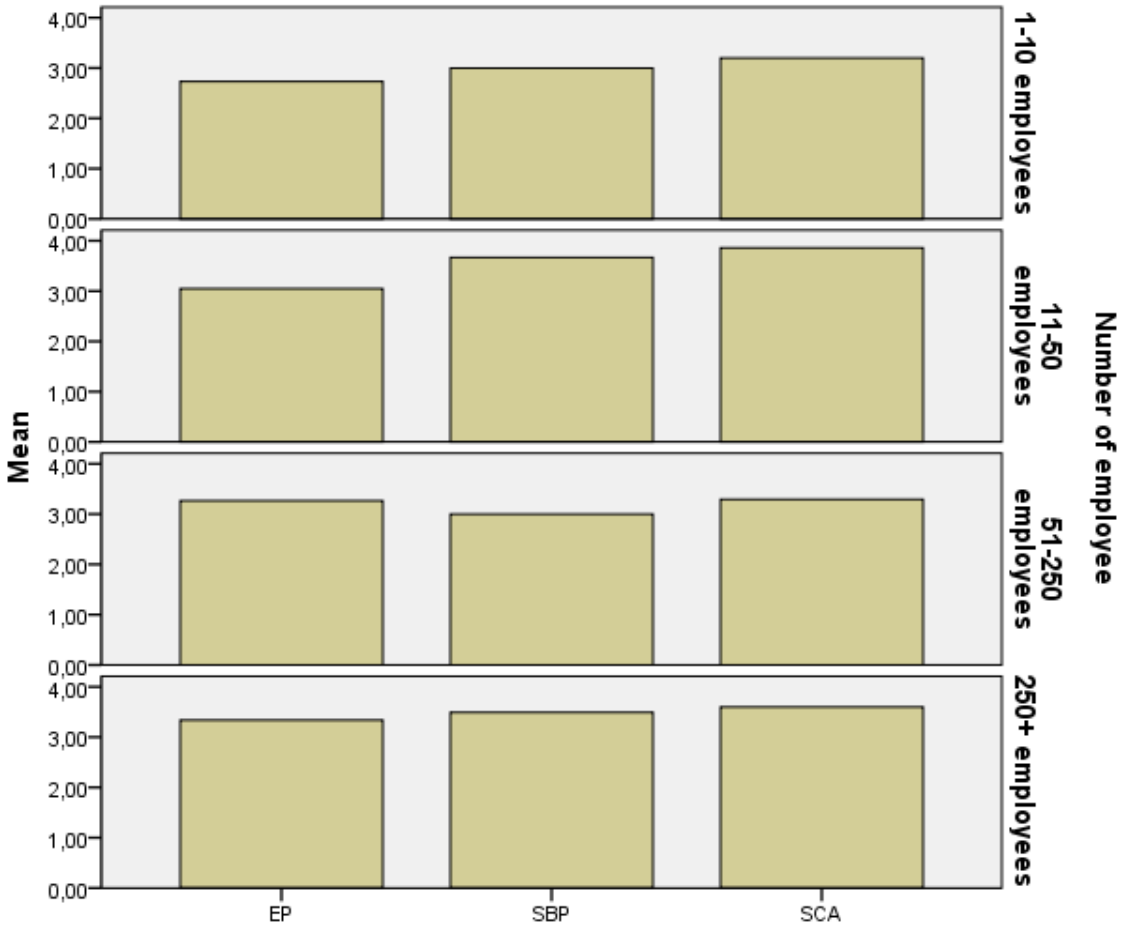


Figure 36: Mean Scores of EP, SBP, and SCA by Firm Size

To conclude, the visual comparison of mean scores for the Economic Pillar (EP), Sustainable Business Performance (SBP), and Sustainable Competitive Advantage (SCA) across different firm sizes reveals that larger organizations tend to perceive greater benefits from sustainability practices particularly in terms of business performance. However, differences in EP and SCA remain statistically insignificant, indicating that firm size alone may not fully account for variations in sustainability outcomes. These findings suggest that while scale can enhance the implementation of sustainable practices, other contextual factors such as industry type, leadership commitment, and strategic orientation play an important role and warrant further investigation.

Key findings

The findings underscore the relationship between sustainable practices and firm performance across different organizational sizes. Although larger firms generally report higher mean scores in Sustainable Business Performance (SBP) and Sustainable Competitive Advantage (SCA), the effect of

firm size on Economic Pillar (EP) practices was not statistically significant. This indicates that while organizational scale may enhance resource availability and institutional capacity for sustainability implementation, it does not uniformly influence all dimensions of sustainable performance.

From a theoretical standpoint, the results resonate with the Triple Bottom Line (TBL) framework, which posits that economic, social, and environmental considerations must be integrated to achieve true sustainability (Elkington, 1997). However, this analysis found only a moderate correlation between EP and SCA, and a stronger, statistically significant correlation between SBP and SCA ($r = 0.711$, $p < 0.001$), suggesting that financial performance acts as a more direct enabler of competitive advantage than economic sustainability actions like supplier engagement alone.

These findings align with Bafas et al. (2023), who concluded that Greek businesses perceive sustainability primarily as a means of reputational enhancement and financial stability, rather than as an integrated strategy across all TBL dimensions. Their study also found moderate correlations between the economic/social pillars and competitive advantage but noted inconsistent engagement with structured sustainability frameworks.

In particular, the weak or non-significant relationship between EP and SBP/SCA suggests that economic engagement, such as supply chain collaboration, may require supportive contextual factors—such as strategic orientation, leadership commitment, or industry dynamics—to translate into measurable performance gains. This is consistent with research emphasizing the need for organizational integration and alignment of sustainability with broader strategic goals (Porter & Kramer, 2011; Bafas et al., 2023).

The lack of statistically significant differences in EP and SCA across firm sizes further supports the idea that scale alone is not a sufficient condition for sustainability success. Instead, internal capabilities, market responsiveness, and external stakeholder pressures may serve as mediators. Smaller firms, for instance, may achieve competitive advantage through agility and niche positioning, while larger firms benefit from structured policies and economies of scale.

In conclusion, while larger firms demonstrate relatively higher sustainable performance especially in SBP, this advantage is not solely attributable to size. Effective sustainability strategies require a multidimensional approach grounded in the TBL framework, with a particular focus on strengthening the link between sustainability initiatives and strategic outcomes. Future research should explore how variables such as industry sector, innovation capacity, and leadership mindset moderate the relationship between sustainable practices and competitive advantage.

5.1.5 Enterprise ESG performance

To evaluate the extent of ESG (Environmental, Social, and Governance) integration within organizations, a comprehensive statistical analysis was conducted. The purpose was to assess the internal consistency of the ESG measurement scale, uncover patterns of ESG adoption, and examine the distribution of responses across key ESG dimensions. Descriptive statistics, reliability testing using

Cronbach's Alpha, and correlation analysis were employed to offer valuable insights into how companies operationalize ESG principles in practice.

Descriptive statistics

The descriptive statistics reveal a generally high level of ESG engagement across organizations. The highest mean is observed for Commitment to ethics and anti-corruption (M = 4.30, SD = 0.889), followed closely by Employee safety and development (M = 4.23, SD = 0.910) and Risk management and data security (M = 4.04, SD = 0.950), indicating strong organizational emphasis on ethical conduct, employee welfare, and operational resilience. Conversely, the lowest mean is seen in Department for pollution management (M = 3.19, SD = 1.285), suggesting that not all firms have formal environmental management structures.

Table 106: Descriptive statistics for enterprise ESG performance indicators

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Presence of environmental or CSR report	84	1	5	3,71	1,048
Stakeholder involvement in environmental policy	84	1	5	3,71	,913
Department for pollution management	84	1	5	3,19	1,285
ISO 14001 implementation	84	1	5	3,68	1,153
Information on environmental audits	84	1	5	3,62	1,140
Disclosure of resource use and emissions	84	1	5	3,51	1,103
Employee safety and development	84	1	5	4,23	,910
Product quality and responsibility	84	1	5	3,86	1,020
Risk management and data security	84	1	5	4,04	,950
Commitment to social contributions	84	1	5	4,01	,988
Shareholder rights and governance stability	84	1	5	3,89	,932
Information disclosure and transparency	84	1	5	3,92	1,078
Commitment to ethics and anti-corruption	84	1	5	4,30	,889
Valid N (listwise)	84				

To further investigate the distribution of responses, frequency analysis was conducted for each ESG variable.

Environmental performance

A substantial portion of organizations report adopting formal environmental strategies. For example, 65.5% of respondents agreed or strongly agreed that their company publishes an Environmental or CSR report (Table 107), suggesting a strong emphasis on transparency. Similarly, 65.5% indicated stakeholder involvement in environmental policy decisions (Table 108), highlighting participatory governance in environmental planning.

However, gaps remain in operational structure. Only 47.6% of firms agreed or strongly agreed they have a dedicated department or senior position for pollution management (Table 109), indicating room for improvement in organizational accountability for environmental impact. ISO 14001 implementation showed promising adoption, with 54.8% of companies affirming alignment with this international standard (Table 110).

In addition, practices like disclosure of resource use and emissions received more mixed responses—only 53.5% of firms agreed or strongly agreed they engage in such disclosures (Table 112), signaling inconsistency in environmental reporting standards across firms.

Social performance

Social responsibility indicators demonstrate strong commitment. 84.5% of respondents agreed or strongly agreed their company prioritizes employee safety, motivation, and development (Table 113), making it one of the most widely accepted ESG practices. Similar patterns were observed for product quality and responsibility (66.7% agreement, Table 114) and risk management and data security (76.2% agreement, Table 115).

Encouragingly, commitment to social contributions, such as community services and employment, also scored high, with 78.5% of firms affirming such involvement (Table 116), aligning with broader ESG frameworks that emphasize stakeholder engagement and societal value creation.

Governance performance

Corporate governance practices also appear to be well-embedded. For instance, 73.8% of firms reported attention to shareholder rights and governance stability (Table 117), and 69.0% supported transparency in information disclosure (Table 118). The strongest governance-related consensus was found in ethics and anti-corruption, with 85.7% of organizations agreeing or strongly agreeing with the statement (Table 119). This indicates a clear commitment to ethical business conduct and regulatory compliance.

Table 107: Frequency distribution of presence of environmental or CSR Report

Presence of environmental or CSR report

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	11	13,1	13,1	15,5
	Neither Agree nor Disagree	16	19,0	19,0	34,5
	Agree	35	41,7	41,7	76,2
	Strongly Agree	20	23,8	23,8	100,0
	Total	84	100,0	100,0	

Table 108: Frequency distribution of stakeholder involvement in environmental policy

Stakeholder involvement in environmental policy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,6	3,6	3,6
	Disagree	3	3,6	3,6	7,1
	Neither Agree nor Disagree	23	27,4	27,4	34,5
	Agree	41	48,8	48,8	83,3
	Strongly Agree	14	16,7	16,7	100,0
	Total	84	100,0	100,0	

Table 109: Frequency distribution of department for pollution management

Department for pollution management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	12	14,3	14,3	14,3
	Disagree	13	15,5	15,5	29,8
	Neither Agree nor Disagree	19	22,6	22,6	52,4
	Agree	27	32,1	32,1	84,5
	Strongly Agree	13	15,5	15,5	100,0
	Total	84	100,0	100,0	

Table 110: Frequency distribution of ISO 14001 implementation

ISO 14001 implementation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6,0	6,0	6,0
	Disagree	5	6,0	6,0	11,9
	Neither Agree nor Disagree	28	33,3	33,3	45,2
	Agree	20	23,8	23,8	69,0
	Strongly Agree	26	31,0	31,0	100,0
	Total	84	100,0	100,0	

Table 111: Frequency distribution of information on environmental audits

Information on environmental audits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	7,1	7,1	7,1
	Disagree	7	8,3	8,3	15,5
	Neither Agree nor Disagree	19	22,6	22,6	38,1
	Agree	33	39,3	39,3	77,4
	Strongly Agree	19	22,6	22,6	100,0
	Total	84	100,0	100,0	

Table 112: Frequency distribution of disclosure of resource use and emissions

Disclosure of resource use and emissions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	7,1	7,1	7,1
	Disagree	6	7,1	7,1	14,3
	Neither Agree nor Disagree	27	32,1	32,1	46,4
	Agree	29	34,5	34,5	81,0
	Strongly Agree	16	19,0	19,0	100,0
	Total	84	100,0	100,0	

Table 113: Frequency distribution of employee safety and development

Employee safety and development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	2	2,4	2,4	4,8
	Neither Agree nor Disagree	9	10,7	10,7	15,5
	Agree	33	39,3	39,3	54,8
	Strongly Agree	38	45,2	45,2	100,0
	Total	84	100,0	100,0	

Table 114: Frequency distribution of product quality and responsibility

Product quality and responsibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	6	7,1	7,1	9,5
	Neither Agree nor Disagree	20	23,8	23,8	33,3
	Agree	30	35,7	35,7	69,0
	Strongly Agree	26	31,0	31,0	100,0
	Total	84	100,0	100,0	

Table 115: Frequency distribution of risk management and data security

Risk management and data security

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	3	3,6	3,6	6,0
	Neither Agree nor Disagree	15	17,9	17,9	23,8
	Agree	34	40,5	40,5	64,3
	Strongly Agree	30	35,7	35,7	100,0
	Total	84	100,0	100,0	

Table 116: Frequency distribution of commitment to social contributions

Commitment to social contributions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	4,8	4,8	4,8
	Disagree	1	1,2	1,2	6,0
	Neither Agree nor Disagree	13	15,5	15,5	21,4
	Agree	38	45,2	45,2	66,7
	Strongly Agree	28	33,3	33,3	100,0
	Total	84	100,0	100,0	

Table 117: Frequency distribution of shareholder rights and governance stability

Shareholder rights and governance stability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,6	3,6	3,6
	Disagree	2	2,4	2,4	6,0
	Neither Agree nor Disagree	17	20,2	20,2	26,2
	Agree	41	48,8	48,8	75,0
	Strongly Agree	21	25,0	25,0	100,0
	Total	84	100,0	100,0	

Table 118: Frequency distribution of information disclosure and transparency

Information disclosure and transparency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	4,8	4,8	4,8
	Disagree	3	3,6	3,6	8,3
	Neither Agree nor Disagree	19	22,6	22,6	31,0
	Agree	28	33,3	33,3	64,3
	Strongly Agree	30	35,7	35,7	100,0
	Total	84	100,0	100,0	

Table 119: Frequency distribution of commitment to ethics and anti-corruption

Commitment to ethics and anti-corruption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	1	1,2	1,2	3,6
	Neither Agree nor Disagree	9	10,7	10,7	14,3
	Agree	30	35,7	35,7	50,0
	Strongly Agree	42	50,0	50,0	100,0
	Total	84	100,0	100,0	

The frequency data reveal that enterprises are actively integrating ESG principles, particularly in the social and governance domains. While environmental practices are also broadly adopted, areas such as pollution management structures and emissions disclosure warrant further attention. In conclusion, the responses suggest a positive ESG trajectory, but with identifiable gaps that call for stronger operationalization and standardization of environmental practice.

Reliability analysis (Cronbach's Alpha)

To assess the internal consistency of the ESG performance scale, a Cronbach's Alpha reliability test was conducted. As shown in Table 120, all 84 cases were included with no missing values, ensuring complete data for analysis. The Cronbach's Alpha value was 0.929, indicating excellent internal consistency across the 13 ESG performance indicators. According to Nunnally and Bernstein (1994), a reliability coefficient above 0.9 is considered highly reliable, suggesting that the items consistently measure the underlying construct of ESG performance. This result confirms that the scale is statistically robust and suitable for further analyses such as correlation, factor analysis, or regression.

Table 120: Reliability statistics for ESG performance variables

Case Processing Summary

		N	%
Cases	Valid	84	100,0
	Excluded[a]	0	,0
	Total	84	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,929	13

Correlation analysis

The correlation matrix (Appendix D) reveals a strong and statistically significant interrelationship among the 13 ESG performance indicators. Most variables show positive and significant correlations at the 0.01 level, indicating that companies with high performance in one ESG area are likely to perform well in others.

- Information on environmental audits is strongly correlated with ISO 14001 implementation ($r = 0.694$, $p < 0.01$) and disclosure of resource use and emissions ($r = 0.732$, $p < 0.01$), suggesting that firms engaging in formal environmental standards are also more transparent in reporting.
- Employee safety and development is highly correlated with risk management and data security ($r = 0.785$, $p < 0.01$) and commitment to ethics and anti-corruption ($r = 0.780$, $p < 0.01$), reflecting that a strong internal social performance often aligns with ethical governance practices.
- Commitment to social contributions and shareholder rights and governance stability also show a very high correlation ($r = 0.852$, $p < 0.01$), indicating that socially responsible firms are also likely to maintain sound governance structures.

These findings support the theoretical argument that ESG dimensions are not isolated efforts but mutually reinforcing components of a broader corporate sustainability strategy. The high internal consistency among variables further validates the reliability of the ESG construct, as supported by the previously reported Cronbach's Alpha ($\alpha = 0.929$).

Factor analysis

To explore the underlying structure of the 13 ESG performance indicators, Principal Component Analysis (PCA) with Varimax rotation was applied. The analysis aimed to reduce data dimensionality and identify latent constructs that explain variance in ESG practices across organizations.

As shown in Table 121, the communalities after extraction ranged from 0.520 (stakeholder involvement in environmental policy) to 0.805 (commitment to social contributions), indicating that most variables are well-represented by the extracted components. High communalities suggest that a substantial proportion of each variable's variance is captured by the factor solution.

The Kaiser criterion (eigenvalues > 1) and Scree Plot (Figure 37) both support a two-factor solution. The first two components account for 69.92% of the total variance (Table 122), with the first component explaining 38.00% and the second component 31.92% after rotation.

Table 121: Communalities of ESG performance indicators

Communalities

	Initial	Extraction
Presence of environmental or CSR report	1,000	,587
Stakeholder involvement in environmental policy	1,000	,520
Department for pollution management	1,000	,579
ISO 14001 implementation	1,000	,699
Information on environmental audits	1,000	,780
Disclosure of resource use and emissions	1,000	,616
Employee safety and development	1,000	,804
Product quality and responsibility	1,000	,732
Risk management and data security	1,000	,794
Commitment to social contributions	1,000	,805
Shareholder rights and governance stability	1,000	,779
Information disclosure and transparency	1,000	,610
Commitment to ethics and anti-corruption	1,000	,784

Extraction Method: Principal Component Analysis.

Table 122: Total variance explained by principal components

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7,276	55,972	55,972	7,276	55,972	55,972	4,940	38,001	38,001
2	1,813	13,943	69,915	1,813	13,943	69,915	4,149	31,915	69,915
3	,652	5,018	74,933						
4	,598	4,603	79,537						
5	,527	4,051	83,588						
6	,493	3,791	87,379						
7	,396	3,045	90,424						
8	,328	2,524	92,949						
9	,297	2,286	95,235						
10	,212	1,628	96,863						
11	,194	1,494	98,356						
12	,133	1,023	99,379						
13	,081	,621	100,000						

Extraction Method: Principal Component Analysis.

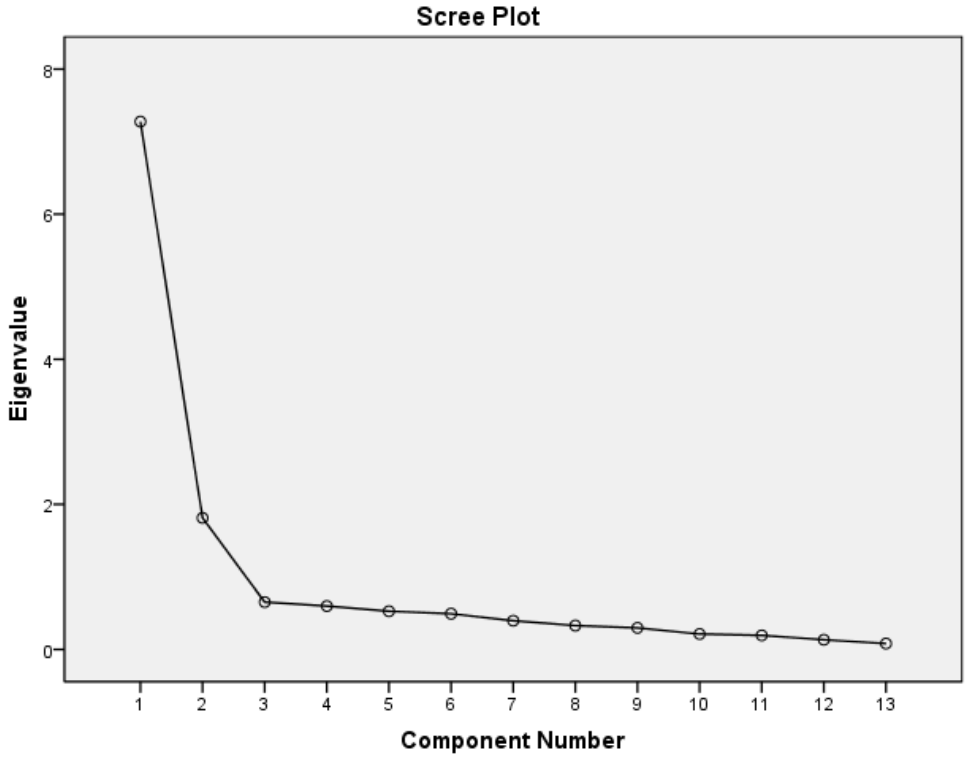


Figure 37: Scree Plot for ESG Performance Indicators

The unrotated component matrix (Table 123) showed strong primary loadings on most variables, but the Varimax rotation improved interpretability by clustering variables more clearly into two coherent factors.

Table 123: Component matrix before rotation

Component Matrix[a]

	Component	
	1	2
Presence of environmental or CSR report	,725	,249
Stakeholder involvement in environmental policy	,662	,285
Department for pollution management	,566	,508
ISO 14001 implementation	,636	,543
Information on environmental audits	,781	,412
Disclosure of resource use and emissions	,666	,414
Employee safety and development	,793	-,418
Product quality and responsibility	,851	,085
Risk management and data security	,836	-,307
Commitment to social contributions	,838	-,321
Shareholder rights and governance stability	,840	-,272
Information disclosure and transparency	,685	-,375
Commitment to ethics and anti-corruption	,777	-,425

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

The rotated component matrix in Table 124 reveals a clear two-factor structure:

- **Component 1** represents internal ESG orientation, heavily loading on variables related to employee well-being, governance ethics, social contributions, and risk management. High loadings are observed for:
  - ✓ Commitment to ethics and anti-corruption (0.865)

- ✓ Employee safety and development (0.874)
- ✓ Risk management and data security (0.834)
- ✓ Social contributions (0.844)
- ✓ Governance stability (0.813)

- **Component 2** reflects external and operational ESG practices, with strong loadings on indicators such as:
  - ✓ ISO 14001 implementation (0.827)
  - ✓ Information on environmental audits (0.823)
  - ✓ Department for pollution management (0.755)
  - ✓ Disclosure of resource use and emissions (0.749)

This distinction suggests that firms may approach ESG from two strategic angles: (1) enhancing internal operations and culture and (2) implementing formalized, externally visible environmental practices.

Table 124: Rotated Component Matrix (Varimax with Kaiser Normalization)

Rotated Component Matrix[a]

	Component	
	1	2
Presence of environmental or CSR report	,385	,662
Stakeholder involvement in environmental policy	,315	,649
Department for pollution management	,096	,755
ISO 14001 implementation	,126	,827
Information on environmental audits	,322	,823
Disclosure of resource use and emissions	,233	,749
Employee safety and development	,874	,202
Product quality and responsibility	,589	,621
Risk management and data security	,834	,314
Commitment to social contributions	,844	,305
Shareholder rights and gov-ernance stability	,813	,343
Information disclosure and transparency	,763	,164
Commitment to ethics and anti-corruption	,865	,186

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

The component transformation matrix (Table 125) shows the correlation between the original and rotated components, confirming that rotation redistributed the explained variance without altering the total variance.

Table 125: Component transformation matrix

Component Transformation Matrix

Component	1	2
1	,757	,654
2	-,654	,757

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

The factor analysis confirms that ESG performance in organizations is best explained by two distinct but related constructs: internal ethical and social governance practices and external, standards-driven environmental efforts**.** These findings can inform future ESG strategies by helping firms prioritize initiatives that align with their core strengths and reporting requirements.

One-Way ANOVA

A one-way ANOVA was conducted to determine whether ESG performance varies by company sector. The analysis showed no statistically significant difference in internal ESG scores across sectors ($F(18, 65) = 1.534$, $p = .107$), suggesting similar internal ESG engagement (e.g., ethics, employee care) across industries. However, external ESG performance showed a near-significant difference ($F(18, 65) = 1.715$, $p = .059$), indicating that some sectors may place more emphasis on outward-facing ESG practices, such as reporting, certifications, and stakeholder involvement.

Table 126: One-Way ANOVA Results for Internal and External ESG Scores Across Company Sectors

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Internal ESG	Between Groups	24,750	18	1,375	1,534	,107
	Within Groups	58,250	65	,896		
	Total	83,000	83			
External ESG	Between Groups	26,725	18	1,485	1,715	,059
	Within Groups	56,275	65	,866		
	Total	83,000	83			

The ANOVA results reveal that company size has a marginally non-significant effect on internal ESG scores ($F = 2.484$, $p = .067$), suggesting a possible variation in internal ESG practices (e.g., employee safety, ethics) across different firm sizes, though not statistically conclusive at the 0.05 level. In contrast, external ESG scores show a statistically significant difference by company size ($F = 4.589$, $p =$

.005). This indicates that larger companies may be more proactive or capable in implementing external ESG activities such as environmental reporting, stakeholder engagement, or public disclosures. These findings suggest that firm size plays a more critical role in shaping external ESG transparency and practices than internal ESG commitments. Further post hoc analysis could clarify which size groups differ significantly.

Table 127: One-Way ANOVA results for internal and external esg scores by company size

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Internal ESG	Between Groups	7,072	3	2,357	2,484	,067
	Within Groups	75,928	80	,949		
	Total	83,000	83			
External ESG	Between Groups	12,185	3	4,062	4,589	,005
	Within Groups	70,815	80	,885		
	Total	83,000	83			

To further explore the differences in ESG performance across company sizes, Tukey's Honest Significant Difference (HSD) post hoc test was conducted following the one-way ANOVA results. The goal was to identify which specific size groups differ significantly in their Internal and External ESG performance. For example:

- The mean difference between micro (1–10 employees) and large firms (250+ employees) was notable (MD = -0.98), but not statistically significant (p = .144).
- Similarly, comparisons between small (11–50) and large firms (MD = -0.63, p = .381) also failed to reach significance.

This indicates that internal ESG practices (such as ethical conduct, governance, or employee well-being) are relatively uniform across firm sizes, with no group showing a distinct advantage. While mean values suggest a trend of increasing internal ESG engagement with firm size, these differences are not strong enough to be statistically confirmed.

In contrast, external ESG performance shows statistically significant variation between some size groups:

- The most notable result is between small firms (11–50 employees) and large firms (250+ employees), with a significant mean difference of -1.14 (p = .017).
- Although differences between micro (1–10) and large firms approached significance (MD = -1.06, p = .083), it did not meet the conventional 0.05 threshold.

These results suggest that larger firms (250+ employees) are significantly more engaged in external ESG activitiessuch as environmental disclosures, stakeholder involvement, and external audits—compared to smaller-sized firms. This supports the notion that firm size enables more visible and formalized ESG commitments.

Table 128: Tukey HSD post hoc comparison of internal and external esg scores by company size

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) Number of employee	(J) Number of employee	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Internal ESG	1-10 employees	11-50 employees	-,35449991	,57044268	,925	-1,8512637	1,1422639
		51-250 employees	-,60722435	,48966518	,603	-1,8920390	,6775903
		250+ employees	-,98376278	,45577077	,144	-2,1796431	,2121175
	11-50 employees	1-10 employees	,35449991	,57044268	,925	-1,1422639	1,8512637
		51-250 employees	-,25272444	,43074105	,936	-1,3829302	,8774813
		250+ employees	-,62926287	,39178164	,381	-1,6572444	,3987187
	51-250 employees	1-10 employees	,60722435	,48966518	,603	-,6775903	1,8920390
		11-50 employees	,25272444	,43074105	,936	-,8774813	1,3829302
		250+ employees	-,37653843	,26049952	,475	-1,0600536	,3069768

	250+ employees	1-10 employees	,98376278	,45577077	,144	-,2121175	2,1796431
		11-50 employees	,62926287	,39178164	,381	-,3987187	1,6572444
		51-250 employees	,37653843	,26049952	,475	-,3069768	1,0600536
External ESG	1-10 employees	11-50 employees	,08008554	,55090131	,999	-1,3654043	1,5255754
		51-250 employees	-,76584035	,47289097	,374	-2,0066417	,4749610
		250+ employees	-1,06265482	,44015766	,083	-2,2175685	,0922588
	11-50 employees	1-10 employees	-,08008554	,55090131	,999	-1,5255754	1,3654043
		51-250 employees	-,84592588	,41598537	,184	-1,9374147	,2455630
		250+ employees	-1,14274036*	,37836057	,017	-2,1355069	-,1499738
	51-250 employees	1-10 employees	,76584035	,47289097	,374	-,4749610	2,0066417
		11-50 employees	,84592588	,41598537	,184	-,2455630	1,9374147
		250+ employees	-,29681448	,25157571	,641	-,9569148	,3632859

	250+ employees	1-10 employees	1,06265482	,44015766	,083	-,0922588	2,2175685
		11-50 employees	1,14274036*	,37836057	,017	,1499738	2,1355069
		51-250 employees	,29681448	,25157571	,641	-,3632859	,9569148

*. The mean difference is significant at the 0.05 level.

The homogeneous subsets reinforce this observation. Firms with 250+ employees form a distinct group with higher external ESG scores, while smaller firms cluster together with lower average performance. This pattern supports the idea that organizational scale enhances the capacity for transparent and externally visible ESG practices, likely due to better resources, formal structures, and regulatory pressures.

Table 129: Homogeneous subsets for internal esg scores by company size (tukey hsd)

Internal ESG

Tukey HSD[a,b]

Number of employee	N	Subset for alpha = 0.05
		1
1-10 employees	5	-,7875975
11-50 employees	7	-,4330976
51-250 employees	19	-,1803731
250+ employees	53	,1961653
Sig.		,127

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,654.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 130: Homogeneous subsets for external esg scores by company size (TUKEY HSD)

External ESG

Tukey HSD[a,b]

Number of employee	N	Subset for alpha = 0.05	
		1	2
11-50 employees	7	-,9171221	
1-10 employees	5	-,8370366	-,8370366
51-250 employees	19	-,0711962	-,0711962
250+ employees	53		,2256182
Sig.		,206	,071

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,654.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Regression analysis of Internal ESG Performance

A multiple linear regression analysis was conducted to examine the extent to which company size and sector predict Internal ESG performance, which includes factors such as employee welfare, ethics, and governance practices. As shown in Table 131, both predictors: number of employees and sector of company were included in the model using the enter method.

Table 131: Variables entered and removed in the regression model for internal ESG Performance

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Number of employee, Sector of company[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Internal ESG

The model summary (Table 132) indicates that the regression model explained approximately 8.5% of the variance in internal ESG performance ($R^2 = 0.085$), with an adjusted R^2 of 0.063, suggesting a modest explanatory power.The standard error of the estimate was 0.97, indicating the average deviation of observed values from the predicted scores. The ANOVA results in Table 133 show that the regression model is statistically significant ($F(2, 81) = 3.786$, $p = .027$), indicating that company size and sector together contribute meaningfully to the prediction of internal ESG performance.

Table 132: Model summary for multiple regression predicting internal ESG from company size and sector

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,292[a]	,085	,063	,96803694

a. Predictors: (Constant), Number of employee, Sector of company

Table 133: ANOVA results for regression model of internal ESG by company size and sector

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7,095	2	3,548	3,786	,027[a]
	Residual	75,905	81	,937		
	Total	83,000	83			

a. Predictors: (Constant), Number of employee, Sector of company

b. Dependent Variable: Internal ESG

These findings suggest that organizational characteristics, such as firm size and industry sector, have a significant yet limited effect on internal ESG practices. This aligns with previous research emphasizing that while larger firms may have more formal structures for ESG engagement, internal dimensions such as ethics and employee care may still be embedded across organizations of all sizes and sectors (Rahman & Post, 2012).

Regression analysis of External ESG Performance

To examine the impact of organizational characteristics on External ESG performance, a multiple linear regression analysis was conducted with company size (number of employees) and sector of company as independent variables. The results provide insight into the relative contributions of these factors to explaining variations in ESG engagement related to environmental reporting, stakeholder interaction, and public transparency.

The regression model was statistically significant, $F(2, 81) = 6.245$, $p = .003$, indicating that the combination of company size and sector significantly predicts external ESG performance (Table 184). The R^2 value of 0.134 suggests that approximately 13.4% of the variance in external ESG performance can be explained by the two predictors (Table 134). While this represents a moderate effect, it highlights that other contextual or strategic factors not included in the model may also play a role.

Table 134: Variables entered and removed in the regression model for external ESG performance

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Number of employee, Sector of company[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: External ESG

Table 135: Model summary for multiple regression predicting external ESG from company size and sector

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,366[a]	,134	,112	,94222798

a. Predictors: (Constant), Number of employee, Sector of company

Table 136: ANOVA results for regression model of external ESG by company size and sector

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11,089	2	5,544	6,245	,003[a]
	Residual	71,911	81	,888		
	Total	83,000	83			

a. Predictors: (Constant), Number of employee, Sector of company

b. Dependent Variable: External ESG

As shown in Table 137, company size (measured by number of employees) emerged as a statistically significant positive predictor of external ESG performance (B = 0.413, β = 0.365, p = .001). This finding suggests that larger firms are more likely to engage in external ESG activities, such as environmental disclosures, stakeholder engagement, and sustainability certifications. The result may reflect the greater availability of resources in larger organizations, along with increased regulatory scrutiny and stakeholder expectations.

Conversely, the sector of the company was not a significant predictor of external ESG performance (B = 0.001, p = .922), indicating that industry type does not substantially influence ESG transparency in this sample. This aligns with the idea that ESG practices are becoming institutionalized across industries, rather than confined to specific sectors. These outcomes highlight the greater explanatory power of organizational size over industry affiliation when it comes to external ESG efforts.

Table 137: Coefficients for predicting external ESG from company size and sector

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1,431	,428		-3,344	,001
	Sector of company	,001	,013	,010	,099	,922
	Number of employee	,413	,118	,365	3,512	,001

a. Dependent Variable: External ESG

Key findings

The results demonstrate a high degree of ESG integration across surveyed enterprises, particularly in social and governance dimensions. The high internal consistency (Cronbach's α = 0.929) and strong inter-correlations among ESG variables affirm that ESG performance is a cohesive construct, echoing findings by Rahman and Post (2012), who argue that sustainability practices are often embedded holistically in organizational strategy rather than pursued in isolation.

Factor analysis revealed two distinct but related ESG constructs: an internal dimension (e.g., ethics, employee development, governance) and an external dimension (e.g., environmental audits, ISO 14001 certification, emissions disclosure). This aligns with the Huazheng ESG Ratings Methodology (2023), which similarly separates ESG criteria into internally governed practices and externally visible disclosures to assess firms' overall ESG maturity.

Organizational size significantly predicts external ESG performance (p = .001), supporting the resource-based view that larger firms are better equipped to implement formalized ESG mechanisms and meet stakeholder expectations for transparency and compliance (Huazheng, 2023). In contrast, internal ESG performance does not significantly vary across sectors or sizes, reinforcing the claim by Rahman and Post (2012) that core ethical and social commitments are increasingly institutionalized norms across businesses, regardless of industry or scale.

The results suggest a positive ESG trajectory, but also highlight areas—particularly environmental operationalization where firms, especially smaller ones, may need stronger structural support and standardization to match governance and social performance levels. These findings emphasize the need for context sensitive ESG frameworks that balance internal culture development with external accountability, in line with both regulatory expectations and evolving stakeholder demands.

5.1.6 Quantitative evaluation of sustainability Dimensions and their impact on sustainable Business Performance (SBP) using composite variables

To empirically investigate the influence of sustainability-related factors on Sustainable Business Performance (SBP), a multiple linear regression analysis was conducted using a set of composite variables, some of which were extracted through prior statistical techniques such as factor analysis, while others were manually computed based on theoretical constructs and thematic grouping (Table 138). These variables represent key dimensions of green marketing, ESG performance, and sustainable development that, together, reflect how firms internalize and operationalize sustainability. By integrating both statistically derived factors and conceptually grounded indices, the model offers a holistic view of the structural drivers influencing SBP across organizations.

Table 138: Overview of constructed and composite variables created during the study.

Variable name	Label / Description	Origin	Pillar	Sub-dimension
SGMO_Avg	Strategic Green Marketing Orientation (average score)	Created during analysis	Green Marketing	Strategic green marketing orientation
TGMOFAC1_1	Digital Sustainability	Created during factor analysis	Green Marketing	Tactical green marketing orientation
TGMOFAC2_1	Material & Cost Sustainability	Created during factor analysis	Green Marketing	Tactical green marketing orientation
IGMOFAC1_1	Employee Engagement & Training	Created during factor analysis	Green Marketing	Internal green marketing orientation
IGMOFAC2_1	Incentives & Rewards	Created during factor analysis	Green Marketing	Internal green marketing orientation
EP	Economic Pillar (from questionnaire items)	Created during analysis	Sustainable Performance	Economic Pillar (EP)
SBP	Sustainable Business Performance	Created during analysis	Sustainable Performance	Sustainable Business Performance(S.B.P)
SCA	Sustainable Competitive Advantage	Created during analysis	Sustainable Performance	Sustainable Competitive Advantage (SCA)
ESGFAC1_1	Internal ESG	Created during factor analysis	Enterprise ESG Performance	Newly constructed dimension (not from questionnaire)
ESGFAC2_1	External ESG	Created during factor analysis	Enterprise ESG Performance	Newly constructed dimension (not from questionnaire)
SD	Sustainable Development Index	Created manually (composite)	Sustainable Development	Composite index (not directly from questionnaire)

The model demonstrated a strong explanatory power, with an R^2 of 0.573 and an adjusted R^2 of 0.513 (Table 139), indicating that over half the variance in SBP can be attributed to the selected predictors. The significance of the l model ($F = 9.652$, $p < .001$) as shown in Table 140 confirms that the relationship between the predictors and SBP is statistically robust.

Table 139: Model summary of multiple linear regression(composite variables)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,757[a]	,573	,513	,48122	2,207

a. Predictors: (Constant), Sustainable Development Index, Incentives & Rewards , Digital Sustainability, Economic Pillar , Material & Cost Sustainability, Internal ESG, Sustainable Competitive Advantage , External ESG, Employee Engagement & Training , Strategic green marketing orientation

b. Dependent Variable: Sustainable Business Performance

Table 140: ANOVA results of the regression model (composite variables)

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22,352	10	2,235	9,652	,000[a]
	Residual	16,673	72	,232		
	Total	39,025	82			

a. Predictors: (Constant), Sustainable Development Index, Incentives & Rewards , Digital Sustainability, Economic Pillar , Material & Cost Sustainability, Internal ESG, Sustainable Competitive Advantage , External ESG, Employee Engagement & Training , Strategic green marketing orientation

b. Dependent Variable: Sustainable Business Performance

Among the predictors, Sustainable Competitive Advantage (SCA) emerged as the most influential factor, with a standardized beta of 0.722 and a highly significant p-value (< 0.001), suggesting that firms leveraging sustainability for competitive differentiation see a notable impact on their business performance (Table 141). Employee Engagement & Training also had a positive and statistically significant effect (β = 0.259, p = 0.033), underlining the importance of internal capacity-building in supporting sustainable outcomes. Conversely, several factors such as Strategic Green Marketing Orientation, Digital Sustainability, Internal ESG, and External ESG did not show statistically significant individual effects, despite theoretical support in literature. This suggests potential mediating or moderating effects, or the need for more mature implementation of these practices in the sampled firms. Nonetheless, their inclusion improved the model's predictive capability and should not be disregarded.

Table 141: Regression coefficients for predicting sustainable business performance

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	,386	,552		,699	,487		
	Strategic green marketing orientation	-,136	,129	-,167	-1,058	,293	,239	4,193
	Digital Sustainability	-,080	,061	-,116	-1,322	,190	,766	1,305
	Material & Cost Sustainability	,008	,060	,012	,137	,891	,778	1,286
	Employee Engagement & Training	,179	,082	,259	2,169	,033	,416	2,406
	Incentives & Rewards	-,042	,070	-,061	-,602	,549	,584	1,711
	Economic Pillar	,038	,084	,040	,453	,652	,751	1,332
	Sustainable Competitive Advantage	,785	,099	,722	7,937	,000	,716	1,396
	Internal ESG	,008	,061	,011	,126	,900	,751	1,331
	External ESG	-,024	,075	-,034	-,316	,753	,497	2,014
	Sustainable Development Index	,158	,115	,124	1,374	,174	,730	1,370

a. Dependent Variable: Sustainable Business Performance

Multicollinearity diagnostics (Table 142) confirmed the absence of severe inter-correlations among predictors, with all Variance Inflation Factor (VIF) values falling below the commonly accepted threshold of 5. Residual statistics (Table 143), along with the histogram (Figure 38) and the P–P plot (Figure 39), supported the assumptions of normality and homoscedasticity, validating the use of linear regression.

Table 142: Collinearity Diagnostics for Predictors of Sustainable Business Performance

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions										
				(Constant)	Strategic green marketing orientation	Digital Sustainability	Material & Cost Sustainability	Employee Engagement & Training	Incentives & Rewards	Economic Pillar	Sustainable Competitive Advantage	Internal ESG	External ESG	Sustainable Development Index
1	1	4,916	1,000	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00
	2	1,978	1,577	,00	,00	,02	,09	,04	,05	,00	,00	,04	,06	,00
	3	1,317	1,932	,00	,00	,23	,03	,07	,08	,00	,00	,07	,00	,00
	4	,994	2,224	,00	,00	,06	,06	,01	,00	,00	,00	,39	,15	,00
	5	,761	2,541	,00	,00	,26	,08	,09	,32	,00	,00	,06	,00	,00
	6	,631	2,792	,00	,00	,09	,66	,01	,00	,00	,00	,05	,26	,00
	7	,332	3,849	,00	,00	,30	,06	,43	,35	,00	,00	,34	,22	,00
	8	,037	11,505	,00	,00	,00	,00	,01	,00	,66	,08	,01	,00	,07
	9	,017	17,212	,01	,06	,01	,01	,01	,06	,03	,86	,01	,02	,24
	10	,011	21,160	,00	,77	,01	,00	,15	,10	,24	,00	,00	,13	,42
	11	,007	26,324	,98	,17	,00	,00	,17	,03	,07	,05	,02	,17	,26

a. Dependent Variable: Sustainable Business Performance

Table 143: Residuals statistics of the regression model (composite variables)

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1,8789	4,6029	3,3655	,52210	83
Residual	-1,57932	1,01203	,00000	,45093	83
Std. Predicted Value	-2,847	2,370	,000	1,000	83
Std. Residual	-3,282	2,103	,000	,937	83

a. Dependent Variable: Sustainable Business Performance

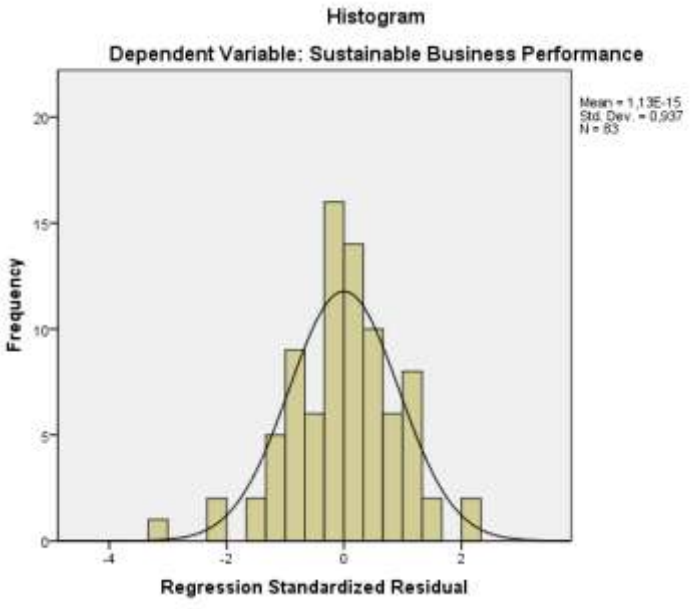


Figure 38: Histogram of regression standardized residuals for sustainable business performance model

The partial regression plots (Figures 42–49) further illustrate the isolated contribution of each predictor to SBP. Notably, Figure 48 highlights the clear positive linear relationship between SCA and SBP, visually reinforcing the strength of this dimension. In contrast, variables like Strategic Green Marketing (Figure 40) and External ESG (Figure 48) exhibit more dispersed patterns, reflecting their weaker or more complex influences.

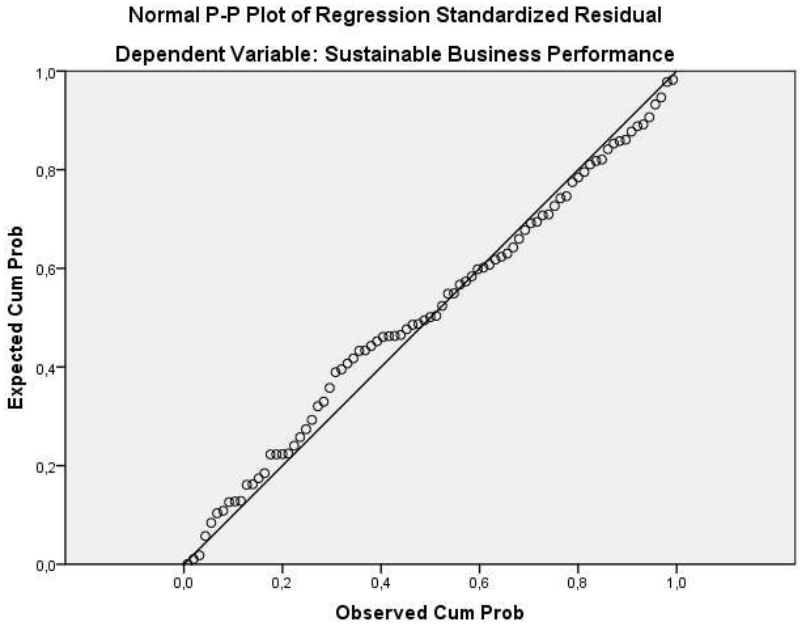


Figure 39: Normal P–P Plot of regression standardized residuals for sustainable business performance.

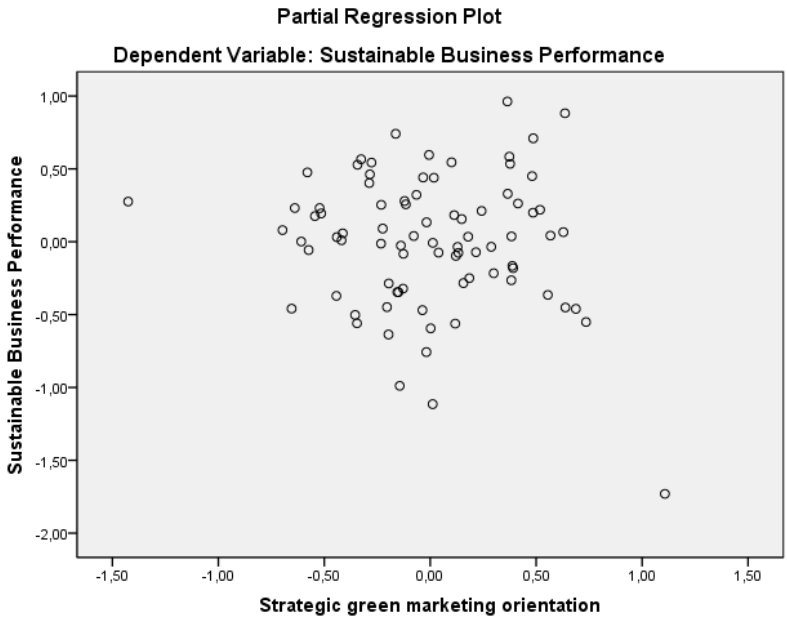


Figure 40: Partial regression plot for strategic green marketing orientation and sustainable business performance

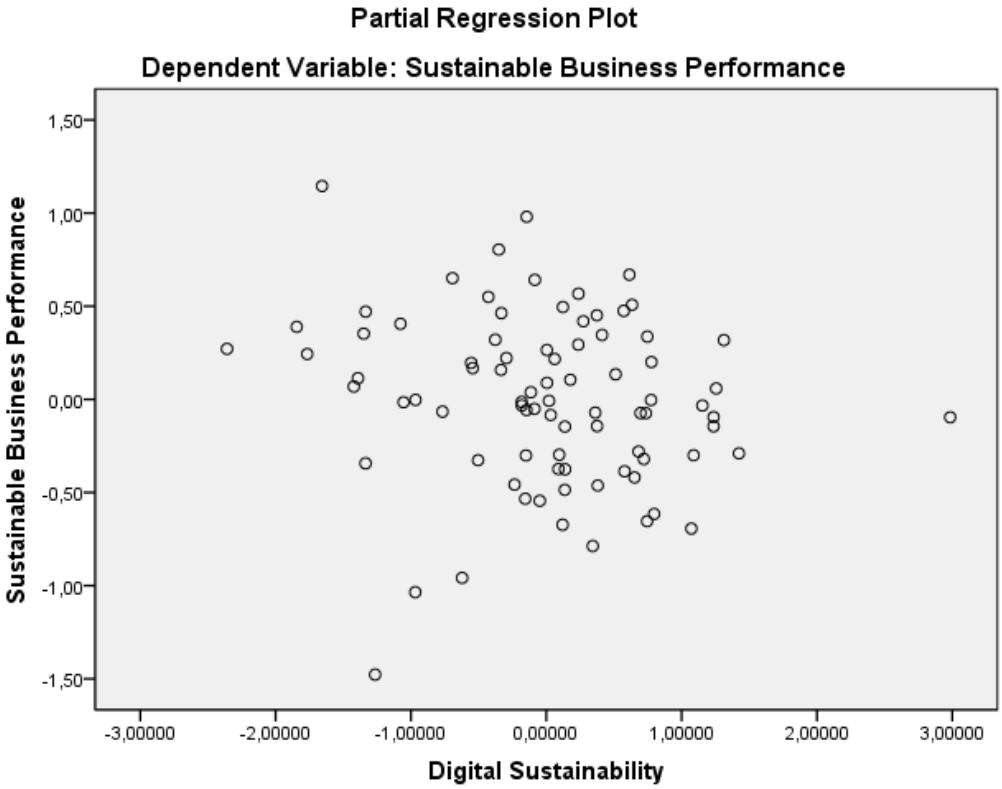


Figure 41: Partial regression plot for digital sustainability and sustainable business performance

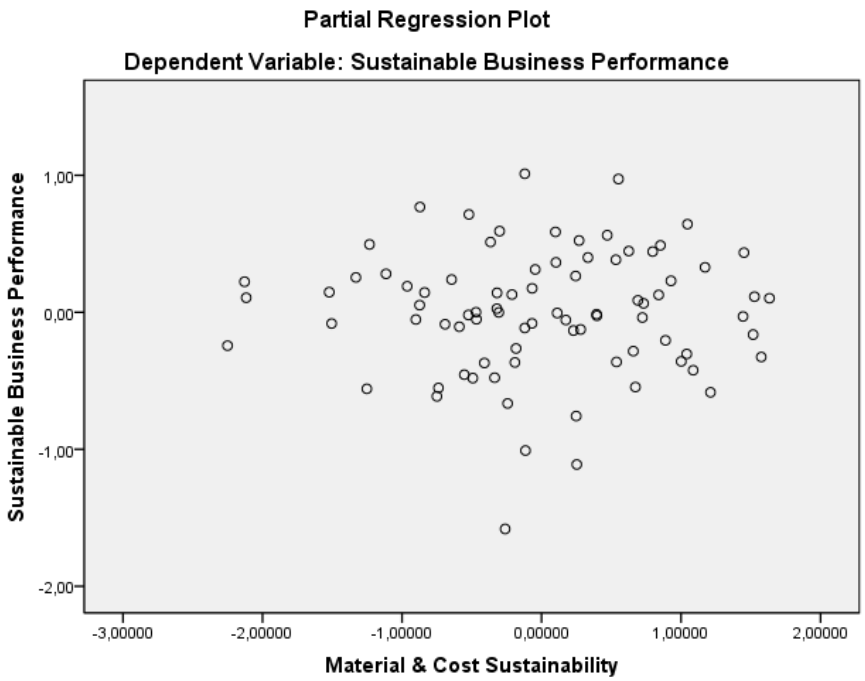


Figure 42: Partial Regression Plot for Material & Cost Sustainability and Sustainable Business Performance

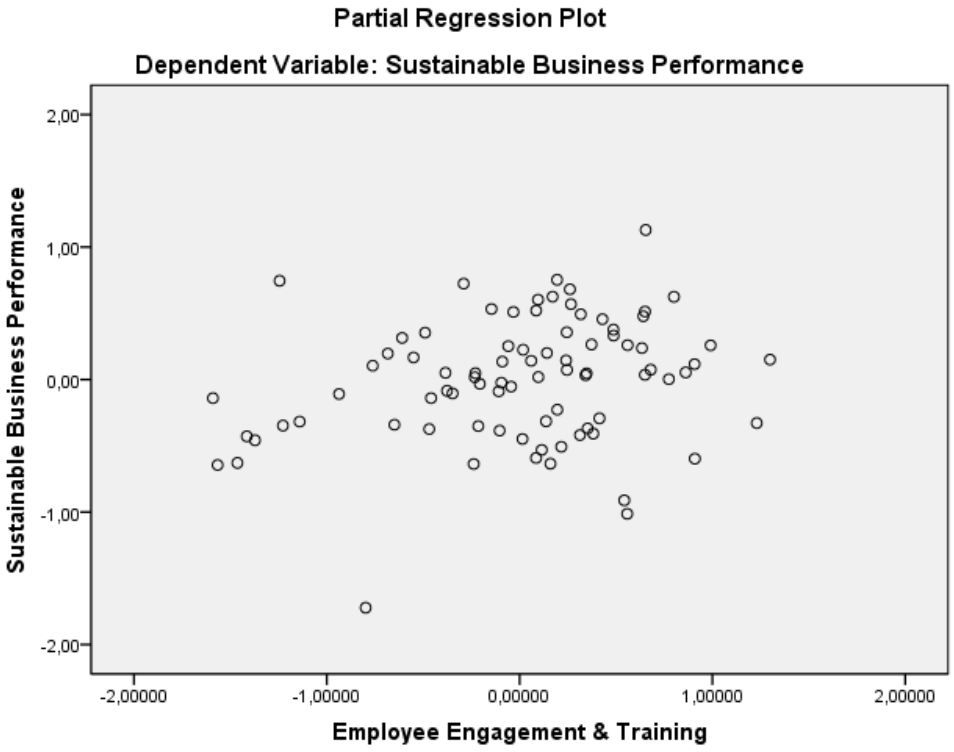


Figure 43: Partial Regression Plot for Employee Engagement & Training and Sustainable Business Performance

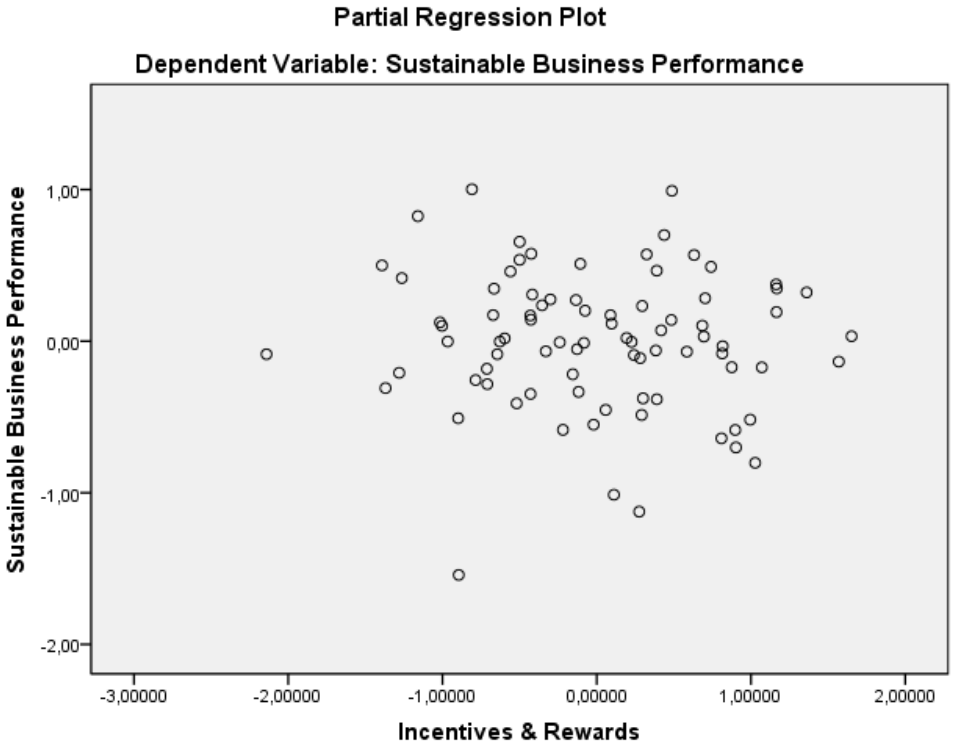


Figure 44: Partial Regression Plot for Incentives & Rewards and Sustainable Business Performance

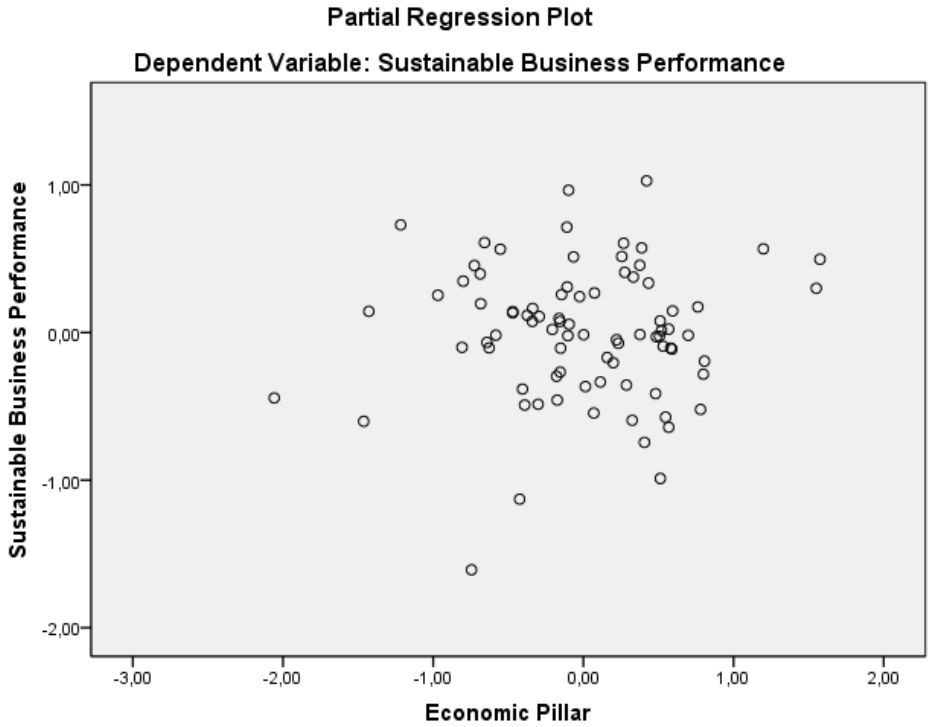


Figure 45: Partial Regression Plot for Economic Pillar and Sustainable Business Performance

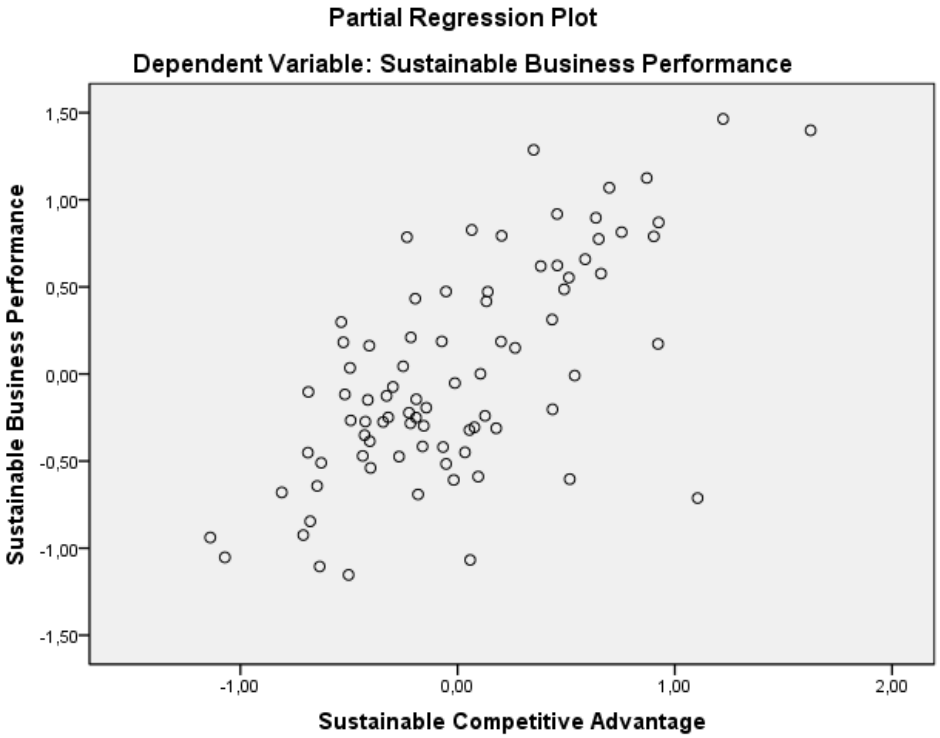


Figure 46: Partial regression plot for sustainable competitive advantage and sustainable business performance

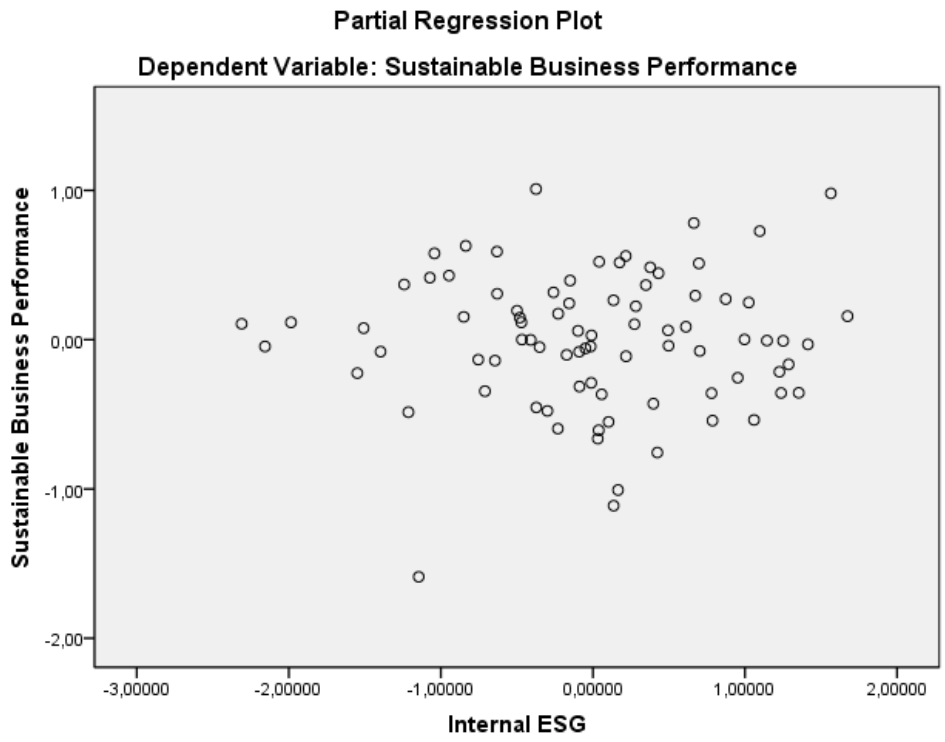


Figure 47: Partial Regression Plot for Internal ESG and Sustainable Business Performance

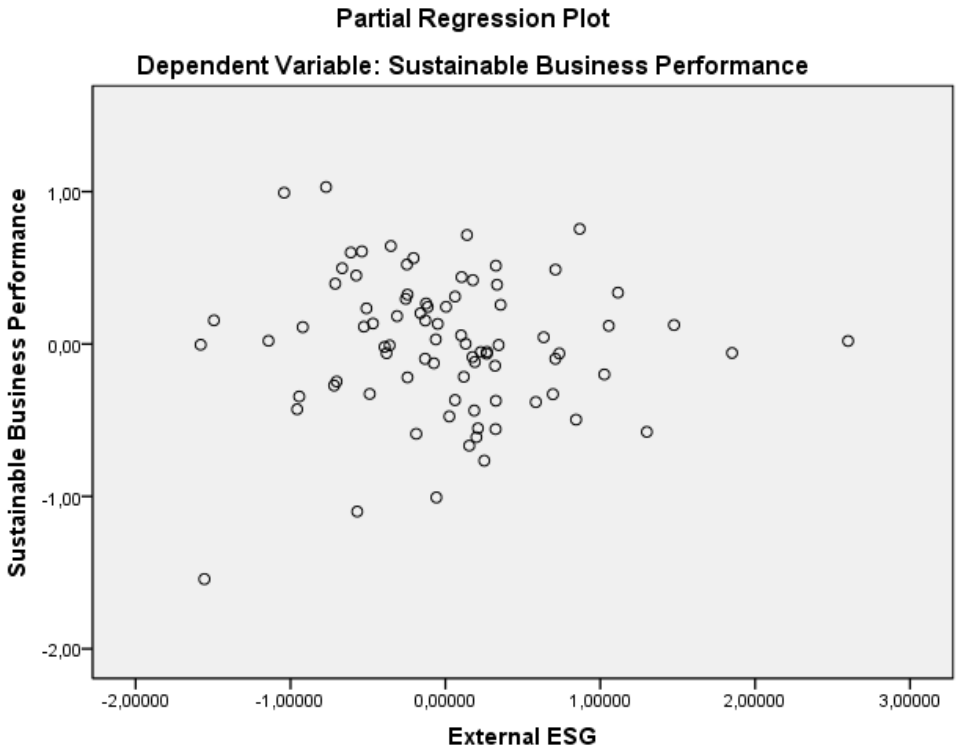


Figure 48: Partial Regression Plot for External ESG and Sustainable Business Performance

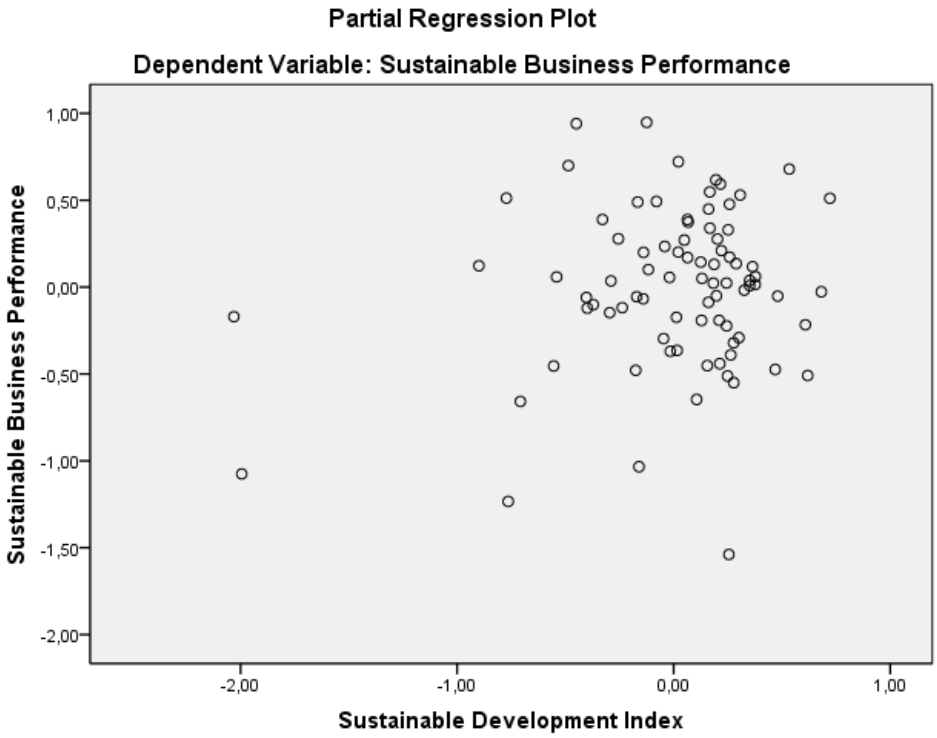


Figure 49: Partial Regression Plot for Sustainable Development Index and Sustainable Business Performance

In summary, this analysis underscores the multifaceted nature of sustainable business performance, with competitive advantage rooted in sustainability and employee-driven internal practices playing pivotal roles. While other variables may exert indirect effects or require longer-term implementation to manifest statistically, their strategic value remains significant.

6. CONCLUSION

This master thesis aimed to explore how sustainable development practices, R&D involvement, green marketing strategies, and ESG performance interact and affect business competitiveness, growth, and long-term performance. By various statistical analyses, the study provided clear and practical insights into these relationships, while also helping to answer the research questions posed at the beginning.

For Research Question 1, the results showed that most companies are aware of sustainable development and recognize its importance for business success, as seen in the descriptive statistics (Table 17). However, the factor analysis (section 3.2.3) made it clear that turning this awareness into real, operational strategies is not always easy. The low scores on the 'Complexity of Implementation' variable suggest that many firms still face real challenges in fully integrating sustainability into their business models. This supports the Triple Bottom Line (TBL) theory, which argues that balancing economic, environmental, and social goals is demanding and requires more than just awareness.

Regarding Research Question 2, the chi-square tests and cross-tabulations (section 3.2.2) showed that companies with dedicated R&D departments, especially the larger ones, tend to have stronger ESG performance and are more active in sustainable innovation projects. This finding reflects the Resource-Based View (RBV), which emphasizes the strategic advantage of internal resources like R&D in driving both innovation and sustainability, particularly in high-tech sectors.

For Research Question 3, the regression analysis (section 3.2.4) confirmed that all types of green marketing orientations: strategic, tactical, and internal positively influence ESG and sustainable business performance (SBP). However, strategic and tactical marketing showed stronger impacts, especially among bigger companies. This links well to Stakeholder Theory, which highlights the importance of active engagement with both internal and external stakeholders to improve both sustainability metrics and business outcomes.

When addressing Research Question 4, the ANOVA analysis (section 3.2.5) did not reveal significant differences in the Economic Pillar (EP) or Sustainable Competitive Advantage (SCA) across company sizes. However, SBP did show notable differences, with larger firms reporting better outcomes than mid-sized ones. This observation ties into Institutional Theory, suggesting that while company size matters, external factors such as industry regulations, norms, and stakeholder expectations also play a big role, especially since larger firms tend to face higher public and regulatory scrutiny.

Research Question 5 was examined through correlation and factor analysis (section 3.2.6), which highlighted that internal and external ESG efforts are closely connected with green marketing, innovation, and business expansion. These results support both Stakeholder Theory and the Resource-Based View, showing that sustainable business growth is influenced not only by external pressures but also by internal capabilities like governance and transparency.

Finally, for Research Question 6, the regression models (section 3.2.7) confirmed that combined sustainability variables ,those covering internal systems, external pressures, and green marketingare significant predictors of sustainable business performance. This reinforces TBL thinking,

showing that integrating sustainability across different functions is key to long-term competitiveness and growth.

In summary, the findings suggest that while sustainability is becoming an essential part of business strategies, how well it is integrated still depends heavily on factors like company size, sector, internal capabilities, and stakeholder dynamics. Firms that embed sustainability into their R&D, marketing, and internal processes tend to achieve better ESG results and stronger business performance. However, the challenges in implementation and the differences between industries mean there is no universal approach. Companies need tailored strategies that reflect their specific context.

For future research, it would be valuable to examine how these relationships evolve over time. This could be achieved through longitudinal studies, tracking changes in sustainability practices and their impact on business performance. Furthermore, conducting in-depth case studies on specific companies or sectors would provide rich, contextual insights into how sustainability strategies are implemented and how they influence long-term competitiveness and growth in real-world settings.

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8. APPENDIX A - Questionnaire

Questionnaire

Ερωτήσεις Απαντήσεις 84 Ρυθμίσεις

Ενότητα 1 από 7

Sustainable practices and their impact on business growth: A Comprehensive Survey

B I U

This questionnaire is developed by Anna Mavrea a M.Sc. student of Master in Technology & Innovation Management (MTIM) program offered by the Technical University of Crete in order to collect primary data for her master thesis titled '***The Green Engine of Growth: Unraveling the impact of ESG, green marketing, R&D investments and sustainable innovation on business expansion***'.

Your participation in this questionnaire is a key element in unraveling the impact of sustainable practices on business growth. By sharing your insights, you contribute to understanding how organizations navigate ESG principles, green marketing, R&D investments and sustainable innovation. Your responses are instrumental in shaping our understanding of the role sustainability plays in driving business expansion.

Please rest assured, your responses will be treated with the utmost confidentiality and used solely for academic purposes.

Thank you for taking the time to share your valuable perspectives!

Μετά την ενότητα 1 Συνέχεια στην επόμενη ενότητα

Ενότητα 2 από 7

Basic Information

This section collects basic demographic and professional information to understand the varied perspectives contributing to our study on sustainability in business. Your responses, which will remain confidential, are crucial for contextualizing our findings across diverse sectors. Please provide the requested details.

1) What is your age? *

Κείμενο σύντομης απάντησης

2) What is your gender identity? *

- Woman
- Man
- Non-binary person
- Other
- Prefer not to answer

3) What is your level of education? *

- Less than High School
- High School/college graduate, diploma or equivalent
- Technical certification
- Bachelor's degree
- Master's degree
- Ph.D. degree
- Prefer not to say

4) What is your major? *

- ○ Engineering
- ○ Computer Science
- ○ Management/Economics/Marketing
- ○ Science (e.g., Physics, Chemistry, and Biology)
- ○ Social Science other than Economics/Management
- ○ Health Sciences
- ○ Other

5) How many years of professional experience do you have? *

- ○ Less than 3 years
- ○ 3–5
- ○ 6–8
- ○ 9–11
- ○ 12–14
- ○ 15-17
- ○ 18-20
- ○ More than 20 years

6) What is the sector of activities of your company? *

- ○ Agriculture/Food
- ○ Mining and Natural Resources
- ○ Manufacturing
- ○ Construction
- ○ Energy
- ○ ICT
- ○ Financial Sector
- ○ Healthcare
- ○ Retail
- ○ Transportation and Logistics
- ○ Real Estate
- ○ Hospitality and Tourism
- ○ Education Sector
- ○ Government and Public Administration
- ○ Nonprofit and Social Services
- ○ Entertainment and Media
- ○ Consulting Services
- ○ Automotive Sector
- ○ Aerospace and Defense
- ○ Consumer Goods
- ○ Environmental and Green Energy
- ○ Pharmaceuticals and Biotechnology
- ○ Insurance
- ○ Legal Services
- ○ Other

7) What type of market does your current company primarily operate in? *

- ○ Business-to-Business (B2B)
- ○ Business-to-Consumer (B2C)
- ○ Both B2B and B2C

8) How many employees does your current company have? *

- ○ 1-10 employees
- ○ 11-50 employees
- ○ 51-250 employees
- ○ 250+ employees

9) What is the closest representation to your role within the organization? *

- ○ Executive/Managerial
- ○ Professional/Technical
- ○ Administrative/Support
- ○ Sales/Marketing
- ○ Operations/Production
- ○ Customer Service
- ○ IT/Computing
- ○ Human Resources
- ○ Finance/Accounting
- ○ Research and Development
- ○ Design
- ○ Education/Training
- ○ Healthcare
- ○ Legal
- ○ Public Relations/Communications
- ○ Other

10) Please specify your current job title. *

Κείμενο σύντομης απάντησης

11) Do you work in the field of ESG or in the field of impact investments? *

- ○ Yes
- ○ No

12) Does your current company have a dedicated Research and Development (R&D) Department? *

- ○ Yes, we have a distinct R&D Department.
- ○ No, we do not have a separate R&D Department.
- ○ I don't know.

13) In your current role to what extent do you participate in Research and Development (R&D) projects? *

- ○ Actively involved in leading or conducting R&D projects
- ○ Collaborate with R&D teams but not directly involved in project leadership
- ○ Occasionally contribute insights to ongoing R&D initiatives
- ○ Limited involvement or no participation in R&D projects
- ○ Not applicable - I am not currently engaged in professional activities with R&D components

Μετά την ενότητα 2 Συνέχεια στην επόμενη ενότητα

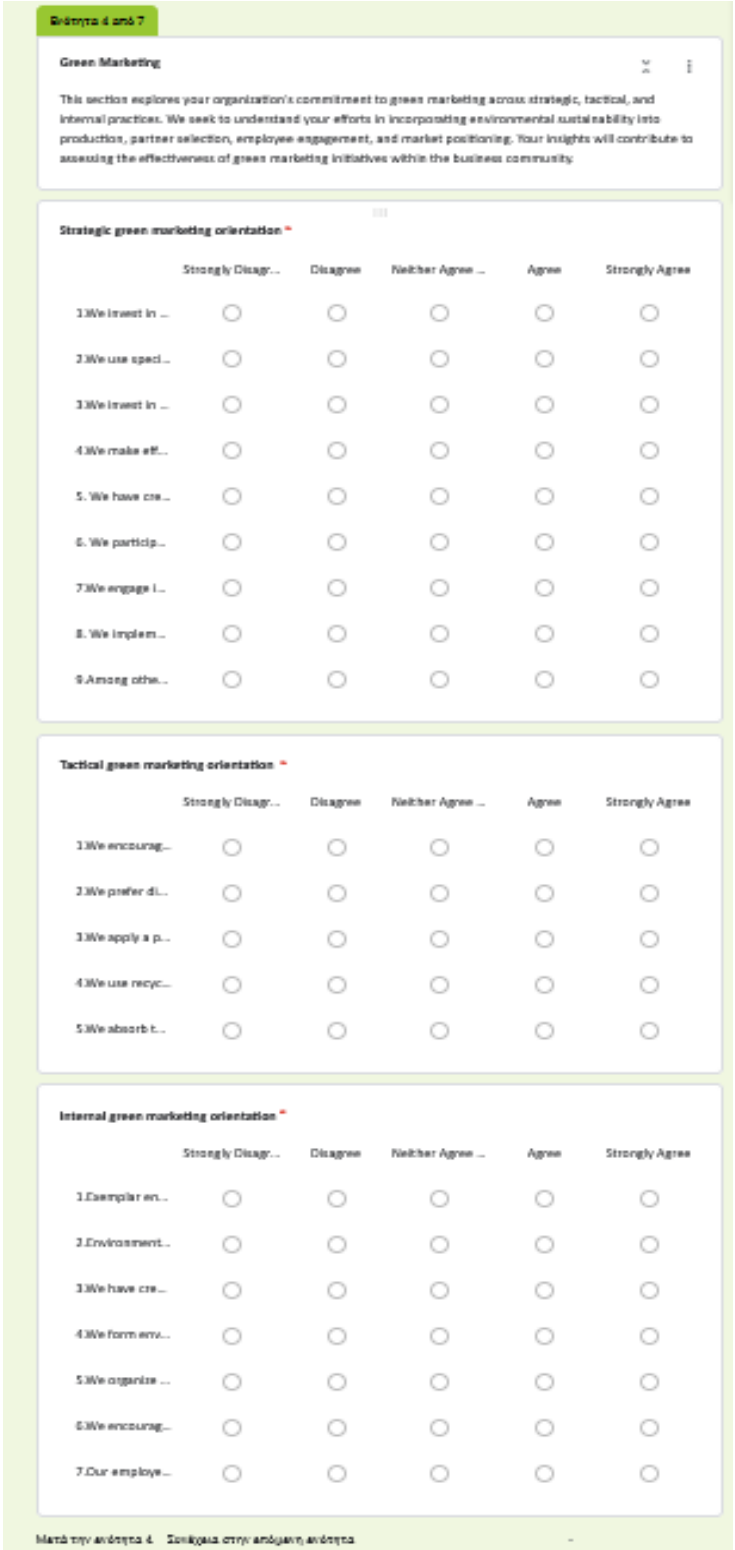
Ενότητα 3 από 7

Sustainable Development

This section explores your familiarity and engagement with sustainable development within your organization. We'll assess the value, implementation challenges, and impact of sustainable practices on your business strategy. Your insights are crucial for understanding how companies are navigating and integrating sustainability into their operations.

Sustainable Development *

	Strongly Disagr...	Disagree	Neither Agree ...	Agree	Strongly Agree
1.Do you know...	○	○	○	○	○
2.Sustainable ...	○	○	○	○	○
3.Is implement...	○	○	○	○	○
4.Would you u...	○	○	○	○	○
5.Would you a...	○	○	○	○	○
6.Your busines...	○	○	○	○	○
7.Your busines...	○	○	○	○	○
8.Your busines...	○	○	○	○	○
9.Are you cons...	○	○	○	○	○
10.Do your HR ...	○	○	○	○	○
11.Sustainable...	○	○	○	○	○
12.Sustainable...	○	○	○	○	○
13.Sustainable...	○	○	○	○	○
14.Would you ...	○	○	○	○	○
15.Do custom...	○	○	○	○	○
16.Do most of ...	○	○	○	○	○



Ενότητα 4 από 7

Green Marketing

This section explores your organization's commitment to green marketing across strategic, tactical, and internal practices. We seek to understand your efforts in incorporating environmental sustainability into production, partner selection, employee engagement, and market positioning. Your insights will contribute to assessing the effectiveness of green marketing initiatives within the business community.

Strategic green marketing orientation *

	Strongly Disagr...	Disagree	Neither Agree ...	Agree	Strongly Agree
1.We invest in ...	○	○	○	○	○
2.We use speci...	○	○	○	○	○
3.We invest in ...	○	○	○	○	○
4.We make eff...	○	○	○	○	○
5. We have cre...	○	○	○	○	○
6. We particip...	○	○	○	○	○
7.We engage i...	○	○	○	○	○
8. We implem...	○	○	○	○	○
9.Among othe...	○	○	○	○	○

Tactical green marketing orientation *

	Strongly Disagr...	Disagree	Neither Agree ...	Agree	Strongly Agree
1.We encourag...	○	○	○	○	○
2.We prefer di...	○	○	○	○	○
3.We apply a p...	○	○	○	○	○
4.We use recyc...	○	○	○	○	○
5.We absorb t...	○	○	○	○	○

Internal green marketing orientation *

	Strongly Disagr...	Disagree	Neither Agree ...	Agree	Strongly Agree
1.Exemplar en...	○	○	○	○	○
2.Environment...	○	○	○	○	○
3.We have cre...	○	○	○	○	○
4.We form env...	○	○	○	○	○
5.We organize ...	○	○	○	○	○
6.We encourag...	○	○	○	○	○
7.Our employe...	○	○	○	○	○

Μετά την ενότητα 4 Συνέχεια στην επόμενη ενότητα

Ενότητα 5 από 7

Sustainable Performance

This section assesses your organization's sustainable performance across three key areas: Economic Pillar (EP), Sustainable Business Performance (S.B.P), and Sustainable Competitive Advantage (SCA). We aim to understand how your business engages with suppliers and customers, its financial health compared to competitors, and its resilience and reputation in the marketplace. Your responses will provide valuable insights into how sustainability practices contribute to economic success, competitive positioning, and overall organizational growth.

Economic Pillar (EP) *

	Strongly Disagr...	Disagree	Neither Agree ...	Agree	Strongly Agree
1.Do you invel...	○	○	○	○	○
2.Do you infor...	○	○	○	○	○
3.Do you provi...	○	○	○	○	○

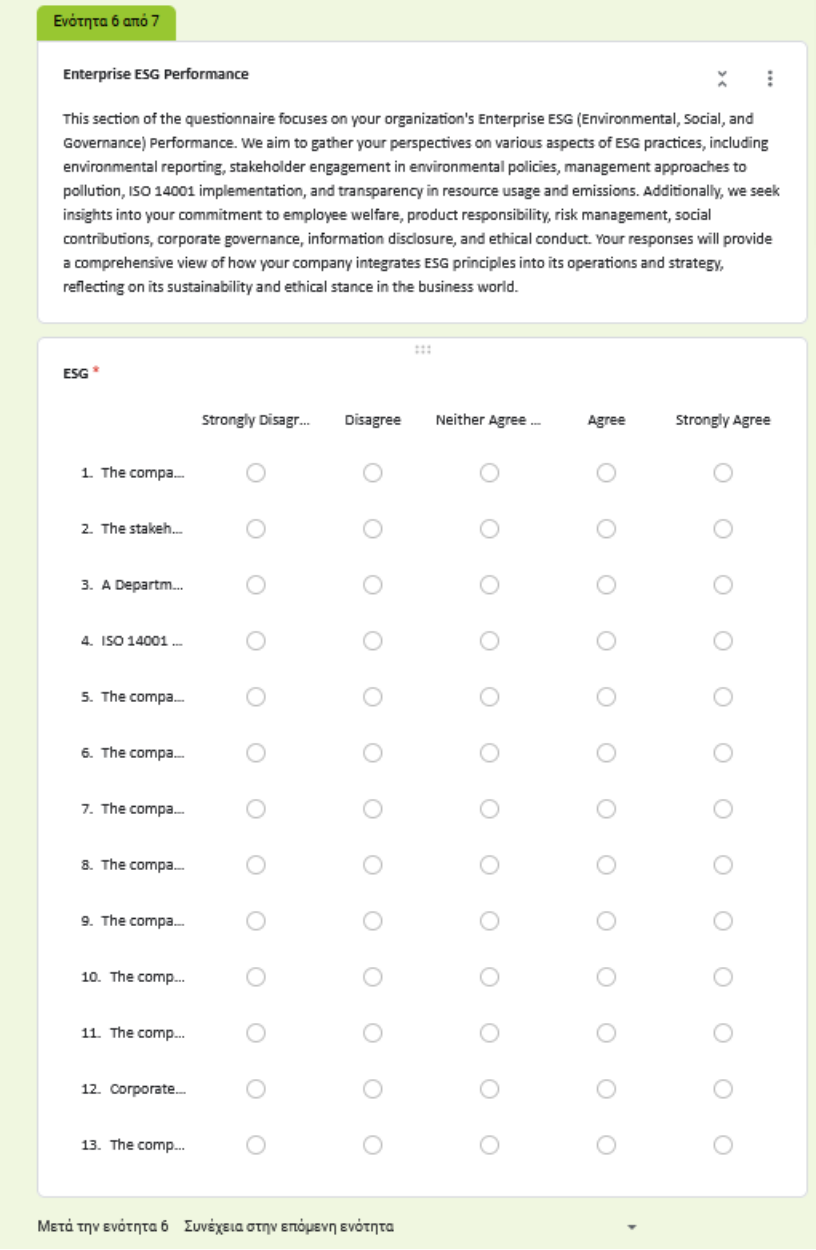
Sustainable Business Performance (S.B.P) *

	Strongly Disagr...	Disagree	Neither Agree ...	Agree	Strongly Agree
1.The net profi...	○	○	○	○	○
2.Profitability ...	○	○	○	○	○
3.Profitability ...	○	○	○	○	○

Sustainable Competitive Advantage (SCA) *

	Strongly Disagr...	Disagree	Neither Agree ...	Agree	Strongly Agree
1.The compan...	○	○	○	○	○
2.Customer sal...	○	○	○	○	○
3.Employee sa...	○	○	○	○	○
4.Ability to ma...	○	○	○	○	○
5.Sales have in...	○	○	○	○	○

Μετά την ενότητα 5: Συνέχεια στην επόμενη ενότητα



Ενότητα 6 από 7

Enterprise ESG Performance

This section of the questionnaire focuses on your organization's Enterprise ESG (Environmental, Social, and Governance) Performance. We aim to gather your perspectives on various aspects of ESG practices, including environmental reporting, stakeholder engagement in environmental policies, management approaches to pollution, ISO 14001 implementation, and transparency in resource usage and emissions. Additionally, we seek insights into your commitment to employee welfare, product responsibility, risk management, social contributions, corporate governance, information disclosure, and ethical conduct. Your responses will provide a comprehensive view of how your company integrates ESG principles into its operations and strategy, reflecting on its sustainability and ethical stance in the business world.

ESG *

	Strongly Disagr...	Disagree	Neither Agree ...	Agree	Strongly Agree
1. The compa...	○	○	○	○	○
2. The stakeh...	○	○	○	○	○
3. A Departm...	○	○	○	○	○
4. ISO 14001 ...	○	○	○	○	○
5. The compa...	○	○	○	○	○
6. The compa...	○	○	○	○	○
7. The compa...	○	○	○	○	○
8. The compa...	○	○	○	○	○
9. The compa...	○	○	○	○	○
10. The comp...	○	○	○	○	○
11. The comp...	○	○	○	○	○
12. Corporate...	○	○	○	○	○
13. The comp...	○	○	○	○	○

Μετά την ενότητα 6 Συνέχεια στην επόμενη ενότητα

Ενότητα 7 από 7

Thank you for your participation!

Περιγραφή (προαιρετικό)

Thank you for dedicating your time and effort to complete this comprehensive questionnaire, covering vital sectors of Sustainable Development, Green Marketing, Sustainable Performance, and Enterprise ESG Performance. Your detailed responses provide essential insights into how businesses today navigate the challenges and opportunities of sustainability, green marketing strategies, economic resilience, and ethical governance. Your participation is invaluable, offering a critical perspective on the integration of sustainable practices across various dimensions of business operations. This information not only enriches our research but also contributes significantly to the broader understanding of sustainable business practices in the modern economic landscape. We are truly grateful for your contribution and commitment to advancing sustainable and ethical business practices.

9. APPENDIX B - Basic information questions

Cross-Tabulation Analysis of demographic and organizational characteristics

To explore relationships between key demographic variables, cross-tabulation analyses were conducted:

B.1 Gender vs Role

The following cross-tabulation analysis between Role and Gender within the organization reveals distinct patterns in role distribution. While men and women are represented across a variety of roles, specific trends emerge. Executive and managerial roles appear to be evenly distributed, with nine men and nine women occupying these leadership positions, suggesting a level of gender parity at the top. However, women are more represented in roles traditionally associated with supportive and creative functions, including administrative/support positions, customer service, and design. In contrast, men are more likely to occupy roles in finance/accounting and IT/computing, which often require technical and analytical expertise.

To further examine this relationship, a Chi-Square test and Fisher's Exact Test were conducted. The Pearson Chi-Square yielded a value of 33.836 with 24 degrees of freedom and a p-value of 0.088. While not statistically significant at the 0.05 threshold, this result approaches marginal significance, hinting at a potential underlying association between gender and role distribution. Fisher's Exact Test produced a comparable p-value of 0.090, reinforcing this observation. Nonetheless, the validity of these tests is constrained by a high proportion of cells (82.1%) with expected counts below five, which limits the reliability of the findings.

Despite the lack of statistical significance, the observed patterns are noteworthy. Women's higher representation in supportive and creative roles, alongside men's dominance in technical and analytical fields, reflects broader trends that may stem from cultural expectations, professional trajectories, or organizational practices.

Table 144: Distribution of roles within organizations by gender identity

Role within organization * Gender identity Crosstabulation

Count

		Gender identity			
		Woman	Man	Prefer not to answer	Total
Role within organization	Executive/Managerial	9	9	0	18
	Professional/Technical	7	8	0	15
	Administrative/Support	2	0	0	2
	Sales/Marketing	4	1	0	5
	Operations/Production	6	0	0	6
	Customer Service	1	0	0	1
	IT/Computing	1	3	0	4
	Human Resources	1	0	0	1
	Finance/Accounting	6	8	0	14
	Research and Development	4	3	2	9
	Design	1	0	0	1
	Legal	1	0	0	1
	Other	6	1	0	7
Total		49	33	2	84

Table 145: Chi-Square Test results for role distribution by gender identity

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	33,836[a]	24	,088	.[b]		
Likelihood Ratio	30,295	24	,175	,050		
Fisher's Exact Test	34,285			,090		
Linear-by-Linear Association	,020[c]	1	,887	,901	,437	,012
N of Valid Cases	84					

a. 32 cells (82,1%) have expected count less than 5. The minimum expected count is ,02.

b. Cannot be computed because there is insufficient memory.

c. The standardized statistic is ,142.

B.2 Gender vs ESG Engagement

The analysis examining the relationship between gender identity and participation in ESG or Impact Investments indicates no statistically significant association. Of the 21 individuals engaged in ESG or Impact Investments, 11 identify as women, 10 as men, and none as "Prefer not to answer." In contrast, among the 63 individuals not engaged in ESG or Impact Investments, 38 identify as women, 23 as men, and 2 as "Prefer not to answer."

The Pearson Chi-Square test yielded a value of 1.332 with 2 degrees of freedom and a p-value of 0.514, indicating that the observed differences in ESG participation across gender groups are likely due to chance rather than any systematic pattern. Fisher's Exact Test further supports this conclusion, with a two-sided p-value of 0.692. The Linear-by-Linear Association test similarly found no significant linear trend, with a p-value of 0.932.

Despite the lack of statistical significance, the observed distribution is noteworthy. Women and men are almost equally represented among those involved in ESG or Impact Investments, with women comprising a slight majority. This balance reflects an encouraging level of gender inclusivity in sustainability-related roles, aligning with broader goals of diversity and equity in green growth initiatives. However, the higher overall representation of women in the sample may partly explain this result, warranting further investigation with a larger and more balanced dataset.

Table 146: Engagement in ESG or impact investments by gender identity

Works in ESG or Impact Investments * Gender identity Crosstabulation

Count

		Gender identity			
		Woman	Man	Prefer not to answer	Total
Works in ESG or Impact Investments	Yes	11	10	0	21
	No	38	23	2	63
Total		49	33	2	84

Table 147: Chi-Square Test results for ESG or impact investment engagement by gender identity

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	1,332[a]	2	,514	,476		
Likelihood Ratio	1,799	2	,407	,384		
Fisher's Exact Test	1,013			,692		
Linear-by-Linear Association	,007[b]	1	,932	1,000	,558	,128
N of Valid Cases	84					

a. 2 cells (33,3%) have expected count less than 5. The minimum expected count is ,50.

b. The standardized statistic is ,086.

B.3 Sector vs. ESG Engagement

The analysis of the relationship between working in ESG or Impact Investments and the sector of the company indicates no statistically significant association. The Pearson Chi-Square test produced a value of 18.251 with 18 degrees of freedom and an asymptotic p-value of 0.439, suggesting no meaningful relationship between the two variables under the null hypothesis. To address the high proportion of cells with expected counts less than 5 (86.8%), Monte Carlo simulations with 10,000 iterations were conducted, yielding a two-sided p-value of 0.462 within a 99% confidence interval of [0.449, 0.475]. These results further support the lack of statistical significance.

Similarly, Fisher's Exact Test, which provides a robust alternative for small sample sizes, yielded a p-value of 0.529 with a 99% confidence interval of [0.516, 0.542], corroborating the findings from the Chi-Square test and Monte Carlo simulations. The Linear-by-Linear Association test produced a p-value of 0.215, indicating no significant linear trend between the variables.

These results highlight the limitations of the dataset, including the uneven distribution of responses across sectors and the small sample size of individuals engaged in ESG or Impact Investments. Such conditions reduce the power of statistical tests to detect significant associations.

Despite the lack of statistical significance, the data reveal some observable patterns. For example, the Consulting Services sector has the highest representation of individuals working in ESG or Impact Investments (7 individuals), reflecting the sector's alignment with sustainability advisory roles. Sectors such as Agriculture/Food (4 individuals) and Environmental and Green Energy (1 individual) also show some engagement in ESG activities, consistent with their intrinsic focus on environmental issues. In contrast, traditional sectors like Manufacturing and Construction exhibit limited participation in ESG roles, potentially due to slower adoption of sustainability practices.

While the results do not confirm a statistically significant relationship, they suggest areas for further exploration. A larger, more evenly distributed dataset could provide deeper insights into how sectoral characteristics influence ESG engagement. These findings emphasize the need for tailored strategies to foster ESG involvement across industries, particularly in sectors where participation is currently limited.

Table 148: Engagement in ESG or impact investments by sector of company

Works in ESG or Impact Investments * Sector of company Crosstabulation

Count

		Sector of company																			Total
		Agriculture/Food	Mining and Natural Resources	Manufacturing	Construction	Energy	ICT	Financial Sector	Healthcare	Retail	Transportation and Logistics	Education Sector	Government and Public Administration	Consulting Services	Automotive Sector	Consumer Goods	Environmental and Green Energy	Pharmaceuticals and Biotechnology	Legal Services	Other	
Works in ESG or Impact Investments	Yes	4	0	2	0	1	1	0	0	0	0	0	1	7	0	0	1	1	1	2	21
	No	6	1	10	6	2	6	2	2	1	3	2	0	9	1	1	4	1	0	6	63
Total		10	1	12	6	3	7	2	2	1	3	2	1	16	1	1	5	2	1	8	84

Table 149: Chi-Square Test results for ESG or impact investment engagement by sector of company

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Sig.	99% Confidence Interval		Sig.	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	18,251[a]	18	,439	,462[b]	,449	,475			
Likelihood Ratio	21,934	18	,235	,406[b]	,393	,419			
Fisher's Exact Test	16,271			,529[b]	,516	,542			
Linear-by-Linear Association	1,539[c]	1	,215	,214[b]	,203	,224	,110[b]	,102	,118
N of Valid Cases	84								

a. 33 cells (86,8%) have expected count less than 5. The minimum expected count is 25.

b. Based on 10000 sampled tables with starting seed 957002199.

c. The standardized statistic is -1,241.

B.4 Sector vs. R&D Department

The analysis of the relationship between the presence of a distinct R&D department and the sector of respondents reveals trends of interest, although statistical significance is marginal. Among the 84 respondents analyzed, 43 reported working in organizations with a distinct R&D department, 35 indicated that their organizations did not have one, and 6 were unsure.

Respondents from the Agriculture/Food and Manufacturing sectors reported the highest presence of R&D departments, with 8 respondents from each sector indicating a dedicated R&D function. This aligns with the resource-intensive and innovation-driven nature of these industries. In contrast, respondents from sectors such as Construction (1 respondent) and ICT (2 respondents) reported a lower presence of R&D departments, suggesting potential gaps in structured innovation efforts.

Statistical testing using the Pearson Chi-Square test yielded a value of 50.512 with 36 degrees of freedom and an asymptotic p-value of 0.055. Monte Carlo simulations provided a more robust two-sided p-value of 0.078 (99% confidence interval: [0.071, 0.085]), which approaches significance but does not definitively indicate a strong relationship. The Fisher's Exact Test produced a similar result, with a p-value of 0.051 (99% confidence interval: [0.046, 0.057]). These results suggest that while there may be sectoral differences in the presence of R&D departments, the association is not statistically significant in this dataset.

The limitations of the dataset, including the high proportion of cells (91.2%) with expected counts less than 5, reduce the reliability of the Chi-Square test. However, the observed patterns are noteworthy. Respondents from the Consulting Services sector displayed a balanced split, with 7 reporting the presence of an R&D department and 7 without, reflecting variability in approaches to innovation within the sector. Respondents from the Environmental and Green Energy sector, with 4 reporting the presence of an R&D department and none explicitly stating the absence of one, highlight the sector's strong alignment with innovation and sustainability.

These findings emphasize the importance of sector-specific strategies for fostering R&D, particularly in industries with lower representation of structured innovation functions. Further research with larger and more balanced samples is necessary to validate these trends and uncover the underlying factors influencing the relationship between sector and R&D presence. While the results do not confirm a statistically significant association, the observed variations provide valuable insights into how sectors prioritize innovation in their operational strategies.

Table 150: Presence of R&D departments by sector of company

Sector of company * Company has R&D Department Crosstabulation

Count

		Company has R&D Department			
		Yes, we have a distinct R&D Department	No, we do not have a separate R&D Depart-ment	I don't know	Total
Sector of company	Agriculture/Food	8	2	0	10
	Mining and Natural Resources	1	0	0	1
	Manufacturing	8	4	0	12
	Construction	1	5	0	6
	Energy	1	2	0	3
	ICT	2	5	0	7
	Financial Sector	0	2	0	2
	Healthcare	2	0	0	2
	Retail	0	0	1	1
	Transportation and Logistics	1	2	0	3
	Education Sector	0	1	1	2
	Government and Public Administration	0	1	0	1
	Consulting Services	7	7	2	16
	Automotive Sector	1	0	0	1
	Consumer Goods	1	0	0	1
	Environmental and Green Energy	4	0	1	5
	Pharmaceuticals and Biotechnology	2	0	0	2
	Legal Services	0	1	0	1
	Other	4	3	1	8
Total		43	35	6	84

Table 151: Chi-Square Test results for presence of R&D departments by sector of company

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Sig.	99% Confidence Interval		Sig.	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	50,512[a]	36	,055	,078[b]	,071	,085			
Likelihood Ratio	49,003	36	,073	,039[b]	,034	,044			
Fisher's Exact Test	44,430			,051[b]	,046	,057			
Linear-by-Linear Association	,776[c]	1	,379	,384[b]	,371	,396	,190[b]	,180	,200
N of Valid Cases	84								

a. 52 cells (91,2%) have expected count less than 5. The minimum expected count is ,07.

b. Based on 10000 sampled tables with starting seed 624387341.

c. The standardized statistic is ,881.

B.5 Number of employee vs. R&D Department

The analysis of the relationship between the presence of an R&D department and the number of employees in an organization reveals a significant association. Among the 84 respondents, 43 indicated that their organization has a distinct R&D department, while 35 reported no such department, and 6 were unsure.The results show a clear trend: organizations with a larger number of employees are more likely to have a dedicated R&D department. Of those reporting the presence of an R&D department, 30 respondents were from organizations with more than 250 employees, and 13 were from organizations with 51–250 employees. In contrast, no respondents from organizations with 1–50 employees reported having a distinct R&D department. Among those without an R&D department, 17 respondents were from organizations with more than 250 employees, while smaller organizations with 1–50 employees (12 respondents) were more likely to lack a dedicated R&D function.Statistical analysis using the Pearson Chi-Square test yielded a value of 22.492 with 6 degrees of freedom and a p-value of 0.001, indicating a statistically significant association. Monte Carlo simulations further corroborated this result, with a two-sided p-value of 0.003 and a 99% confidence interval of [0.002, 0.005]. Fisher's Exact Test also confirmed the significance, with a p-value of 0.001. However, the high proportion of cells (66.7%) with expected counts less than 5 limits the reliability of the Chi-Square test, necessitating caution in interpreting these findings.

These results underline the influence of organizational size on the presence of an R&D department. Larger organizations, with greater resources and operational capacity, are significantly more likely to establish dedicated R&D functions. Conversely, smaller organizations may face resource constraints that limit their ability to support structured innovation efforts.

Table 152: Relationship between company size (number of employees) and the presence of R&D departments

Company has R&D Department * Number of employee Crosstabulation

Count

		Number of employee				
		1-10 employees	11-50 employees	51-250 employees	250+ employees	Total
Company has R&D Department	Yes, we have a distinct R&D Department	0	0	13	30	43
	No, we do not have a separate R&D Department	5	7	6	17	35
	I don't know	0	0	0	6	6
Total		5	7	19	53	84

Table 153: Chi-Square Test results for the relationship between company size (number of employees) and the presence of R&D departments

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Sig.	99% Confidence Interval		Sig.	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	22,492[a]	6	,001	,003[b]	,002	,005			
Likelihood Ratio	27,891	6	,000	,000[b]	,000	,000			
Fisher's Exact Test	20,003			,001[b]	,000	,002			
Linear-by-Linear Association	2,606[c]	1	,106	,114[b]	,106	,122	,071[b]	,064	,078
N of Valid Cases	84								

a. 8 cells (66,7%) have expected count less than 5. The minimum expected count is ,36.

b. Based on 10000 sampled tables with starting seed 957002199.

c. The standardized statistic is -1,614.

B.6 Market type vs R&D Department

The analysis of the relationship between the presence of a distinct R&D department and the market type of the organization reveals no statistically significant association. Among the 84 respondents, 43 reported that their organization has a distinct R&D department, 35 indicated that their organization does not have one, and 6 were unsure.

Respondents working in Business-to-Business (B2B) organizations reported the highest presence of R&D departments, with 21 indicating such a function. Among organizations serving both B2B and B2C markets, 17 respondents reported having an R&D department. In contrast, organizations focused solely on Business-to-Consumer (B2C) markets showed the lowest representation, with only 5 respondents reporting the presence of an R&D department. Notably, the lack of a separate R&D department was similarly distributed across market types, with 20 respondents from B2B organizations, 9 from mixed markets, and 6 from B2C reporting no dedicated R&D function.

Statistical analysis using the Pearson Chi-Square test yielded a value of 2.855 with 4 degrees of freedom and an asymptotic p-value of 0.582, suggesting no significant relationship. Monte Carlo simulations supported this result, with a two-sided p-value of 0.621 (99% confidence interval: [0.608, 0.633]). Fisher's Exact Test similarly found no significant association, with a p-value of 0.669. The Linear-by-Linear Association test also indicated no significant trend ($p = 0.294$). These results are further tempered by the fact that 44.4% of cells had expected counts below 5, limiting the reliability of the Chi-Square test.

While statistical significance was not achieved, observable trends suggest that organizations with R&D departments are slightly more prevalent in B2B markets and mixed B2B/B2C markets compared to purely B2C organizations. This may reflect the higher innovation demands and technical complexities often associated with B2B operations.

These findings indicate that market type alone may not be a decisive factor in the presence of an R&D department. However, the data underscores potential differences in how R&D priorities align with market focus. Future research could explore additional factors, such as industry-specific demands or company size, to provide a more nuanced understanding of the drivers behind R&D department establishment across different market types.

Table 154: Relationship between market type and the presence of R&D departments

Company has R&D Department * Market type Crosstabulation

Count

		Market type			
		Business-to-Business (B2B)	Business-to-Consumer (B2C)	Both B2B and B2C	Total
Company has R&D Department	Yes, we have a distinct R&D Department	21	5	17	43
	No, we do not have a separate R&D Department	20	6	9	35
	I don't know	4	0	2	6
Total		45	11	28	84

Table 155: Chi-Square Test results for the relationship between market type and the presence of R&D departments

Chi-Square Tests

				Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
					99% Confidence Interval			99% Confidence Interval	
	Value	df	Asymp. Sig. (2-sided)	Sig.	Lower Bound	Upper Bound	Sig.	Lower Bound	Upper Bound
Pearson Chi-Square	2,855[a]	4	,582	,621[b]	,608	,633			
Likelihood Ratio	3,619	4	,460	,543[b]	,530	,556			
Fisher's Exact Test	2,445			,669[b]	,657	,681			
Linear-by-Linear Association	1,099[c]	1	,294	,350[b]	,337	,362	,175[b]	,166	,185
N of Valid Cases	84								

a. 4 cells (44,4%) have expected count less than 5. The minimum expected count is ,79.

b. Based on 10000 sampled tables with starting seed 92208573.

c. The standardized statistic is -1,048.

B.7 Level of participation in R&D projects vs ESG Engagement

The analysis examining the relationship between participation in ESG or Impact Investments and the level of involvement in R&D projects reveals no statistically significant association. Of the 21 individuals engaged in ESG or Impact Investments, 3 are actively involved in leading or conducting R&D projects, 6 collaborate with R&D teams, 5 occasionally contribute insights, 2 have limited or no participation, and 5 report that R&D is not applicable to their current activities. For the 63 individuals not engaged in ESG, 11 are actively involved in R&D leadership, 12 collaborate with R&D teams, 7 occasionally contribute, 9 have limited involvement, and 24 indicate no current engagement in R&D.

The Pearson Chi-Square test yielded a value of 3.743 with 4 degrees of freedom and an asymptotic p-value of 0.442, indicating no significant relationship. Monte Carlo simulations with 10,000 iterations produced a two-sided p-value of 0.456 with a 99% confidence interval of [0.443, 0.469], corroborating the lack of statistical significance. Similarly, Fisher's Exact Test yielded a p-value of 0.461 with a confidence interval of [0.449, 0.474], further supporting this conclusion. The Linear-by-Linear Association test also found no significant trend ($p = 0.344$).

These results suggest that participation in ESG or Impact Investments does not strongly correlate with levels of R&D involvement in this sample. However, the observable trends, such as a higher proportion of ESG-engaged individuals collaborating with R&D teams, highlight potential areas for further investigation. Future research with larger and more balanced samples could better explore the interplay between sustainability practices and innovation, shedding light on how these efforts might be more effectively integrated. While no significant relationship was found, the data underscores the diversity of engagement in both ESG and R&D activities across the sample.

Table 156: Relationship between engagement in ESG or impact investments and level of participation in R&D projects

Works in ESG or Impact Investments * Level of participation in R&D projects Crosstabulation

Count

		Level of participation in R&D projects					
		Actively involved in leading or conducting R&D projects	Collaborate with R&D teams but not directly involved in project leadership	Occasionally contribute insights to ongoing R&D initiatives	Limited involvement or no participation in R&D projects	Not applicable - I am not currently engaged in professional activities with R&D components	Total
Works in ESG or Impact Investments	Yes	3	6	5	2	5	21
	No	11	12	7	9	24	63
Total		14	18	12	11	29	84

Table 157: Chi-Square test results for the relationship between engagement in ESG or impact investments and level of participation in R&D projects

Chi-Square Tests

				Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
					99% Confidence Interval			99% Confidence Interval	
	Value	df	Asymp. Sig. (2-sided)	Sig.	Lower Bound	Upper Bound	Sig.	Lower Bound	Upper Bound
Pearson Chi-Square	3,743[a]	4	,442	,456[b]	,443	,469			
Likelihood Ratio	3,616	4	,461	,508[b]	,496	,521			
Fisher's Exact Test	3,679			,461[b]	,449	,474			
Linear-by-Linear Association	,895[c]	1	,344	,369[b]	,356	,381	,194[b]	,184	,204
N of Valid Cases	84								

a. 4 cells (40,0%) have expected count less than 5. The minimum expected count is 2,75.

b. Based on 10000 sampled tables with starting seed 2000000.

c. The standardized statistic is ,946.

10. APPENDIX C - Sustainable development

Descriptive statistics

Table 158 further explores the central tendency of the data, revealing that the median and mode values for most variables are consistently 4 (Agree), underscoring a consensus among respondents. For example, variables like awareness of sustainable development and adoption of systems to reduce environmental impact show high levels of agreement, emphasizing the importance of tangible sustainability measures. The sum scores add another layer of understanding. The high cumulative score for adopting systems to reduce environmental impact (Sum = 364) reflects a strong organizational commitment to measures like waste reduction and renewable energy. Conversely, lower scores for HR processes exceeding legal requirements (Sum = 275) and stakeholder encouragement to adopt green practices (Sum = 297) suggest areas requiring attention and improvement.

Table 158: Median, Mode, and Sum Values for sustainable development related variables

Statistics

		Awareness of sustainable development	Value of sustainable practices	Complexity of implementing sustainability	Use of sustainability metrics	Adoption of systems to reduce environmental impact	Focus on environmental issues	Focus on social issues	Focus on financial issues	Consideration of social welfare	HR processes exceed legal requirements	Sustainable development as advertising	Sustainability for market survival	Sustainability known in market	Use of sustainable performance systems	Stakeholder encouragement to go green	Competitors' environmental protection
N	Valid	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
	Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean		4,13	4,05	3,61	3,86	4,33	3,88	3,75	3,99	3,85	3,27	3,57	3,62	3,55	3,89	3,54	3,35
Median		4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	3,00	4,00	4,00	4,00	4,00	4,00	3,00
Mode		4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4
Sum		347	340	303	324	364	326	315	335	323	275	300	304	298	327	297	281

Frequency distribution analysis

The following analysis delves into the frequency distribution results for each variable, highlighting trends and providing insights into sustainable development practices across organizations. The frequency tables serve as a foundation for interpreting respondents' perceptions and engagements with sustainability.

Awareness of sustainable development (Table 159) demonstrates a strong understanding among respondents, with 56% agreeing and 31% strongly agreeing. This results in a cumulative agreement of 87%, indicating that the concept of sustainable development is widely recognized. Only 3.6% disagreed, highlighting that most organizations already have a foundational awareness, which can be leveraged to further sustainability initiatives. Similarly, the value of sustainable practices (Table 160) shows that 48.8% agreed and 32.1% strongly agreed, underscoring the recognition of sustainability as critical to business success. However, the complexity of implementing sustainability (Table 161) reveals mixed views, with 55.9% agreement but 33.3% neutrality, indicating the need for tailored strategies to address challenges and streamline integration.

Table 159: Awareness of sustainable development frequency distribution

Awareness of sustainable development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1,2	1,2	1,2
	Disagree	2	2,4	2,4	3,6
	Neither Agree nor Disagree	8	9,5	9,5	13,1
	Agree	47	56,0	56,0	69,0
	Strongly Agree	26	31,0	31,0	100,0
	Total	84	100,0	100,0	

Table 160: Value of sustainable practices frequency distribution

Value of sustainable practices

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	3	3,6	3,6	6,0
	Neither Agree nor Disagree	11	13,1	13,1	19,0
	Agree	41	48,8	48,8	67,9
	Strongly Agree	27	32,1	32,1	100,0
	Total	84	100,0	100,0	

Table 161: Complexity of Implementing Sustainability Frequency Distribution

Complexity of implementing sustainability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,6	3,6	3,6
	Disagree	6	7,1	7,1	10,7
	Neither Agree nor Disagree	28	33,3	33,3	44,0
	Agree	31	36,9	36,9	81,0
	Strongly Agree	16	19,0	19,0	100,0
	Total	84	100,0	100,0	

The use of sustainability metrics (Table 162) reveals that 54.8% of respondents agreed and 19% strongly agreed, resulting in a total agreement of 73.8%. This reflects growing recognition of the importance of measurable sustainability performance. However, the 21.4% neutrality highlights the opportunity to further advocate for metrics-driven sustainability practices across industries.

Table 162: Use of sustainability metrics frequency distribution

Use of sustainability metrics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	2	2,4	2,4	4,8
	Neither Agree nor Disagree	18	21,4	21,4	26,2
	Agree	46	54,8	54,8	81,0
	Strongly Agree	16	19,0	19,0	100,0
	Total	84	100,0	100,0	

Adoption of systems to reduce environmental impact (Table 163) garnered the highest level of agreement, with 40.5% agreeing and 48.8% strongly agreeing, making a cumulative 89.3%. This demonstrates a significant commitment to tangible measures such as waste reduction, energy efficiency, and eco-friendly packaging. The near absence of disagreement underscores that environmental systems are widely prioritized. In additional, the focus on environmental issues (Table 164) indicates that 45.2% agreed and 26.2% strongly agreed, with a cumulative 71.4% agreement. This highlights that environmental sustainability remains a central pillar for most organizations. However, the 21.4% neutrality suggests that further emphasis on environmental initiatives is needed to engage a broader base of stakeholders.

Table 163: Adoption of systems to reduce environmental impact frequency

Adoption of systems to reduce environmental impact

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Neither Agree nor Disagree	7	8,3	8,3	10,7
	Agree	34	40,5	40,5	51,2
	Strongly Agree	41	48,8	48,8	100,0
	Total	84	100,0	100,0	

Table 164: Focus on environmental issues frequency distribution

Focus on environmental issues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	4	4,8	4,8	7,1
	Neither Agree nor Disagree	18	21,4	21,4	28,6
	Agree	38	45,2	45,2	73,8
	Strongly Agree	22	26,2	26,2	100,0
	Total	84	100,0	100,0	

The focus on social issues (Table 165) reveals that 48.8% agreed and 19% strongly agreed, resulting in 67.8% cumulative agreement. The 23.8% neutrality reveals room for improvement in integrating social sustainability into business practices, such as community engagement and equity-focused initiatives. Moreover, the focus on financial issues (Table 166) scored higher, with 47.6% agreeing and 32.1% strongly agreeing, reflecting a cumulative 79.7% agreement. This demonstrates that financial sustainability is well-aligned with organizational goals, likely due to its direct connection to profitability and risk management.

Table 165: Focus on social issues frequency distribution

Focus on social issues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,6	3,6	3,6
	Disagree	4	4,8	4,8	8,3
	Neither Agree nor Disagree	20	23,8	23,8	32,1
	Agree	41	48,8	48,8	81,0
	Strongly Agree	16	19,0	19,0	100,0
	Total	84	100,0	100,0	

Table 166: Focus on financial issues frequency distribution

Focus on financial issues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,6	3,6	3,6
	Disagree	5	6,0	6,0	9,5
	Neither Agree nor Disagree	9	10,7	10,7	20,2
	Agree	40	47,6	47,6	67,9
	Strongly Agree	27	32,1	32,1	100,0
	Total	84	100,0	100,0	

When examining the consideration of social welfare (Table 167), 52.4% agreed and 21.4% strongly agreed, indicating 73.8% cumulative agreement. This reflects a substantial acknowledgment of social welfare in business strategies. However, the 19% neutrality suggests that more efforts could be made to emphasize the broader societal impacts of organizational operations.

Table 167: Consideration of social welfare frequency distribution

Consideration of social welfare

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,6	3,6	3,6
	Disagree	3	3,6	3,6	7,1
	Neither Agree nor Disagree	16	19,0	19,0	26,2
	Agree	44	52,4	52,4	78,6
	Strongly Agree	18	21,4	21,4	100,0
	Total	84	100,0	100,0	

The results for HR processes exceeding legal requirements (Table 168) are less encouraging, with only 33.3% agreeing and 13.1% strongly agreeing, making a cumulative 46.4%. The significant neutrality (32.1%) and disagreement (21.4%) highlight potential gaps in advanced HR practices, such as diversity, employee well-being, and inclusive hiring policies.

Table 168: HR processes exceeding legal requirements frequency distribution

HR processes exceed legal requirements

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	9	10,7	10,7	10,7
	Disagree	9	10,7	10,7	21,4
	Neither Agree nor Disagree	27	32,1	32,1	53,6
	Agree	28	33,3	33,3	86,9
	Strongly Agree	11	13,1	13,1	100,0
	Total	84	100,0	100,0	

The perception of sustainable development as a means of advertising (Table 169) received mixed responses. While 40.5% agreed and 20.2% strongly agreed (cumulative 60.7%), 20.2% remained neutral. This suggests that while sustainability is recognized as a branding opportunity, it is not yet fully leveraged as a competitive advantage in many organizations. The responses regarding sustainability for market survival (Table 170) reflect that 40.5% agreed and 19% strongly agreed, resulting in 59.5% cumulative agreement. However, the 26.2% neutrality indicates that more education and advocacy are needed to underscore the role of sustainability in long-term market viability. The results for Sustainability Known in the Market (Table 171) show 52.4% agreeing and 8.3% strongly agreeing, with a cumulative agreement of 60.7%. The 28.6% neutrality and 10.7% disagreement indicate room for improvement in promoting sustainability's market visibility and importance.

Table 169: Sustainable development as a means of advertising frequency distribution

Sustainable development as advertising

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	4,8	4,8	4,8
	Disagree	12	14,3	14,3	19,0
	Neither Agree nor Disagree	17	20,2	20,2	39,3
	Agree	34	40,5	40,5	79,8
	Strongly Agree	17	20,2	20,2	100,0
	Total	84	100,0	100,0	

Table 170:Sustainability for market survival frequency distribution

Sustainability for market survival

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2,4	2,4	2,4
	Disagree	10	11,9	11,9	14,3
	Neither Agree nor Disagree	22	26,2	26,2	40,5
	Agree	34	40,5	40,5	81,0
	Strongly Agree	16	19,0	19,0	100,0
	Total	84	100,0	100,0	

Table 171 :Sustainability known in the market frequency distribution

Sustainability known in market

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,6	3,6	3,6
	Disagree	6	7,1	7,1	10,7
	Neither Agree nor Disagree	24	28,6	28,6	39,3
	Agree	44	52,4	52,4	91,7
	Strongly Agree	7	8,3	8,3	100,0
	Total	84	100,0	100,0	

The results for Use of Sustainable Performance Systems (Table 172) show 60.7% agreeing and 15.5% strongly agreeing, with a cumulative agreement of 76.2%. However, 22.6% neutrality indicates that some organizations are yet to fully adopt or recognize the value of these systems.

Table 172:Use of sustainable performance systems frequency distribution

Use of sustainable performance systems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1,2	1,2	1,2
	Neither Agree nor Disagree	19	22,6	22,6	23,8
	Agree	51	60,7	60,7	84,5
	Strongly Agree	13	15,5	15,5	100,0
	Total	84	100,0	100,0	

The role of stakeholders in encouraging green practices (Table 173) shows 46.4% agreement and 11.9% strong agreement, totaling 58.3%. The 31% neutrality suggests a need for stronger stakeholder engagement to drive green initiatives, such as incentivizing sustainable supply chain practices.

The responses for competitors' environmental protection measures (Table 174) reveal that 39.3% agreed and 9.5% strongly agreed, while 34.5% were neutral. This indicates that while some organizations are aware of competitive environmental efforts, many may not actively benchmark or align their strategies with market leaders.

Table 173: Stakeholder encouragement to go green frequency distribution

Stakeholder encouragement to go green

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6,0	6,0	6,0
	Disagree	4	4,8	4,8	10,7
	Neither Agree nor Disagree	26	31,0	31,0	41,7
	Agree	39	46,4	46,4	88,1
	Strongly Agree	10	11,9	11,9	100,0
	Total	84	100,0	100,0	

Table 174: Competitors' environmental protection measures frequency distribution

Competitors' environmental protection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	7,1	7,1	7,1
	Disagree	8	9,5	9,5	16,7
	Neither Agree nor Disagree	29	34,5	34,5	51,2
	Agree	33	39,3	39,3	90,5
	Strongly Agree	8	9,5	9,5	100,0
	Total	84	100,0	100,0	

Correlation analysis

The correlation matrix (Table 175) provides valuable insights into the relationships between various dimensions of sustainable development practices, revealing patterns that highlight both strengths and challenges. Awareness of sustainable development demonstrates significant positive correlations with critical variables such as the value of sustainable practices ($r=0.560$, $p<0.01$), focus on environmental issues ($r=0.338$, $p<0.01$) and use of sustainable performance systems ($r=0.408$,

p<0.01). These findings suggest that higher awareness serves as a foundation for organizations to adopt sustainability measures across diverse domains. The moderate correlation with stakeholder encouragement (r=0.258, p<0.05) indicates that while awareness drives internal alignment, external advocacy plays a complementary role.

The value of sustainable practices emerges as an important variable, with strong correlations to adoption of systems to reduce environmental impact (r=0.479, p<0.01), focus on environmental issues (r=0.505, p<0.01), and use of sustainable performance systems (r=0.507, p<0.01). These relationships highlight how organizations that prioritize the value of sustainability are more likely to adopt tangible environmental measures and performance-based systems. Additionally, significant correlations with social focus (r=0.424, p<0.01) and financial focus (r=0.387, p<0.01) emphasize the holistic integration of sustainability across environmental, social, and economic dimensions.

The complexity of implementing sustainability shows moderate correlations with the use of sustainability metrics (r=0.293, p<0.01) and adoption of environmental systems (r=0.220, p<0.05). These relationships indicate that organizations are addressing implementation challenges through structured approaches such as performance metrics and operational adjustments. However, weaker correlations with stakeholder encouragement (r=0.257, p<0.05) and sustainability as advertising (r=0.315, p<0.01) suggest underutilization of external support and marketing in overcoming implementation barriers.

The adoption of systems to reduce environmental impact is strongly correlated with the use of sustainability metrics (r=0.609, p<0.01), focus on environmental issues (r=0.457, p<0.01) and financial focus (r=0.442, p<0.01). These correlations demonstrate that organizations adopting such systems often integrate them into broader sustainability agendas encompassing financial, social, and operational goals. The significant correlation with social focus (r=0.356, p<0.01) further emphasizes the interconnected nature of these efforts.

Stakeholder encouragement to adopt green practices shows a strong correlation with competitors' environmental protection (r=0.645, p<0.01), reflecting how external pressures and market competition influence sustainability initiatives. The correlation between stakeholder encouragement and sustainability known in the market (r=0.564, p<0.01) underscores the importance of advocacy and external perceptions in shaping organizational strategies and public positioning. These dynamics highlight the dual role of external pressures in driving both internal adoption and external visibility.

The use of sustainable performance systems correlates strongly with focus on environmental issues (r=0.499, p<0.01,), social focus (r=0.474,p<0.01) and financial focus (r=0.345,p<0.01). These relationships demonstrate that performance systems are integral to operationalizing sustainability across multiple dimensions. The correlation with stakeholder encouragement (r=0.424, p<0.01r=0.424) and sustainability known in the market (r=0.391, p<0.01) suggests that performance systems enhance both internal accountability and external market positioning.

Sustainable development as advertising is strongly correlated with sustainability for market survival (r=0.726,p<0.01), indicating alignment between branding efforts and strategic goals of long-term

viability. The correlation with financial focus (r=0.310,p<0.01) reinforces the idea that sustainability is not only an ethical imperative but also a driver of economic resilience and competitive advantage. Competitors' environmental protection measures demonstrate strong correlations with focus on environmental issues (r=0.471, p<0.01) and stakeholder encouragement (r=0.645, p<0.01), suggesting that market competition and external pressures play a significant role in shaping organizational strategies. These findings indicate that organizations benchmark their sustainability efforts against competitors to remain relevant in a market increasingly driven by sustainability.

The correlation matrix highlights the interconnected nature of sustainable development variables, where awareness, perceived value, and tangible adoption efforts act as critical levers for broader sustainability integration. The significant correlations between adoption of systems, performance metrics, and stakeholder engagement reflect a multidimensional approach to sustainability, influenced by both internal priorities and external pressures. While the data shows positive momentum, weaker correlations in areas like HR processes and sustainability as advertising suggest potential areas for improvement, particularly in leveraging sustainability for strategic and operational gains.

Table 175: Correlation matrix for sustainable development variables

Correlations

		Awareness of sustainable development	Value of sustainable practices	Complexity of implementing sustainability	Use of sustainability metrics	Adoption of systems to reduce environmental impact	Focus on environmental issues	Focus on social issues	Focus on financial issues	Consideration of social welfare	HR processes exceed legal requirements	Sustainable development as advertising	Sustainability for market survival	Sustainability known in market	Use of sustainable performance systems	Stakeholder encouragement to go green	Competitors' environmental protection
Awareness of sustainable development	Pearson Correlation	1	,560**	,178	,401**	,252*	,338**	,178	,220*	,366**	,243*	,248*	,344**	,370**	,408**	,258*	,277*
	Sig. (2-tailed)		,000	,106	,000	,021	,002	,106	,044	,001	,026	,023	,001	,001	,000	,018	,011
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Value of sustainable practices	Pearson Correlation	,560**	1	,316**	,423**	,479**	,505**	,424**	,387**	,441**	,299**	,296**	,365**	,389**	,507**	,395**	,399**
	Sig. (2-tailed)	,000		,003	,000	,000	,000	,000	,000	,000	,006	,006	,001	,000	,000	,000	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Complexity of implementing sustainability	Pearson Correlation	,178	,316**	1	,293**	,220*	,299**	,228*	,262*	,274*	,179	,315**	,162	,179	,270*	,257*	,312**
	Sig. (2-tailed)	,106	,003		,007	,044	,006	,037	,016	,012	,104	,004	,141	,103	,013	,018	,004
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Use of sustainability metrics	Pearson Correlation	,401**	,423**	,293**	1	,609**	,331**	,259*	,386**	,422**	,066	,321**	,292**	,172	,491**	,375**	,395**
	Sig. (2-tailed)	,000	,000	,007		,000	,002	,017	,000	,000	,552	,003	,007	,118	,000	,000	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Adoption of systems to reduce environmental impact	Pearson Correlation	,252*	,479**	,220*	,609**	1	,457**	,356**	,442**	,415**	,042	,315**	,358**	,226*	,441**	,359**	,261*
	Sig. (2-tailed)	,021	,000	,044	,000		,000	,001	,000	,000	,704	,004	,001	,039	,000	,001	,016
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Focus on environmental issues	Pearson Correlation	,338**	,505**	,299**	,331**	,457**	1	,580**	,384**	,340**	,209	,286**	,348**	,371**	,499**	,321**	,471**
	Sig. (2-tailed)	,002	,000	,006	,002	,000		,000	,000	,002	,057	,008	,001	,001	,000	,003	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Focus on social issues	Pearson Correlation	,178	,424**	,228*	,259*	,356**	,580**	1	,483**	,301**	,196	,195	,254*	,427**	,474**	,344**	,428**
	Sig. (2-tailed)	,106	,000	,037	,017	,001	,000		,000	,005	,073	,075	,020	,000	,000	,001	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Focus on financial issues	Pearson Correlation	,220*	,387**	,262*	,386**	,442**	,384**	,483**	1	,363**	,170	,310**	,319**	,157	,345**	,217*	,381**
	Sig. (2-tailed)	,044	,000	,016	,000	,000	,000	,000		,001	,123	,004	,003	,153	,001	,048	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Consideration of social welfare	Pearson Correlation	,366**	,441**	,274*	,422**	,415**	,340**	,301**	,363**	1	,514**	,310**	,325**	,193	,199	,200	,223*
	Sig. (2-tailed)	,001	,000	,012	,000	,000	,002	,005	,001		,000	,004	,003	,078	,070	,068	,042
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
HR processes exceed legal requirements	Pearson Correlation	,243*	,299**	,179	,066	,042	,209	,196	,170	,514**	1	,261*	,309**	,241*	,052	,243*	,204
	Sig. (2-tailed)	,026	,006	,104	,552	,704	,057	,073	,123	,000		,016	,004	,027	,638	,026	,062
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Sustainable development as advertising	Pearson Correlation	,248*	,296**	,315**	,321**	,315**	,286**	,195	,310**	,310**	,261*	1	,726**	,242*	,299**	,292**	,407**
	Sig. (2-tailed)	,023	,006	,004	,003	,004	,008	,075	,004	,004	,016		,000	,027	,006	,007	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Sustainability for market survival	Pearson Correlation	,344**	,365**	,162	,292**	,358**	,348**	,254*	,319**	,325**	,309**	,726**	1	,455**	,338**	,371**	,446**
	Sig. (2-tailed)	,001	,001	,141	,007	,001	,001	,020	,003	,003	,004	,000		,000	,002	,001	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Sustainability known in market	Pearson Correlation	,370**	,389**	,179	,172	,226*	,371**	,427**	,157	,193	,241*	,242*	,455**	1	,391**	,564**	,454**
	Sig. (2-tailed)	,001	,000	,103	,118	,039	,001	,000	,153	,078	,027	,027	,000		,000	,000	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Use of sustainable performance systems	Pearson Correlation	,408**	,507**	,270*	,491**	,441**	,499**	,474**	,345**	,199	,052	,299**	,338**	,391**	1	,424**	,459**
	Sig. (2-tailed)	,000	,000	,013	,000	,000	,000	,000	,001	,070	,638	,006	,002	,000		,000	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Stakeholder encouragement to go green	Pearson Correlation	,258*	,395**	,257*	,375**	,359**	,321**	,344**	,217*	,200	,243*	,292**	,371**	,564**	,424**	1	,645**
	Sig. (2-tailed)	,018	,000	,018	,000	,001	,003	,001	,048	,068	,026	,007	,001	,000	,000		,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Competitors' environmental protection	Pearson Correlation	,277*	,399**	,312**	,395**	,261*	,471**	,428**	,381**	,223*	,204	,407**	,446**	,454**	,459**	,645**	1
	Sig. (2-tailed)	,011	,000	,004	,000	,016	,000	,000	,000	,042	,062	,000	,000	,000	,000	,000	
	N	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Factor analysis

Factor analysis was conducted on the dataset to explore the interrelationships between variables related to sustainable development. This analysis aimed to reduce the complexity of the data by identifying core factors that summarize key dimensions of sustainability practices within organizations. The results, as detailed below, reveal five distinct components that provide valuable insights into sustainability adoption, challenges, and strategic focus areas.

Communalities

Communalities (Table 176) reflect the proportion of variance in each variable accounted for by the extracted components. High communalities, such as those for "HR processes exceed legal requirements" (0.807), "Sustainable development as advertising" (0.838), and "Sustainability for market survival" (0.781), indicate that these variables are strongly represented within the factor structure. Conversely, the variable "Complexity of implementing sustainability" exhibits a notably low communality (0.291), suggesting it is weakly associated with the extracted components and may function as an independent construct.

The majority of variables demonstrate high communalities (extraction values > 0.6), affirming that the components effectively capture a significant proportion of the variance in these variables. However, the low communality for "Complexity of implementing sustainability" highlights its limited integration within the whole factor structure. This finding suggests that while the dataset supports a cohesive factor model, certain elements, such as implementation complexity, warrant separate consideration due to their unique challenges and contextual significance.

Table 176: Communalities for sustainable development variables

Communalities

	Initial	Extraction
Awareness of sustainable development	1,000	,753
Value of sustainable practices	1,000	,681
Complexity of implementing sustainability	1,000	,291
Use of sustainability metrics	1,000	,726
Adoption of systems to reduce environmental impact	1,000	,677
Focus on environmental issues	1,000	,610
Focus on social issues	1,000	,766
Focus on financial issues	1,000	,627
Consideration of social welfare	1,000	,757
HR processes exceed legal requirements	1,000	,807
Sustainable development as advertising	1,000	,838
Sustainability for market survival	1,000	,781
Sustainability known in market	1,000	,726
Use of sustainable performance systems	1,000	,654
Stakeholder encouragement to go green	1,000	,639
Competitors' environmental protection	1,000	,675

Extraction Method: Principal Component Analysis.

Component matrix and rotated component matrix for sustainable development variables

The Component Matrix(Table 177) and Rotated Component Matrix(Table 178) provide a comprehensive understanding of the underlying structure of the sustainable development variables. While

the Component Matrix highlights initial factor loadings, the Rotated Component Matrix improves interpretability by redistributing the factor loadings using the Varimax rotation.

Table 177: Component matrix for sustainable development variables

Component Matrix[a]

	Component				
	1	2	3	4	5
Value of sustainable practices	,739				
Competitors' environmental protection	,698		-,395		
Focus on environmental issues	,697				
Use of sustainable perfor-mance systems	,690	-,343			
Sustainability for market survival	,650	,431		-,408	
Adoption of systems to re-duce environmental impact	,647	-,367			
Stakeholder encouragement to go green	,643		-,462		
Use of sustainability metrics	,643	-,318			
Focus on social issues	,631			,349	,401
Sustainability known in market	,595		-,520		
Focus on financial issues	,592				,401
Sustainable development as advertising	,584	,395		-,561	
Consideration of social welfare	,579		,563		
Complexity of implementing sustainability	,461				
HR processes exceed legal requirements	,392	,656		,397	
Awareness of sustainable development	,571				-,611

Extraction Method: Principal Component Analysis.

a. 5 components extracted.

Table 178: Rotated component matrix for sustainable development variables

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
Sustainability known in market	,817				
Stakeholder encouragement to go green	,719				
Competitors' environmental protection	,634		,363	,358	
Use of sustainability metrics		,760			
Awareness of sustainable development	,352	,666			,403
Adoption of systems to reduce environmental impact		,650	,445		
Value of sustainable practices	,373	,575			,365
Use of sustainable performance systems	,492	,531	,335		
Focus on social issues	,436		,741		
Focus on financial issues			,714		
Focus on environmental issues	,398		,591		
Complexity of implementing sustainability			,426		
Sustainable development as advertising				,868	
Sustainability for market survival	,353			,759	
HR processes exceed legal requirements					,851
Consideration of social welfare		,377	,329		,684

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 10 iterations.

Below is an analysis of Rotated Component Matrix:

Component 1: External influence and market dynamics

- Variables such as "Sustainability known in market" (0.817), "Stakeholder encouragement to go green" (0.719), and "Competitors' environmental protection" (0.634) load strongly onto this factor.
- This highlights the role of external stakeholders, market awareness, and competitive dynamics in shaping sustainability strategies. The cross-loading of " Competitors' environmental protection" across multiple components underscores its multifaceted influence.

Component 2: Operational metrics and awareness

- Key variables include "Use of sustainability metrics" (0.760), "Adoption of systems to reduce environmental impact" (0.650), and "Awareness of sustainable development" (0.666).
- This factor highlights the importance of structured systems and awareness in implementing sustainability. It underscores the role of operational tools like metrics and systems in transforming awareness into action.

Component 3: Social and financial integration

- High loadings for "Focus on social issues" (0.741) and "Focus on financial issues" (0.714) define this component.
- This component underscores the balance between social responsibility and economic objectives, highlighting sustainability as a holistic framework integrating societal and financial dimensions.
- The inclusion of "Focus on environmental issues" (0.591) suggests interconnectedness between social, financial, and environmental aspects.

Component 4: Strategic branding and competitive advantage

- Strong loadings for "Sustainable development as advertising" (0.868) and "Sustainability for market survival" (0.759) represent this factor.
- This component reflects the strategic use of sustainability as a branding tool and a mechanism for achieving long-term market survival.
- Cross-loadings with other components, such as Competitors' environmental protection, suggest that branding efforts are influenced by both internal and external factors.

Component 5: HR Practices and social responsibility

- High loadings for "HR processes exceed legal requirements" (0.851) and "Consideration of social welfare" (0.684) highlight the importance of human resource practices and broader social responsibility.
- This component emphasizes internal organizational efforts, including HR strategies that go beyond compliance to foster a culture of sustainability.

Multivariate Analysis of Variance (MANOVA) for sustainable development dimensions across sectors

The Multivariate Analysis of Variance (MANOVA) was conducted to examine the influence of company sectors on four key dimensions of sustainable development: awareness of sustainable development, complexity of implementing sustainability, use of sustainability metrics, and stakeholder encouragement to go green. Although the multivariate tests did not reveal statistically significant differences across sectors ($p>0.05$), the analysis of descriptive statistics and partial effect sizes provides valuable insights into sectoral trends.

Descriptive Statistics

The descriptive statistics for each sustainable development dimension across sectors are summarized in Table 179. These results illustrate notable variations in mean scores and standard deviations across sectors.

Table 179: Descriptive statistics by sector for sustainable development variables

Descriptive Statistics

	Sector of company	Mean	Std. Deviation	N
Awareness of sustainable development	Agriculture/Food	3,90	,738	10
	Mining and Natural Resources	5,00	.	1
	Manufacturing	4,25	,622	12
	Construction	3,67	,516	6
	Energy	3,67	,577	3
	ICT	4,43	,535	7
	Financial Sector	5,00	,000	2
	Healthcare	3,50	,707	2
	Retail	5,00	.	1
	Transportation and Logistics	4,00	,000	3
	Education Sector	4,00	,000	2
	Government and Public Administration	5,00	.	1
	Consulting Services	4,25	,856	16
	Automotive Sector	3,00	.	1
	Consumer Goods	4,00	.	1
	Environmental and Green Energy	4,00	1,732	5
	Pharmaceuticals and Biotechnology	4,00	,000	2
	Legal Services	4,00	.	1
	Other	4,25	,707	8
	Total	4,13	,773	84
Complexity of implementing sustainability	Agriculture/Food	3,70	1,252	10
	Mining and Natural Resources	4,00	.	1
	Manufacturing	3,75	,754	12
	Construction	3,00	,632	6
	Energy	3,67	,577	3
	ICT	3,57	,976	7
	Financial Sector	4,50	,707	2

	Healthcare	3,50	,707	2
	Retail	1,00	.	1
	Transportation and Logistics	3,33	,577	3
	Education Sector	4,50	,707	2
	Government and Public Administration	5,00	.	1
	Consulting Services	3,56	1,094	16
	Automotive Sector	4,00	.	1
	Consumer Goods	5,00	.	1
	Environmental and Green Energy	3,60	1,517	5
	Pharmaceuticals and Biotechnology	4,00	1,414	2
	Legal Services	4,00	.	1
	Other	3,25	,707	8
	Total	3,61	,994	84
Use of sustainability metrics	Agriculture/Food	4,10	,568	10
	Mining and Natural Resources	5,00	.	1
	Manufacturing	3,83	,835	12
	Construction	3,50	,548	6
	Energy	4,00	,000	3
	ICT	3,86	,378	7
	Financial Sector	4,50	,707	2
	Healthcare	3,50	,707	2
	Retail	5,00	.	1
	Transportation and Logistics	3,67	1,528	3
	Education Sector	3,50	,707	2
	Government and Public Administration	4,00	.	1
	Consulting Services	3,88	1,025	16
	Automotive Sector	3,00	.	1
	Consumer Goods	5,00	.	1
	Environmental and Green Energy	3,20	1,483	5
	Pharmaceuticals and Biotechnology	4,50	,707	2

	Legal Services	4,00	.	1
	Other	3,75	,707	8
	Total	3,86	,838	84
Stakeholder encouragement to go green	Agriculture/Food	3,70	1,160	10
	Mining and Natural Resources	4,00	.	1
	Manufacturing	3,83	,577	12
	Construction	2,50	1,049	6
	Energy	3,67	,577	3
	ICT	3,86	,378	7
	Financial Sector	4,00	,000	2
	Healthcare	3,50	,707	2
	Retail	3,00	.	1
	Transportation and Logistics	4,00	1,000	3
	Education Sector	3,00	1,414	2
	Government and Public Administration	4,00	.	1
	Consulting Services	3,75	1,065	16
	Automotive Sector	3,00	.	1
	Consumer Goods	5,00	.	1
	Environmental and Green Energy	3,20	1,483	5
	Pharmaceuticals and Biotechnology	3,50	,707	2
	Legal Services	4,00	.	1
	Other	2,75	,886	8
	Total	3,54	,975	84

Key observations

- Awareness of Sustainable Development: The highest scores (5.00) were observed in sectors such as Retail, Financial Sector, and Government/Public Administration, reflecting a strong alignment with sustainability principles. The Automotive Sector recorded the lowest score (3.00), signaling a potential need for increased awareness initiatives.
- Complexity of Implementing Sustainability: Sectors like Government/Public Administration and Consumer Goods reported the highest complexity (5.00), suggesting these industries face regulatory or operational barriers. The Retail sector had the lowest complexity score

(1.00), indicating streamlined processes or fewer challenges in adopting sustainability measures.

- Use of Sustainability Metrics: Retail and Consumer Goods sectors excelled in the use of sustainability metrics, with mean scores of 5.00. The Automotive Sector scored the lowest (3.00), highlighting an area for improvement in adopting measurement tools.
- Stakeholder Encouragement to Go Green: Stakeholder engagement was highest in the Consumer Goods sector (mean = 5.00), underscoring strong external pressures to adopt sustainability. The Construction sector had the lowest score (2.50), suggesting a need for better stakeholder involvement.

Multivariate tests results

The multivariate tests examined the collective impact of the company sector on all four dimensions. Results are presented in Table 180.

Table 180: Multivariate tests for sectoral influence for sustainable development variables

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	,962	393,064[a]	4,000	62,000	,000	,962
	Wilks' Lambda	,038	393,064[a]	4,000	62,000	,000	,962
	Hotelling's Trace	25,359	393,064[a]	4,000	62,000	,000	,962
	Roy's Largest Root	25,359	393,064[a]	4,000	62,000	,000	,962
Company_sector	Pillai's Trace	,808	,915	72,000	260,000	,668	,202
	Wilks' Lambda	,398	,902	72,000	246,157	,692	,206
	Hotelling's Trace	1,059	,890	72,000	242,000	,717	,209
	Roy's Largest Root	,443	1,600[b]	18,000	65,000	,087	,307

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept + Company_sector

The multivariate tests do not reveal statistically significant sectoral differences ($p>0.05$), indicating that the sectors do not collectively influence all four sustainable development dimensions in a meaningful way.

Tests of between-subjects effects

The between-subjects tests assess the sectoral influence on each individual sustainable development dimension. While no sectoral differences reached statistical significance ($p>0.05$), stakeholder encouragement to go green had the highest effect size ($\eta^2=0.251$), indicating a modest sectoral influence.

Table 181: Tests of Between-Subjects Effects by Dimension for sustainable development variables

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Awareness of sustainable development	9,695[a]	18	,539	,878	,605	,196
	Complexity of implementing sustainability	18,501[b]	18	1,028	1,052	,419	,226
	Use of sustainability metrics	10,645[c]	18	,591	,807	,685	,183
	Stakeholder encouragement to go green	19,802[d]	18	1,100	1,210	,280	,251
Intercept	Awareness of sustainable development	652,254	1	652,254	1063,522	,000	,942
	Complexity of implementing sustainability	527,036	1	527,036	539,187	,000	,892
	Use of sustainability metrics	601,542	1	601,542	820,735	,000	,927
	Stakeholder encouragement to go green	488,009	1	488,009	536,814	,000	,892
Company_sector	Awareness of sustainable development	9,695	18	,539	,878	,605	,196
	Complexity of implementing sustainability	18,501	18	1,028	1,052	,419	,226
	Use of sustainability metrics	10,645	18	,591	,807	,685	,183
	Stakeholder encouragement to go green	19,802	18	1,100	1,210	,280	,251

Error	Awareness of sustainable development	39,864	65	,613			
	Complexity of implementing sustainability	63,535	65	,977			
	Use of sustainability metrics	47,640	65	,733			
	Stakeholder encouragement to go green	59,090	65	,909			
Total	Awareness of sustainable development	1483,000	84				
	Complexity of implementing sustainability	1175,000	84				
	Use of sustainability metrics	1308,000	84				
	Stakeholder encouragement to go green	1129,000	84				
Corrected Total	Awareness of sustainable development	49,560	83				
	Complexity of implementing sustainability	82,036	83				
	Use of sustainability metrics	58,286	83				
	Stakeholder encouragement to go green	78,893	83				

a. R Squared = ,196 (Adjusted R Squared = -,027)

b. R Squared = ,226 (Adjusted R Squared = ,011)

c. R Squared = ,183 (Adjusted R Squared = -,044)

d. R Squared = ,251 (Adjusted R Squared = ,044)

Levene's Test for Homogeneity

Levene's test confirmed the equality of variances across sectors for all dimensions (p>0.05), as shown in Table 182, validating the MANOVA assumptions.

Table 182: Levene's Test for Equality of Variances for sustainable development variables

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Awareness of sustainable development	1,631	18	65	,078
Complexity of implementing sustainability	1,552	18	65	,101
Use of sustainability metrics	1,158	18	65	,322
Stakeholder encouragement to go green	1,186	18	65	,299

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Company_sector

The MANOVA results provide valuable insights into how sectors differ in their approach to sustainable development. Although no statistically significant differences were found, high-performing sectors such as Retail, Consumer Goods, and Financial Services demonstrate strong alignment with sustainability practices, serving as potential benchmarks. Sectors like Construction and Automotive, with lower scores, indicate areas for targeted interventions, such as enhanced stakeholder engagement and the adoption of sustainability metrics.

Multivariate Analysis of Variance (MANOVA) for sustainable development dimensions by company size

The Multivariate Analysis of Variance (MANOVA) was conducted to examine the influence of company size (measured by the number of employees) on four dimensions of sustainable development: awareness of sustainable development, complexity of implementing sustainability, use of sustainability metrics and stakeholder encouragement to go green. While no statistically significant differences were found across company sizes (p>0.05), descriptive statistics and partial effect sizes highlight interesting patterns.The descriptive statistics for each sustainable development dimension by company size are summarized below. These results indicate variations in mean scores and standard deviations across company size groups.

Table 183: Descriptive statistics by company size for sustainable development dimensions

Descriptive Statistics

	Number of employee	Mean	Std. Deviation	N
Awareness of sustainable development	1-10 employees	3,60	,548	5
	11-50 employees	4,29	,756	7
	51-250 employees	4,11	,994	19
	250+ employees	4,17	,700	53
	Total	4,13	,773	84
Complexity of implementing sustainability	1-10 employees	2,80	,447	5
	11-50 employees	4,00	1,155	7
	51-250 employees	3,58	1,121	19
	250+ employees	3,64	,942	53
	Total	3,61	,994	84
Use of sustainability metrics	1-10 employees	3,60	,548	5
	11-50 employees	3,71	,756	7
	51-250 employees	3,74	1,046	19
	250+ employees	3,94	,795	53
	Total	3,86	,838	84
Stakeholder encouragement to go green	1-10 employees	2,60	1,140	5
	11-50 employees	3,14	1,069	7
	51-250 employees	3,68	,885	19
	250+ employees	3,62	,945	53
	Total	3,54	,975	84

Key observations:

- Awareness of Sustainable Development: Larger organizations with 250+ employees exhibited the highest awareness (mean = 4.17), followed by medium-sized companies (51-250 employees, mean = 4.11). Small businesses with 1-10 employees reported the lowest awareness (mean = 3.60), suggesting potential gaps in sustainability knowledge among smaller organizations.
- Complexity of Implementing Sustainability: Companies with 11-50 employees reported the highest complexity (mean = 4.00), followed by larger firms (250+ employees, mean = 3.64). Micro businesses (1-10 employees) had the lowest complexity score (mean = 2.80), potentially reflecting simpler operational structures.
- Use of Sustainability Metrics: Larger firms (250+ employees) had the highest score (mean = 3.94), indicating greater adoption of metrics-driven approaches to sustainability. Micro

businesses scored the lowest (mean = 3.60), reflecting potential barriers to implementing advanced measurement tools.

- Stakeholder Encouragement to Go Green: The highest scores were reported by medium-sized companies (51-250 employees, mean = 3.68), indicating strong stakeholder influence. Micro businesses scored the lowest (mean = 2.60), suggesting weaker external pressures to adopt green practices.

Multivariate test results

The multivariate test results evaluate the collective effect of company size on all four dimensions. Results are summarized in the table below.

Table 184: Multivariate Tests for Company Size on Sustainable Development Dimensions

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	,951	375,926[a]	4,000	77,000	,000	,951
	Wilks' Lambda	,049	375,926[a]	4,000	77,000	,000	,951
	Hotelling's Trace	19,529	375,926[a]	4,000	77,000	,000	,951
	Roy's Largest Root	19,529	375,926[a]	4,000	77,000	,000	,951
Company_size	Pillai's Trace	,163	1,135	12,000	237,000	,333	,054
	Wilks' Lambda	,844	1,125	12,000	204,014	,341	,055
	Hotelling's Trace	,177	1,113	12,000	227,000	,350	,056
	Roy's Largest Root	,109	2,153[b]	4,000	79,000	,082	,098

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept + Company_size

The multivariate results do not indicate statistically significant differences across company size groups ($p>0.05$), suggesting that company size does not collectively influence all four sustainable development dimensions.

Tests of Between-Subjects Effects

The between-subjects effects provide a closer look at the influence of company size on each sustainable development dimension. Results are summarized in the table below.

Table 185: Between-subjects effects for sustainable development dimensions by company size

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Awareness of sustainable development	1,670[a]	3	,557	,930	,430	,034
	Complexity of implementing sustainability	4,415[b]	3	1,472	1,517	,216	,054
	Use of sustainability metrics	1,143[c]	3	,381	,533	,661	,020
	Stakeholder encouragement to go green	6,278[d]	3	2,093	2,305	,083	,080
Intercept	Awareness of sustainable development	630,305	1	630,305	1052,927	,000	,929
	Complexity of implementing sustainability	474,406	1	474,406	488,951	,000	,859
	Use of sustainability metrics	542,614	1	542,614	759,658	,000	,905
	Stakeholder encouragement to go green	410,986	1	410,986	452,782	,000	,850
Company_size	Awareness of sustainable development	1,670	3	,557	,930	,430	,034
	Complexity of implementing sustainability	4,415	3	1,472	1,517	,216	,054
	Use of sustainability metrics	1,143	3	,381	,533	,661	,020
	Stakeholder encouragement to go green	6,278	3	2,093	2,305	,083	,080

Error	Awareness of sustainable development	47,890	80	,599			
	Complexity of implementing sustainability	77,620	80	,970			
	Use of sustainability metrics	57,143	80	,714			
	Stakeholder encouragement to go green	72,615	80	,908			
Total	Awareness of sustainable development	1483,000	84				
	Complexity of implementing sustainability	1175,000	84				
	Use of sustainability metrics	1308,000	84				
	Stakeholder encouragement to go green	1129,000	84				
Corrected Total	Awareness of sustainable development	49,560	83				
	Complexity of implementing sustainability	82,036	83				
	Use of sustainability metrics	58,286	83				
	Stakeholder encouragement to go green	78,893	83				

a. R Squared = ,034 (Adjusted R Squared = -,003)

b. R Squared = ,054 (Adjusted R Squared = ,018)

c. R Squared = ,020 (Adjusted R Squared = -,017)

d. R Squared = ,080 (Adjusted R Squared = ,045)

No individual dimension reached statistical significance (p>0.05). However, stakeholder encouragement to go green showed the largest effect size (η^2=0.080), suggesting that company size may moderately influence this dimension.

Homogeneity of variances

Levene's test results validate the assumption of equal variances across company size groups (p>0.05) for all dimensions, ensuring the reliability of MANOVA results.

Table 186: Levene's Test for equality of variances for sustainable development dimensions

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Awareness of sustainable development	,476	3	80	,700
Complexity of implementing sustainability	1,586	3	80	,199
Use of sustainability metrics	,558	3	80	,644
Stakeholder encouragement to go green	,293	3	80	,830

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Company_size

The analysis suggests that company size does not significantly affect sustainable development dimensions. However, the observed trends provide actionable insights. Larger organizations generally exhibit higher awareness and adoption of sustainability metrics, reflecting their resources and capabilities. Smaller organizations, particularly micro businesses, report lower scores across most dimensions, indicating a need for targeted support, such as training and resource allocation, to enhance sustainability engagement.

Medium-sized companies (51-250 employees) demonstrated stronger stakeholder encouragement to go green, suggesting that external pressures, including consumer expectations and supply chain requirements, are particularly influential in this group.

11. APPENDIX D- Enterprise ESG performance

Table 187: Pearson Correlation Matrix of ESG Performance indicators

Correlations

		Presence of environmental or CSR report	Stakeholder involvement in environmental policy	Department for pollution management	ISO 14001 implementation	Information on environmental audits	Disclosure of resource use and emissions	Employee safety and development	Product quality and responsibility	Risk management and data security	Commitment to social contributions	Shareholder rights and governance stability	Information disclosure and transparency	Commitment to ethics and anti-corruption
Presence of environmental or CSR report	Pearson Correlation	1	,543**	,542**	,482**	,634**	,472**	,473**	,570**	,531**	,504**	,511**	,373**	,455**
	Sig. (2-tailed)		,000	,000	,000	,000	,000	,000	,000	,000	,000	,000	,000	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84
Stakeholder involvement in environmental policy	Pearson Correlation	,543**	1	,427**	,519**	,520**	,506**	,471**	,525**	,429**	,418**	,502**	,318**	,359**
	Sig. (2-tailed)	,000		,000	,000	,000	,000	,000	,000	,000	,000	,000	,003	,001
	N	84	84	84	84	84	84	84	84	84	84	84	84	84
Department for pollution management	Pearson Correlation	,542**	,427**	1	,546**	,536**	,475**	,200	,490**	,320**	,321**	,309**	,325**	,256*
	Sig. (2-tailed)	,000	,000		,000	,000	,000	,068	,000	,003	,003	,004	,003	,019
	N	84	84	84	84	84	84	84	84	84	84	84	84	84

ISO 14001 implementation	Pearson Correlation	,482**	,519**	,546**	1	,694**	,548**	,300**	,627**	,374**	,363**	,349**	,250*	,294**
	Sig. (2-tailed)	,000	,000	,000		,000	,000	,006	,000	,000	,001	,001	,022	,007
	N	84	84	84	84	84	84	84	84	84	84	84	84	84
Information on environmental audits	Pearson Correlation	,634**	,520**	,536**	,694**	1	,732**	,421**	,699**	,525**	,550**	,528**	,337**	,470**
	Sig. (2-tailed)	,000	,000	,000	,000		,000	,000	,000	,000	,000	,000	,002	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84
Disclosure of resource use and emissions	Pearson Correlation	,472**	,506**	,475**	,548**	,732**	1	,363**	,516**	,419**	,403**	,500**	,310**	,347**
	Sig. (2-tailed)	,000	,000	,000	,000	,000		,001	,000	,000	,000	,000	,004	,001
	N	84	84	84	84	84	84	84	84	84	84	84	84	84
Employee safety and development	Pearson Correlation	,473**	,471**	,200	,300**	,421**	,363**	1	,646**	,785**	,748**	,697**	,622**	,780**
	Sig. (2-tailed)	,000	,000	,068	,006	,000	,001		,000	,000	,000	,000	,000	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84
Product quality and responsibility	Pearson Correlation	,570**	,525**	,490**	,627**	,699**	,516**	,646**	1	,702**	,672**	,681**	,515**	,553**
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000		,000	,000	,000	,000	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84

Risk management and data security	Pearson Correlation	,531**	,429**	,320**	,374**	,525**	,419**	,785**	,702**	1	,783**	,712**	,615**	,744**
	Sig. (2-tailed)	,000	,000	,003	,000	,000	,000	,000	,000		,000	,000	,000	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84
Commitment to social contributions	Pearson Correlation	,504**	,418**	,321**	,363**	,550**	,403**	,748**	,672**	,783**	1	,852**	,567**	,751**
	Sig. (2-tailed)	,000	,000	,003	,001	,000	,000	,000	,000	,000		,000	,000	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84
Shareholder rights and governance stability	Pearson Correlation	,511**	,502**	,309**	,349**	,528**	,500**	,697**	,681**	,712**	,852**	1	,663**	,679**
	Sig. (2-tailed)	,000	,000	,004	,001	,000	,000	,000	,000	,000	,000		,000	,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84
Information disclosure and transparency	Pearson Correlation	,373**	,318**	,325**	,250*	,337**	,310**	,622**	,515**	,615**	,567**	,663**	1	,680**
	Sig. (2-tailed)	,000	,003	,003	,022	,002	,004	,000	,000	,000	,000	,000		,000
	N	84	84	84	84	84	84	84	84	84	84	84	84	84
Commitment to ethics and anti-corruption	Pearson Correlation	,455**	,359**	,256*	,294**	,470**	,347**	,780**	,553**	,744**	,751**	,679**	,680**	1
	Sig. (2-tailed)	,000	,001	,019	,007	,000	,001	,000	,000	,000	,000	,000	,000	
	N	84	84	84	84	84	84	84	84	84	84	84	84	84

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).