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**Does sustainability orientation lead to  
improved innovation performance? The  
role of transformational leadership**

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*Alla mia famiglia,  
che ha sempre creduto in me.*

## **Abstract**

In recent years, sustainability orientation has emerged as a key factor for the competitive success of firms. The study highlights that sustainability has become a critical determinant of future business performance. Recent studies suggest that companies with a strong sustainability orientation are better able to address environmental and social challenges, enhancing their competitiveness and strengthening stakeholder confidence in their long-term strategy.

This study investigates the relationship between sustainability-oriented innovation (SOI) and innovation performance, with a specific emphasis on the role of transformational leadership. A multicountry analysis was conducted on a sample of 175 companies undergoing transformation processes characterized by a strong commitment to sustainability, digitalization and innovation.

The results indicate that sustainability-oriented innovation positively influences both product and process innovation.

Transformational leadership does not have a direct effect on innovation outcomes but plays a moderating role in process innovation, amplifying the impact of sustainability-oriented practices.

The study contributes to the literature showing that effective leadership and strategic management help firms create long-term value and resilient business models by aligning sustainability goals with innovation efforts.

## **Italian Abstract**

Negli ultimi anni, l'orientamento alla sostenibilità è emerso come un fattore chiave per il successo competitivo delle imprese. Lo studio evidenzia come la sostenibilità sia diventata una determinante cruciale delle performance aziendali future. Studi recenti suggeriscono che le aziende con un forte orientamento alla sostenibilità sono più in grado di affrontare le sfide ambientali e sociali, migliorando la loro competitività e rafforzando la fiducia degli stakeholder nella strategia a lungo termine.

Questo studio indaga la relazione tra innovazione orientata alla sostenibilità (SOI) e performance innovative, con particolare attenzione al ruolo della leadership trasformativa. È stata condotta un'analisi multipaese su un campione di 175 aziende impegnate in iniziative di trasformazione caratterizzate da un forte impegno verso sostenibilità, digitalizzazione e innovazione.

I risultati indicano che l'innovazione orientata alla sostenibilità influenza positivamente sia l'innovazione di prodotto sia quella di processo. La leadership trasformativa non esercita un effetto diretto sui risultati innovativi, ma svolge un ruolo moderatore nell'innovazione di processo, amplificando l'impatto delle pratiche orientate alla sostenibilità.

Lo studio contribuisce alla letteratura mostrando che una leadership efficace e una gestione strategica aiutano le imprese a creare valore a lungo termine e modelli di business resilienti, allineando gli obiettivi di sostenibilità agli sforzi innovativi.

## **Declaration of Authorship**

I certify that I have written this thesis independently and have not used any sources, resources, or technical tools other than those specified. All statements that were taken from other publications, either literally or analogously, are marked.

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# **Introduction**

## **1.1 Overview**

This first chapter of the thesis aims to provide a general overview of the research topic. It begins with the introduction of the historical and theoretical context of sustainability-oriented innovation (SOI) and transformational leadership (TL). Then, the chapter presents the research objectives and questions and concludes with the structure of the chapters.

## **1.2 Research background**

In today's socio-economic landscape, firms are confronted with a wide range of challenges that require them to continuously adapt and discover new ways to remain competitive, enhance profitability and strengthen the overall performance (Maier D. et al., 2020). Innovation has historically been one of the main drivers of long-term success, enabling firms to grow, access new markets and secure competitive advantages (Chesbrough, 2003). At the same time, innovation has been recognized as a crucial mechanism because it addresses sustainability concerns, linking business development with environmental and societal goals (Boons et Lüdeke-Freund, 2013).

Many organizations, generally, focused their strategies exclusively on competitiveness, often ignoring that the environment is facing strong sustainability challenges (Aboelmaged et Hashem, 2019). However, in recent years there has been growing interest among scholars, practitioners and society in promoting environmental conservation and efficient resource use (ecological concerns), addressing social challenges related to quality of life and fostering long-term economic competitiveness (Behnam et al., 2018).

With the release of the Brundtland Report (United Nations, 1987), researchers, students and theorists began to discuss and explore the connections between sustainability, organizational transformation and innovation. The literature increasingly emphasizes that novel processes can be strongly



influenced and guided by sustainability considerations (Maier et al., 2020). Alongside sustainability, leadership emerges as a critical factor in promoting innovation. Research indicates that leadership is essential for the management of innovation (Nadler et Tushman, 1990; Denti et Hemlin, 2012) and plays a fundamental role as it enhances organizational creativity (Mumford et al., 2002; Amabile et al., 2004), launches and manages innovation projects and overcomes the resistance to change (Gilley et al., 2008). Different leadership styles are likely to impact employee involvement and commitment, which in turn influence the organizational climate for innovation (Bel, 2010). Moreover, ineffective leadership skills are often cited as a key factor in the failure of innovation initiatives (Deschamps, 2005; Bass, 1990b).

Taken together, the literature highlights that both sustainability-oriented innovation (Maier et al., 2020) and effective leadership play important roles in driving firm-level innovation (Mumford et al., 2002; Somech, 2006). While sustainability provides the strategic direction and motivation for innovative change, leadership facilitates the cultural, structural and human mechanisms necessary to implement innovations effectively (Boons et Lüdeke-Freund, 2013). The study tries to investigate the individual and potentially complementary effects of sustainability-oriented innovation and transformational leadership on innovation, in particular product and process innovation.

### **1.3 Aims of the study**

The objectives of this study are:

- Analyze the role of sustainability-oriented innovation in driving product and process innovation. The study explores how environmental, social and economic considerations shape innovation, providing evidence of the importance of sustainability in business practices (van Kleef & Roome, 2007).
- Assess the impact of transformational leadership on innovation outcomes. Transformational leadership refers to leaders who seek to create ideas and

new perspectives to create a new way of growth and prosperity in front of the organization (Moradi Korejan & Shahbazi, 2016).

- Investigate the interplay between SOI and transformational leadership.
- Provide a reflection on the practical value of sustainability and leadership in overcoming resistance to change. The study aims to offer insights showing how effective leadership and visible sustainability initiatives may positively influence even initially skeptical employees (Bel, 2010).
- Highlight the competitive advantage of integrating SOI and TL. The research discusses how firms adopting these strategies can strengthen differentiation and long-term resilience (Nidumolu et al., 2009).

In summary, this study offers a framework to understand how sustainability and transformational leadership influence innovation performance, providing theoretical insights that improve a culture of continuous improvement and strategic competitiveness.

#### **1.4 Research questions**

Another objective of the research is to seek an answer to the following research questions:

**RQ1:** Is there a relation between sustainability orientation and firms' innovation performance?

**RQ2:** Does transformational leadership enhance the relationship between sustainability orientation and innovation performance?

These research questions reflect the two main fields of study. First, it explores whether a strong orientation towards sustainability can enhance a firm's capacity to create product and process innovations. Second, it considers the role of transformational leadership in this relationship, examining whether leadership can act as a key factor in supporting and amplifying the effects of sustainability on innovation.

## **1.5 Thesis outline**

The structure of the thesis is organised as follows:

- The second chapter provides an overview of the literature on innovation. The chapter defines innovation, reviews its theoretical perspectives and examines the different types of innovation.
- The third chapter focuses on the development of the research hypotheses. It begins with a discussion and definition of sustainability, examining scientific literature that links sustainability-oriented practices to innovation performance, which leads to the formulation of the first hypothesis. The chapter then examines transformational leadership, summarizing the relevant empirical studies and showing its influence on innovation. At the end, the development of the second hypothesis of the study is presented.
- The fourth chapter describes the research methodology. It includes a detailed explanation of the research design, the development and distribution of the questionnaire and the identification of the sample. The chapter, also, presents the operationalisation of study constructs: the dependent, independent and control variables.
- The fifth chapter presents the findings and discussion. Regression models and results are reported separately for product and process innovation, followed by a discussion that interprets the empirical evidence based on the literature reviewed in the third chapter.
- The sixth chapter discusses the main contributions of the research. It presents the conclusions drawn from the study, identifies the study's limitations, suggests directions for future research and provides final remarks.
- Appendix

# Literature Review

## 2.1 Definition of innovation

Innovation is a complex and multi-dimensional concept, understood and defined differently across various academic fields and practical applications (Taylor, 2017). Joseph Schumpeter defined innovation as “the process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one” (Schumpeter, J. A. 1934).

In its broadest sense, the term comes from the Latin “innovare” meaning “to make something new” (Tidd et Pavitt, 2011). Moreover, innovation can be defined 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)” (OECD, 2018).

Innovation shouldn’t be confused with creativity or invention. Creativity involves the use of imagination or original ideas to develop new solutions, while innovation specifically concerns the practical and effective implementation of those ideas within a market or organizational context (Govindarajan, 2010).

It involves not only the creation of entirely new products, services or processes, but also the recombination of existing knowledge, the adaptation of current offerings to meet emerging needs and the exploration of new business opportunities (Govindarajan, 2010). This means that not every invention results in innovation and many innovations do not stem from disruptive discoveries, but from the imaginative reconfiguration of existing ideas or resources. Innovation plays a vital role not only at the firm level, enhancing competitiveness, productivity and value creation, but also at a broader economic scale (Kim & Mauborgne, 2019). As highlighted by economist William Baumol, almost all economic growth, since the eighteenth century, can be attributed to innovation (Baumol, 2002).

To provide a clearer framework to better understand innovation, the Oslo Manual, jointly published by the OECD (Organization for economic cooperation and development) and Eurostat, offers guidelines that help distinguish different types of innovation and provide a standard approach to measure and manage innovation activities within organizations and across countries (OECD & Eurostat, 2018).

These guidelines should be viewed as a combination of formal statistical standards, advice on best practices, as well as proposals that extend the measurement of innovation into new domains through the use of existing and new tools (OECD, 2018). In the current situation, a large number of countries and international organisations recognise the importance of innovation measurement and have developed capabilities to collect such data (OECD, 2018). An analysis of Google Trends data confirms a growing global interest in innovation as shown in Figure 1.

*Figure 1: Global search for the term “innovation”*



*Source: Google trends (2004-present)*

A clear upward trend can be observed, with interest growing steadily from 2004 onwards and accelerating around 2015. The highest peak occurs between 2020 and 2022, which may be associated with the COVID-19 pandemic, a period that caused widespread reflection on the role and definition of innovation as a result of global disruption and digital transformation. This attention invites a deeper exploration of how innovation has been theorized, interpreted and applied

across time.

The following section presents key reflections and perspectives from influential researchers whose work has profoundly shaped the understanding of innovation and its role in economic development.

## **2.2 Theoretical views on innovation**

Throughout economic history, several scholars have emphasized the central role of innovation in driving productive and societal transformation (Roncaglia, 2003). In *The Wealth of Nations* (1776), Adam Smith emphasized the relationship between technological advancement, labor specialization and structural transformations within the economy. He observed that improvements in technology lead to increased productivity through the division of labor and the optimization of production efficiency. (Smith, 1999). However, Smith regarded inventions primarily as the result of human curiosity, placing greater emphasis on the effects of planned economic activities (Lemanowicz, 2015).

Moreover, David Ricardo, in *Principles of Political Economy* (1817), highlights the effects that technological and technical changes in goods can affect employment. He argued that an increased use of machinery and its associated costs could negatively affect wages and lead to unemployment (Ricardo, 2004).

Ricardo also warned that, under capitalism, the replacement of workers by machines would intensify, causing a slowdown in technological progress to mitigate job losses. Thus, while not completely opposing innovation, Ricardo highlighted its potential social drawbacks and advocated caution in implementation (Ricardo, 2004).

In addition, French economist Jean-Baptiste Say discussed the economic impact of machinery in production in his *Traité d'économie politique* (Say, 1803). He highlighted the "benefits of innovation," observing that the development of new machines generated employment opportunities and created jobs that previously did not exist (Say, 1803). A more process-oriented perspective was introduced by Abbott Payson Usher in *A History of Mechanical Inventions* (1921), where

innovation is not seen as an end result but as a continuous, dynamic process. Usher described innovation as the outcome of a “cumulative synthesis”, a sequence that begins with the identification of a problem, followed by the initial introduction of an innovative solution, which is then gradually refined and improved (Ruttan, 1959). For Usher, innovation exists in all contexts, but its characteristics are shaped by the specific environment in which it is applied (Usher, 1921).

Among the most influential contributions is the one of Joseph A. Schumpeter, who, in *The Theory of Economic Development* (1911) and *Capitalism, Socialism and Democracy* (1942), considered innovation as a fundamental condition for economic progress that can guarantee competitiveness in the long term. He defined innovation as new combinations of productive means, including the introduction of new goods or production methods, new organizational forms, access into new markets and the acquisition of new sources of supply, even financial innovation (Schumpeter, 1934). Schumpeter introduced the concept of “creative destruction” and positions innovation as a force that disrupts economic equilibrium and drives development (Ziemnowicz, 2020). Later, in 1947, he described innovation as a “creative response” emphasizing the fact that innovation arises when firms or sectors react to external changes not merely by adapting, but by generating new solutions (Ziemnowicz, 2020). Building on this theoretical foundation, Schumpeter’s business cycle theory highlights the central role of innovation in shaping the dynamic nature of capitalist economies.

He argued that economic evolution is driven by three main forces: exogenous shocks, gradual economic growth and innovation (Kuznets, 1940). According to him, major innovations typically emerge from entrepreneurs or new firms changing the structure of production, thereby disrupting the existing equilibrium (Ziemnowicz, 2020). This process launches cyclical fluctuations characterized by four stages: prosperity, recession, depression and revival (Kuznets, 1940). Schumpeter also identified different types of business cycles based on their length and intensity:

1. long-term Kondratieff cycles (approximately 50 years),
2. medium-term Juglar cycles (7–11 years),
3. and short-term Kitchin cycles (around 3 years) (Kuznets, 1940).

These phases can overlap in time and when multiple downward phases coincide, particularly deep and prolonged economic crises occur (Schumpeter, 1934). Another important aspect to consider is the role of managers in supporting and implementing these innovations within organizations (Drucker, 1985).

To foster innovation, managers are crucial because they replace the traditional institutionalized process with new ideas and examples, manage risks, and create a dynamic atmosphere for the business that can allow it to grow and be competitive (Tidd & Bessant, 2018). Schumpeter explained that entrepreneurial innovation is the key factor driving the growth of capitalist economies (Autio et al., 2014). This topic will be explored in greater depth in the following chapters.

### **2.3 Types of innovation**

After having defined the concept of innovation and examined the different theoretical perspectives, the study will focus on the various kinds of innovation.

Product versus process innovation is one of the most significant distinctions as it offers the basis upon which the firms' innovation objectives are defined while participating in innovation (Tidd & Bessant, 2018).

A product can be defined as a good or service offered to a customer, and a process as the method through which the good or service is developed and delivered (Barras, 1986). Thus, product innovation is the development of new products or services to meet market or user needs, and process innovation is the implementation of new elements in an organization's production or service operations, including material changes, task definition, workflow, information systems, or equipment to improve the way a product is produced or a service delivered (Ettlie, 1992). The distinction between product and process innovations is particularly significant, as each type requires different organizational capabilities. Process innovation involves the application of technology to



enhance the efficiency of product development and delivery, while product innovation requires firms to understand and respond to customer needs and to design and manufacture new offerings accordingly (Ettlie, 1984).

To manage product innovation, companies often use strategic frameworks like the Product Innovation Charter (PIC).

The PIC was first envisioned by Crawford as an integrated goal-setting system employed to guide a firm's product development activity (Crawford, 1980). The PIC is a strategic document outlining the scope, objectives and guidelines of an organization's innovation activity. It has evolved over the years into a widely recognized tool for matching innovation activity and business strategy (Crawford, 2006). The original formulation by Crawford outlined three core dimensions:

1. The target business areas: the target business areas define the exact markets and product categories in which the company competes, defined in terms of product type, user requirements, technology and market segments (Bart, 1997).
2. The goals of innovation: the objectives of the innovation program may be quantitative (such as market share, sales, profitability) and qualitative (such as enhancement of brand image, diversification, responsiveness to customers) (Bart, 1997).
3. The program of action strategy: it prescribes tactical policies for achieving these goals. This involves employing organizational strengths, compensating for weaknesses, selecting sources of innovation (inner vs. outer), selecting the degree of wanted innovativeness (e.g., incremental vs. radical) and adapting to specific situational limitations or mandates (Ansoff et Steward, 1967).

Subsequent contributions have expanded and refined the PIC framework. Overall, it provides an approach that helps firms manage innovation, deal with uncertainty, improve cross-functional coordination and ensure uniformity

between innovation efforts and business goals.

Furthermore, various factors influence not only the adoption of product and process innovations but also the degree to which these innovations affect the performance and structure of the adopting firm (Tornatzky et Fleischer, 1990). Although it is widely known that product and process innovations are connected, the way they interact at the company level is still unclear.

In some cases, one type of innovation may drive the other, suggesting a sequential relationship; in others, the two may complement one another and emerge simultaneously (Tornatzky et Fleischer, 1990).

Abernathy and Utterback (1978) model (A-U) describes the evolution of products and processes as a transition from an early ‘fluid’ state to one that is highly ‘specific’ and rigid (Abernathy et Utterback, 1978). In the early stages, a product is in a “fluid” state, which means that it is characterized by a high degree of experimentation, a wide range of ideas and minimal standardization (Abernathy et Utterback, 1978). During this phase, firms operate in a context of uncertainty and are primarily focused on exploring different technological options and design solutions. As a result, innovation efforts are mostly product-oriented, aimed at defining the most effective version of the product.

As the product becomes more established and its design moves toward a common form, companies start to focus on innovations. The aim in this middle phase is to improve production efficiency, lower costs, and streamline operations without changing the main features of the product itself (Abernathy et Utterback, 1978). Once both product and process technologies have attained a consolidated form, the nature of innovation changes.

At this stage, companies usually focus on small improvements. These continuous changes aim to increase performance and boost efficiency (Abernathy et Utterback, 1978). While these adjustments may not be groundbreaking, they are important for staying competitive (Tidd & Bessant, 2018).

When discussing the impact of innovation on firm capabilities, innovations can be classified into competence-enhancing and competence-destroying types

(Nelson, 1982). Competence-enhancing innovations lead to the development and evolution of existing firm competencies, while competence-destroying innovations arise from new capabilities that render previously held competencies obsolete. Innovations can also be categorized based on their scope of impact into architectural and modular innovations (Henderson et Clark, 1990).

Architectural innovations implies changes to the overall design or the way components within a system interact. These changes fundamentally alter the system's structure.

In contrast, modular innovations pertain to modifications of individual components, requiring specialized knowledge limited to the specific element being changed (Henderson et Clark, 1990). Classic examples include the transition from traditional wristwatches to smartwatches and the evolution of hard drives from HDD to SSD technology.

Another important classification is provided by Freeman (1982) in *The Economics of Industrial Innovation*, who distinguished innovations between radical and incremental, positioning them along a continuum based on their degree of departure from existing products or services.

Innovations with a slight change are seen as incremental. Those with a larger change are labeled radical (Acemoglu et al., 2022). Incremental innovations specifically involve improvements to current products and production methods. They usually happen continuously and are often shaped by market demand. These innovations need knowledge and skills that are closely linked to what firms already have. They involve low levels of uncertainty and investment and generally come with limited risk. Radical innovations, on the other hand, develop intermittently and tend to be widely disseminated across firms within an industry (Koberg et al., 2003).

They create new market opportunities by altering existing business paradigms, often leading to the creation of entirely new industries while rendering older ones obsolete.

Radical innovations represent a significant departure from existing products or

services and introduce unprecedented novelty (Acemoglu et al., 2022). The two types should be viewed as complementary, each playing a vital role in the innovation ecosystem. Building on Freeman's (1982) distinction between radical and incremental innovations, it is useful to further explore the complexity of innovation through Pisano's (1994) matrix, as shown in figure 2 (Inside Marketing, 2019).

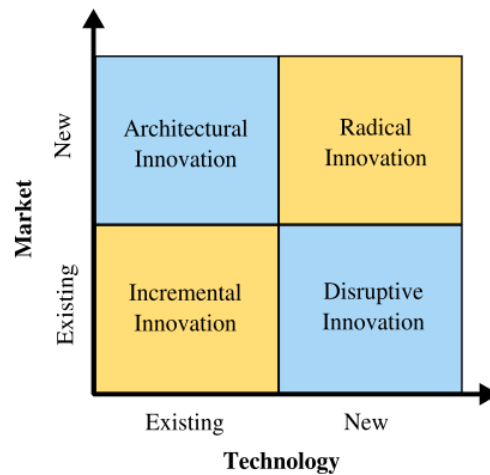
According to this matrix, innovation can be classified following two key dimensions: the market involved and the technology used, each of which can be either existing or new (Pisano, 2015). This framework identifies four main types of innovation: incremental, disruptive, architectural and radical.

Incremental innovation happens when improvements are made to existing technologies in established markets. A good example is the latest iPhone model, which offers new features for its current customers (Desiderato, 2022).

Disruptive innovation brings new technologies into established markets. Netflix's streaming model is a clear example of this, as it changed a well-known entertainment market (Desiderato, 2022). Architectural innovation involves applying existing technologies to new markets, as seen in the development of memory foam mattresses, originally created by NASA for aerospace purposes (Desiderato, 2022).

Radical innovation represents the simultaneous introduction of new technologies and new markets, like the invention of jet-powered aircraft that opened up an entirely new transportation sector. This classification helps organizations better manage and plan their innovation efforts.

Figure 2: Pisano's matrix



Source: Pisano, G. P. (2015). *You Need an Innovation Strategy*.

In conclusion, the evolution of innovation theory and practice shows its complexity. However, innovation is no longer seen as just about economic efficiency or market expansion. In recent years, the idea has changed to focus on sustainability. Organizations and policymakers now stress the importance of responsible innovation. This means innovation that provides economic value while also tackling social and environmental issues (Stilgoe et al. 2013).

A growing emphasis is given to sustainable innovation and green innovation, as clearly illustrated by Figure 3, which presents data derived from Google Trends analysis. The increasing frequency of global searches for this term shows not only an intensified awareness, but also a broadening of the innovation agenda to include environmental and social dimensions.

Figure 3: Global search for “sustainable innovation”



Source: Google trends (2004-present)

In light of this shift, the following chapter will explore the relationship between innovation and other two key variables and, subsequently present the hypothesis of the study.

## **Hypothesis Development**

This chapter presents the development of the research hypotheses. The analysis focuses on examining the relationship between innovation performance and sustainability-oriented innovation, considering the moderating role of transformational leadership.

These hypotheses are based on insights from the academic literature, which are useful to explore how sustainability practices and leadership styles can influence innovation.

The chapter is organized into two main parts: the first focuses on the evolving role of sustainability within modern businesses, considering its environmental, social and economic dimensions. This section discusses the complexity of balancing these three objectives, presents empirical studies and subsequently introduces the first hypothesis.

Secondly, the role of transformational leadership is examined with some scientific literature. At the end, the analysis presents the second hypothesis.

### **3.1 The evolution of sustainability**

As Kidd (1992) underlined, the concept of sustainability is not new; it has a long history and has evolved significantly over time. In fact, the concept has its origins in forestry, where the prevailing principle was to never harvest more than what the forest could regenerate through new growth (Wiersum, 1995). The German term “Nachhaltigkeit” (the German term sustainability) was first used with this meaning in 1713 (Wiersum, 2007).

However, the term gained widespread usage after 1987, when the Brundtland Report from the United Nations’ World Commission on Environment and Development, during the Stockholm conference, officially adopted the term and provided one of its earliest definitions: “sustainable development is defined as development that meets the needs of the present generation without compromising those of future generations” (Treccani, n.d; Heinberg, 2010).

After the 1972 Stockholm Conference, there was a growing rise in global

awareness regarding environmental, social and ethical matters, which peaked at the 1992 Earth Summit in Rio de Janeiro (Sung, 2014). During this meeting, leaders from around the world convened to address urgent issues like environmental decline, poverty and inequality, setting the foundation for sustainable development (Bundesamt für Raumentwicklung ARE, 1992).

The Summit led to three important non-binding agreements:

1. Agenda 21: a global action program that looks at all areas of sustainable development.
2. The Rio Declaration on Environment and Development: a set of 27 principles outlining the rights and responsibilities of nations regarding environmental protection and sustainable development.
3. The United Nations Framework Convention on Climate Change (UNFCCC): an international treaty created to tackle climate change by establishing goals for reducing greenhouse gas emissions (Bundesamt für Raumentwicklung ARE, 1992).

Following this Summit, the European Union adopted the Fifth Environmental Action Programme in 1993, which integrated the principles of sustainable development across key sectors such as manufacturing, transport, energy, agriculture and tourism (LifeGate, 2009).

A crucial point in the development of sustainability is represented by the “Kyoto protocol” signed in 1997, which represents the most important international agreement to fight against climate change and global warming (Rete Clima, 2014). In particular, the protocol requires each member state to reduce its greenhouse gas emissions and to establish a monitoring system to track progress (Böhringer, 2003).

Another important step was the Paris Agreement adopted by 195 Parties at the UN Climate Change Conference (COP21) in Paris in 2015 (UNFCCC, 2015). It is a legally binding international treaty on climate change (Matemilola et al., 2023). Its aim is to limit the global temperature increase to well below 2°C, while also striving to limit it to 1.5°C above pre-industrial levels (Matemilola et al.,



2023). Putting the Paris Agreement into practice requires significant economic and social changes. The treaty is built around a five-year cycle in which countries are expected to take action to tackle climate change (UNFCCC, 2015). Since 2020, each country has been submitting a national climate action plan, which is called Nationally Determined Contribution (NDC), setting out specific goals (WRI, 2024).

International attention to sustainability has grown over the years, culminating in the United Nations Summit on Sustainable Development in 2015, which led to the adoption of Agenda 2030 (United Nations, 2015).

It consists of 17 goals and 169 targets, covering the social, economic and environmental dimensions of development, to be reached by 2030 (Figure 4).

However, reaching the SDGs is not easy and requires the commitment of all sectors of society (United Nations, 2015).

Figure 4: Sustainable development goals



Source: <https://unric.org/it/agenda-2030/>

ASVIS, the [Italian Alliance for Sustainable Development](#), conducts, each year, a study aimed at assessing the progress made and providing a provisional evaluation of Agenda 2030 (Fondazione Ecosistemi, 2024). For example, in the 2024 ASVIS report, Italy is seen as a country that is lagging in achieving the SDGs (ASVIS, 2024). Poverty and social difficulties persist in many areas of the country, inequalities are not decreasing and women and young people face difficulties entering the labor market. Furthermore, the report (ASVIS, 2024) shows that the implementation of the 2030 Agenda does not appear to be a central focus in the Italian policy framework.

At the international level, the United Nations assesses each country's progress using the High-level Political Forum, which was launched in 2013 and it provides political leadership and guidance and aims to drive a shift toward sustainable development (Beisheim, 2015; United Nations, 2024).

Overall, the concept of sustainability has evolved from a focus on environmental management to an integrated approach that requires cooperation between governments, businesses and civil society to address the pressing challenges of today's world.

### **3.2 Three dimensions of sustainability**

In the 1960s and 1970s, people started to realize more clearly that human activities had negative effects on the environment (Brown et al., 2006). While this awareness wasn't widespread yet, it marked a turning point in how companies were expected to act. By the late 1980s, the idea of Corporate Social Responsibility (CSR) came about as a way to think about economic growth that focuses on achieving results that last and help future generations (Casanova, 2010). Grayson and Hodges (2001) identify four main reasons why CSR became a key business issue. Thanks to new technology and communication, companies couldn't hide what they did anymore (Grayson & Hodges, 2001). Bigger global businesses faced more attention, while changes like aging populations and unequal resources created extra challenges (Carroll, 1999). At the same time, people started questioning traditional institutions more. As society began demanding cleaner air, water and less pollution, companies started to improve their environmental practices (Hoffman, 2000, cited in Brown et al., 2006). Building on this growing awareness, the concept of sustainable development further expanded the focus by considering the needs related to various forms of capital, including human, natural, manufactured and financial (Elkington, 1994). In line with this approach, John Elkington (1994) introduced the concept of the "triple bottom line" (TBL), as a framework for measuring a company's performance.

As Elkington (1994) states, "the triple bottom line is a sustainability framework that examines a company's social, environmental and economic impact".

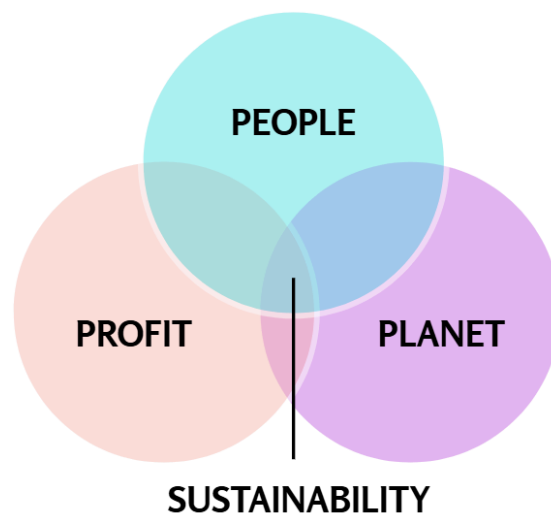
The 3Ps stand for:

- **People:** this refers to the impact that an organization has on people, such as employees, customers, suppliers, families and communities.
- **Planet:** this dimension focuses on how an organization affects the environment. It includes efforts to reduce carbon emissions, minimize the use of natural resources, and harmful materials.

- Profit: it goes beyond financial gain. It includes the economic effects an organization has at local, national, and global levels (Kraaijenbrink, 2019).

To better illustrate the concepts introduced in this section, Figure 5 provides a personal graphical representation that clearly illustrates the intersection of the three pillars, visually showing the essence of sustainability.

*Figure 5: Triple Bottom Line*



*Source: personal graphical representation*

TBL captures the essence of sustainability by evaluating how an organization's activities affect the world around it. Unlike traditional reporting methods, which often struggled to provide clear tools for measuring sustainability, the TBL model stands out because it introduces a structured way to assess not only a company's financial performance, but also its social and environmental impact (Savitz, 2013). A positive TBL reflects a broader form of value creation that includes profitability and returns for shareholders, as well as contributions to social well-being, human development and the preservation of natural capital (Savitz, 2013).

Moreover, this approach doesn't only apply to companies, it also helps evaluate sustainability at a national level. A good example is the Sustainable Society Index (SSI), developed in 2006 by the Sustainable Society Foundation and now

managed by Technische Hochschule Köln (Gonzalez-Cabezas, 2019). The SSI includes 21 indicators that measure human well-being, environmental health and economic performance on a scale from 0 to 10, published every two years (Phillips, 2021).

Unlike many indices, the SSI doesn't combine everything into a single number. Instead, it keeps the dimensions separate to give a clearer, more transparent picture of where progress is happening and where it isn't (Gonzalez-Cabezas, 2019).

One difficulty with the concept of the Triple Bottom Line is that the three dimensions it encompasses cannot simply be combined or aggregated (Zak, 2015). It is difficult to measure the "planet" and "people" accounts in the same way as profit (in terms of cash or monetary value) (Hindle, 2008).

A study by Srivastava (2022) points out several criticisms of the TBL, including:

- Intrinsic ambiguity and lack of clear definition. TBL is seen as ambiguous since it does not convey its exact meaning.
- Deviation from goal attainment approach. It shifts away from a goal-oriented method that measures effectiveness based on results, not methods. If the idea is unclear, companies struggle to translate it into practical strategies.
- Lack of a means-ends structure. Organizations can experience confusion, lack of direction, and unclear priorities about what to achieve and how to achieve it.
- Difficulty in systematic measurement of social performance. There are major issues with measuring the social aspect in TBL. There is no widely accepted standard for calculating social and environmental factors, unlike financial data.
- Inability to explain the true idea of corporate citizenship. Companies often

adopt TBL mainly for marketing reasons, rather than a sincere commitment to making social and environmental changes.

- Costs and complexity. Implementing TBL can add to operational complexity and costs for companies, particularly in terms of staff training and new processes. Striking a balance between the three pillars of sustainability can be costly. Environmental or social practices can raise economic costs, while efforts to reduce costs can lead to negative outcomes for the environment and society.
- Narrow view and obstacles to change. Many companies resist making real changes because doing so would involve rethinking their operations, which they view as too risky. (Srivastava, 2022)

On the other hand, despite the criticism, the adoption of the Triple Bottom Line offers numerous benefits, as highlighted by Schulz et al. (2016). For example:

- Implementing 3BL strategies can lead to business growth and a larger share of the market.
- A focus on social and environmental performance can contribute to higher employee retention.
- Engaging with social and environmental impacts can foster positive relationships with the community.
- TBL can serve as a tool for competitive advantage.
- Companies have learned to use corporate social responsibility as a possible source of innovation.
- The proposed model allows organizations to determine the appropriate amount of resources to allocate to each TBL component (Schulz et al., 2016).

In conclusion, even though bringing together all three parts of the Triple Bottom Line can be challenging, many studies have shown its clear benefits. This makes

it a valuable and necessary tool for helping companies become truly sustainable.

### **3.3 Evidence from Empirical Studies: The Impact of SOI on innovation**

A considerable number of empirical studies underline a strong positive relationship between innovation and sustainability. Collectively, these studies provide a multi-contextual understanding, from international evidence to specific Italian cases, indicating that sustainability-oriented innovation (SOI) improves organizational performance.

Maletič et al. (2014) conducted an empirical study and examined 116 organizations in Slovenia, from both manufacturing and service sectors, in order to explore how sustainability-oriented innovation practices influence organizational performance. The study used a structured survey methodology and considered managers and decision-makers responsible for innovation and sustainability initiatives within their organizations. Respondents were asked to provide detailed information on the types of sustainability practices they had implemented, including environmental initiatives such as energy efficiency improvements, waste reduction and eco-friendly product design, as well as social initiatives like employee welfare programs, community engagement and ethical supply chain management (Maletič et al., 2014).

The study's findings revealed a statistically significant positive relationship between the level of use of sustainability-oriented innovation practices and multiple dimensions of organizational performance, including financial performance, operational efficiency and stakeholder satisfaction. The organizations which incorporated sustainability principles into their innovation processes indicated higher profitability, market competitiveness and also improvements in internal processes and stronger relationships with customers, employees and the wider community. Maletič et al. (2014) suggest that these results show the value of including sustainability into the innovation agenda. In this way, organizations that align innovation with environmental and social objectives are better positioned to achieve long-term success.

Building on the international evidence from Slovenia, Afeltra et al. (2022) conducted a study exploring the impact of sustainable innovation on organizational performance within manufacturing firms. The research focused on sustainability-oriented innovation across three dimensions: environmental, social and economic. The study employed a combination of surveys and structured interviews with managers who were responsible for sustainability and innovation initiatives. By doing this, the authors were able to capture detailed insights into both the implementation and outcomes of these practices (Afeltra et al. 2022). The findings showed that each area of innovation helped improve organizational performance. Environmental initiatives raised operational efficiency. Social practices boosted employee satisfaction. Economic innovations supported financial performance and competitive advantage. Importantly, Afeltra et al. (2022) highlight that the simultaneous adoption of these three dimensions produces synergistic effects, leading to comprehensive improvements in performance that extend beyond purely financial metrics. The report stresses that sustainable innovation is not simply a set of isolated practices, but a strategic approach that integrates environmental responsibility, social commitment and economic efficiency into a firm's innovation processes. These results provide strong empirical support for the idea that organizations that incorporate sustainability into their innovation strategies can achieve a wide range of benefits, reinforcing both their internal capabilities and their position within the market (Afeltra et al. 2022).

Similarly, a study conducted by LIUC - Carlo Cattaneo University (2023), investigated the impact of sustainable innovation on organizational performance within the Italian manufacturing firms. The research employed a structured questionnaire administered to a representative sample of companies, gathering detailed data on their adoption of sustainability-oriented innovations across economic, social and environmental dimensions. The findings revealed that firms implementing sustainable innovation practices achieved significant



improvements in overall organizational performance (LIUC, 2023). In particular, the integration of environmentally friendly technologies, socially responsible practices and economically sustainable strategies was associated with enhanced operational efficiency, better stakeholder engagement and increased market competitiveness. These results indicate that sustainable innovation acts as a strategic lever for Italian firms and enables them to obtain a competitive advantage in the medium and long term period. The study of the university shows that organizations that pursue innovation strategies can achieve both tangible and intangible performance benefits (LIUC, 2023).

Ceptureanu (2025) emphasizes that sustainability-focused innovation greatly improves innovation performance. It does this by helping organizations share knowledge systematically and apply it effectively. The study, which analyzed multiple industries using structural equation modeling, showed that firms embedding sustainability into their innovation strategies experienced measurable improvements in product development, process optimization and technological advancement. Beyond tangible outcomes, the research of Ceptureanu (2025) emphasizes the role of knowledge management as a key mediator: organizations that actively share insights, best practices and lessons learned related to sustainability are able to accelerate their innovative capacity and foster a culture of continuous improvement. Ceptureanu (2025) further notes that this knowledge-driven mechanism strengthens organizational learning, enabling firms to anticipate market trends, reduce inefficiencies and develop solutions that are both innovative and environmentally or socially responsible.

In a complementary context, Fernandes (2023) investigates the impact of sustainable innovation on small and medium-sized enterprises (SMEs), focusing on organizational resilience and long-term growth. The study demonstrates that SMEs adopting sustainability-focused innovations are better positioned to cope with external challenges, such as regulatory pressures, market fluctuations and resource constraints. By integrating environmental, social and economic considerations into their innovation processes, these firms not only improve

operational efficiency and product quality but also enhance their ability to adapt to unforeseen changes in their business environment. Fernandes (2023) emphasizes that this adaptive capacity is a critical component of SME success, showing that sustainability-oriented innovation acts as a strategic lever that simultaneously drives competitive advantage, resilience and sustainable growth.

Building on these observations, the following sections will look closely at specific case studies. This will provide a clearer understanding of how innovation and sustainability are linked. It will also help establish the basis for formulating the research hypothesis.

### **3.4 Integrating Innovation and Sustainability in business: case studies of Patagonia and Unilever**

Within this evolving framework, innovation is no longer viewed solely as a lever for achieving competitive advantage; rather, it is increasingly regarded as a strategic enabler for addressing the complex challenges of sustainable development. It becomes a means through which organizations can contribute to ecological preservation, resource efficiency, social equity and long-term economic resilience (Owen et al., 2013; OECD, 2021; European Commission, 2013). However, the power of innovation can only be realized if it is widely adopted: without diffusion, innovation will not benefit society at large (Neely et Hii, 1998). “Diffusion is the way in which innovations spread, through market or non-market channels. Without diffusion, innovation will have no economic impact” (OECD, 1992). Scholars like Nidumolu et al. (2009) emphasise that sustainability must be deeply embedded within innovation processes to generate long-term business value and positive societal impact.

A good example of this model is Patagonia, a company that has integrated sustainability and innovation into all areas of its business. It is an outdoor company with the aim to “build the best product; cause no unnecessary harm; use business to inspire; and implement solutions to the environmental crisis.” (Patagonia, n.d.).

The company's four principles are:

1. "Quality: A continuous commitment to enhance excellence in all aspects of our work.
2. Integrity: Fostering relationships grounded in honesty and mutual respect.
3. Environmentalism: Acting as a catalyst to promote meaningful personal and corporate environmental responsibility.
4. Not Bound by Convention: Achieving success by embracing innovation and challenging traditional ways of thinking" (Chouinard, 2006).

Yvon Chouinard, the founder of Patagonia, outlines the company's belief in his book *Let My People Go Surfing*: "Lead an examined life; Clean up your own life; Do our penance; Support civil democracy; and Influence other companies" (Chouinard, 2006).

According to the official website (Patagonia, n.d.), 98% of the products in Patagonia's Spring 2025 collection are made with preferred materials, with 100% of their down responsibly sourced and all virgin cotton grown using organic practices.

*Figure 6: The Environmental Responsibility section of Patagonia's official website*



*Source: <https://www.patagonia.com>*

Over the years, the company has implemented several sustainable initiatives. For example, in 1993 the company created Synchilla fleeces, which were made of recycled plastic bottles (Rattalino, 2018).

In 1994, after learning how harmful conventional cotton farming was to the environment, Patagonia decided to switch entirely to 100% organic cotton. This

was a challenging decision as it initially resulted in a 20% loss in revenue; however, it also led to a 25% increase in sales (Rattalino, 2018). Additionally, it served as an inspiration for other prominent brands such as Nike and H&M.

Patagonia's commitment to sustainability goes beyond the design and production of eco-friendly products. The company actively seeks to cultivate a culture of responsibility among its employees and also its customers (Patagonia, n.d.). This approach reflects the principles of transformational leadership, a leadership style focused on inspiring and motivating individuals to embrace positive change and shared values, which will be analyzed in this Chapter (Bass et Riggio, 2006). A clear example of Patagonia's efforts to engage its community is the Common Threads Initiative, launched in 2011 (Patagonia, n.d.). This program represents a partnership between Patagonia and its customers, encouraging them to reduce waste by repairing, reusing and recycling their clothing (Rattalino, 2018). Through this initiative, Patagonia invites customers to pledge online to make more sustainable choices and take better care of their clothes throughout their use. By focusing on a closed-loop system, the company emphasises how important it is to keep clothes in use longer and reduce their impact on the environment (Rattalino, 2018).

In 2022, Chouinard decided to transfer the ownership of the company. He did this not for financial gain but to focus on its environmental mission. This decision was not driven by a lucrative sale; rather, as Chouinard himself described in a letter, "The Earth is now our sole shareholder" (Patagonia, 2022).

Specifically, Yvon Chouinard transferred 2 percent of the voting shares to a foundation, while the remaining 98 percent of the shares were given to a nonprofit organization (La Repubblica, 2022). According to an official statement, the goal of this arrangement is to "protect the company's values" and "combat the environmental crisis," ensuring that control of the company remains aligned with its core mission (Patagonia, 2022).

Another important company that integrates sustainability in its business plan is Unilever. It is a global company founded in 1929 by the merger of the

Dutch margarine producer Margarine Unie and the British soap maker Lever Brothers (World Benchmarking Alliance, 2021). Today, it is one of the world's largest and oldest consumer goods businesses, producing personal care, home care, food and refreshment products, with a portfolio of over 400 brands available in 190 countries (World benchmarking Alliance, 2021).

In 2010, the company launched the Unilever Sustainable Living Plan (USLP), which is a model of business growth and innovation that demonstrates how integrating ESG principles can drive measurable business success (Unilever, 2010).

Unilever's plan (2010) focuses on three main goals:

1. improving health and well-being,
2. reducing environmental impact,
3. improving livelihoods.

This approach ensures that sustainability is a fundamental and strategic component of Unilever's operations.

The company has set clear and ambitious goals in the areas of climate and social sustainability. Within its strategy, Unilever (2024) is committed to achieving net zero emissions across its entire value chain, recognizing the need to address the climate crisis through concrete action. At the same time, it aims to foster resilient and regenerative natural and agricultural ecosystems, supporting the health of the planet on which we all depend.

Unilever (2024) also seeks to end plastic pollution by focusing on reduction, circulation and collaboration with partners and communities.

The company plans to cut its use of new plastic by 30% by 2026 and by 40% by 2028. It will use 2019 as a starting point (Unilever, 2024).

Furthermore, Unilever is targeting 100% of its plastic packaging to be reusable, recyclable, or compostable by 2030 for rigid packaging and by 2035 for flexible packaging; currently, 57% of its plastic packaging meets these criteria (76% rigid, 13% flexible) (Unilever, 2024).

On the social front, in 2024 Unilever supported over 80,000 smallholder farmers

by providing access to livelihoods programs and assisted 2.58 million small and medium-sized enterprises (SMEs) in growing their businesses through digital ordering platforms (Unilever, 2024).

These objectives reflect an integrated vision of sustainable development that combines environmental responsibility with social commitment in a thoughtful and inventive business model.

Thanks to the examples of Patagonia and Unilever, it becomes clear that we are moving toward a world where sustainability and innovation are not just complementary, but essential pillars of modern business strategy.

As has been noted by Nidumolu, et al. (2009), “there’s no alternative to sustainable development.” However, despite this awareness, many companies still see environmental responsibility as a cost rather than an opportunity.

In reality, becoming more environmentally friendly often leads to cost savings through greater efficiency and can create opportunities for new revenue streams, better products and even entirely new business models (Nidumolu, et al. (2009).

In the article, the authors outline some rules in order to help companies in their effort to become sustainable. The main guidelines are:

- Don’t start from the present;
- Ensure that learning precedes investments;
- Stay consistent to the goal while adjusting tactics.
- Build collaborative capacity;
- Use a global presence to experiment (Nidumolu, et al. 2009).

Particularly, in a time of crisis or uncertainty, innovation becomes “the real key to progress” (Nidumolu, et al. 2009).

Drawing on our analysis, the scientific literature and the two illustrative case studies, it is evident that sustainability promotes the development of innovative solutions.

Therefore, the first hypothesis of this research is formulated as follows:

**H1: Sustainability oriented innovation is positively correlated with innovation performance.**

### **3.5 The role of transformational leadership**

Although Downton first introduced the term transformational leadership (TL) in 1973, the concept only began to gain broader recognition and credibility after James MacGregor Burns published his book *Leadership* in 1978. James MacGregor Burns (1978) divided leadership into transformational and transactional. Transactional leaders guide others by engaging in exchanges or agreements based on performance and rewards (Burns, 1978). As James (1978) states, politicians, for example, lead by “exchanging one thing for another: jobs for votes, or subsidies for campaign contributions”.

From one perspective, transactional business leaders offer financial rewards for productivity or deny rewards for lack of productivity.

On the other hand, transformational leaders are those who stimulate and encourage their followers to accomplish exceptional results while also helping them grow and develop their own leadership abilities (Burns, 1978).

Early studies showed that transformational leadership was especially effective in military contexts (e.g., Bass, 1985; Boyd, 1988; Curphy, 1992; Longshore, 1988; O’Keefe, 1989; Yammarino & Bass, 1990). However, more recent research has made it clear that transformational leadership plays a vital role across all sectors and settings (Avolio & Yammarino, 2002).

Bernard M. Bass (1925–2007), one of the most influential scholars in the field of leadership, was a psychology professor who stated that transformational leaders encourage people to go beyond what they first expected of themselves, often reaching levels they didn’t think were possible. They challenge their followers with higher goals and usually see better results. Because of this, their followers tend to be more committed and feel more satisfied (Bass, 1985). This leadership involves changes in attitudes, motivation and behaviors of both followers and leaders (Jackson & Parry, 2008).

Moreover, Bass and Riggio, in their book *Transformational Leadership* (2006), explore how this style of leadership goes beyond simple exchanges between

leaders and followers. Transformational leadership builds on the idea of transactional leadership. In this way, while transactional leadership focuses on the give-and-take between leaders, colleagues and followers, where the leader clearly explains what needs to be done and what rewards will be given in return, transformational leadership goes further. It's about inspiring people to come together around a shared vision and common goals, encouraging them to think creatively and solve problems in new ways (Bass & Riggio, 2006).

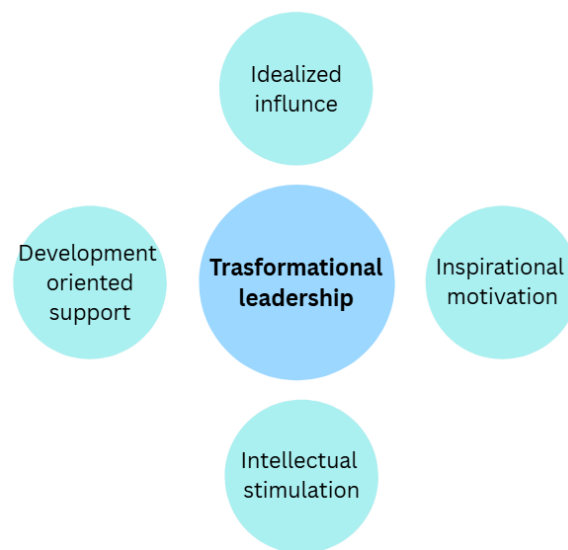
Bass and Avolio (1993) identified four key elements related to the concept of transformational leadership, which are still cited by contemporary researchers as fundamental components of TL:

1. Idealized influence: Transformational leaders act in ways that make them role models for their followers. They earn admiration, respect and trust. Because of this, followers relate to them and want to follow their example. These leaders are seen by their followers as having exceptional abilities, strong perseverance and great determination.
2. Inspirational motivation: Transformational leaders inspire and motivate those around them by providing meaning and purpose in their work. They build a strong team spirit and display enthusiasm and optimism. These leaders get their followers to envision an exciting future, set clear goals that followers are eager to meet, and demonstrate their own commitment to the objectives and shared vision.
3. Intellectual stimulation: Transformational leaders encourage their followers to be innovative and creative by challenging existing assumptions, looking at problems from different angles and finding new ways to handle familiar situations. They create an environment where creativity is fostered. Followers feel free to try new ideas without fear of criticism, even if their thoughts are different from those of the leaders.
4. Individualized consideration: Transformational leaders focus closely on each follower's personal needs for growth and achievement, often acting



as coaches or mentors. They help followers and colleagues develop their potential step by step. This individualized attention involves creating new learning opportunities within a supportive environment, where each person's unique needs and desires are acknowledged and valued (Bass & Avolio, 1993).

*Figure 7: Four key elements of transformational leadership*



*Source: personal graphical representation*

A practical example of how transformational leadership can drive innovation is evident in the example of Apple Inc. under the leadership of Steve Jobs. He had an innovative mindset and his passion for his work and the exceptional ability to communicate compelling vision inspired both internal teams and external stakeholders (Valentine, 2014). Jobs placed the user experience at the core of product development and gave priority to attractive design (Mamatha & Geetanjali, 2020). This approach helped create a culture of ongoing innovation within Apple. Jobs' broad approach to innovation, which combined design, technology and user experience, highlights how transformational leaders can strongly promote innovation (Hunter et Cushenbery, 2011).

Another example can be seen in the leadership of Satya Nadella at Microsoft. As a leader, Nadella promoted employee innovation and creativity that enhanced Microsoft's performance (Prakash et al., 2021). Oke et al. (2009) conducted research showing that creativity increases when leaders make fair decisions and have strong character.

He embraces diversity culture by putting her hands up for the campaign "Black Lives Matter" that has acknowledged him as the "Best CEOs for Diversity 2020" reported by Comparably (2020).

Nadella created a culture of innovation and teamwork at Microsoft. This led to the release of many useful tools like Microsoft Teams, a platform that became very important during the rise of remote work (George, 2019). His focus on inclusion and diversity has also helped make Microsoft's workplace more positive and creative (Kelley, 2020).

These examples show how transformational leadership can lead to innovation. It inspires vision, encourages creativity, and promotes inclusive, collaborative cultures. Jung, Chow and Wu (2003) found that transformational leadership has a positive influence on organizational innovation by motivating employees and fostering an innovative climate. Similarly, Gumusluoglu and Ilsev (2009) highlighted that transformational leaders enhance creativity, which directly contributes to innovation.

### **3.6 Evidence from Empirical Studies: The moderating role of transformational leadership**

There is a growing body of empirical research that explores the moderating role of transformational leadership. Transformational behaviors are useful in strategy implementation since they create an environment in which "followers feel trust and respect towards the leader and are motivated to do more than what they are expected to do" (Yukl, 1989). In addressing this research model, we make four specific contributions to the literature.

Engelen et al. (2012) delve into how entrepreneurial orientation (EO)

affects firm performance, while also considering the moderating influence of transformational leadership (TL) behaviors. Their research underscores that when top management exhibits transformational leadership, it can significantly boost the positive effects of EO on firm performance by creating an organizational atmosphere that encourages proactive and innovative actions. The theoretically derived model is tested using survey data obtained from 790 small-and medium sized firms in six countries and supports the idea that transformational leaders enhance the advantages of entrepreneurial strategies, indicating that firms led by transformational top management are in a stronger position to turn their strategic orientation into real performance results (Engelen et al., 2012).

Building on this foundation, research by Demir et al. (2025) reveals that green transformational leadership (GTL) plays a key role in moderating the connection between green innovation and environmental performance. This shows that transformational behaviors focused on sustainability can really boost the positive effects of innovation on performance outcomes.

Nasir et al. (2022) examine how transformational leadership (TL) affects employee creativity and innovation performance. They highlight two main aspects of TL: intellectual stimulation, which inspires employees to think critically and question the status quo, and individualized consideration, which acknowledges and appreciates each person's unique contributions. Nasir et Al. (2022) research reveals that TL not only encourages creative behaviors but also enhances the effectiveness of innovative practices. This suggests that employees led by transformational leaders are better equipped to turn ideas into real-world results. Their findings provide solid evidence that transformational leadership can amplify the impact of sustainability-focused innovation on the overall innovation performance (Nasir et al., 2022).

In a similar way, Setyawulan et al. (2024) examine transformational leadership in Indonesian IT firms, a highly dynamic and competitive sector. The study finds that TL positively moderates the relationship between innovation efforts and performance, affecting both incremental innovations and radical

innovations. This demonstrates that transformational leaders enhance the success of innovation initiatives in dynamic contexts, highlighting the potential for TL to reinforce the effectiveness of sustainability-oriented innovation in achieving superior innovation performance.

These findings suggest that transformational leadership (TL) influences the strength of the link between sustainability-focused innovation and innovation performance.

Considering the previous discussion of illustrative case studies and supporting empirical evidence, it is possible to formally propose the following hypothesis:

**H2: transformational leadership positively moderates the relation between sustainability oriented innovation and innovation performance.**

# **Method**

## **4.1 Overview**

This chapter presents a detailed description of the method employed to collect the data and specify how the variable will be measured. The chapter is made of five parts. In the first part (Section 4.2), the research context is presented. In Section 4.3, a description is provided of how the survey has been conducted, reviewed, tested and distributed. Section 4.4 details the database, informant quality and sample characteristics. In conclusion, section 4.5 covers the operationalization of dependent, independent and control variables, as well as the correlation matrix.

## **4.2 Research context**

For this study, data from companies across multiple countries worldwide were collected. Several factors motivated the adoption of a global perspective.

First, looking at different countries helps us understand innovation, sustainability, and digital transformation. It shows us various institutional, cultural, and market contexts. Countries worldwide show different levels of progress in these areas. This offers useful insights into a variety of practices and strategies.

Moreover, a multi-country approach enhances the generalizability of the findings by highlighting both shared dynamics and context-specific variations across regions. This methodology allows for a thorough appreciation of the distinctive features of different national systems, while avoiding the limitations associated with focusing on a single geographic area.

This study focuses on understanding the current trends and future perspectives of C-level managers and Top executives responsible for managing sustainability, innovation and/or digital transformation. This includes individuals responsible for these areas, regardless of their job title.

At the same time, the research wants to provide clear, practical suggestions for

creating effective business strategies around these important topics.

The survey in the appendix targets managers who have the highest decision-making authority in areas like innovation, digital transformation, and sustainability, including both environmental and social aspects. To find firms that focus on these areas, we looked for the existence of at least one of the following dedicated leadership roles as a proxy:

- Chief Innovation Officers,
- Chief Digital Officers,
- Chief Sustainability Officers.

### **4.3 Questionnaire development**

The data for this study is collected through a questionnaire designed and owned by the ITIR, Institute for Transformative Innovation Research, affiliated with the University of Pavia. Our empirical analysis focuses on very large, large and medium-sized companies, specifically selected for their high level of innovativeness. The study targets primarily firms undergoing digital transformation or sustainability transitions. The presence of a dedicated leader in innovation, sustainability, or digitalisation was used as a key indicator of such strategic orientation.

Data was collected through a questionnaire administered between July and December 2023, which resulted in 175 responses and a response rate of 13%.

To minimize respondents' reluctance or difficulty in answering accurately, several strategies were implemented:

- Clear instructions were provided at the beginning of each section of the questionnaire;
- The number of questions was kept to a minimum;
- Open-ended questions were limited to reduce the effort required from respondents, with most questions offering predefined answer options;
- Sensitive questions were minimized and placed toward the end of the

questionnaire;

- Information requiring more effort to provide, such as accounting data, was obtained from public databases to enhance accuracy and speed up responses;
- Plain language was used, avoiding business jargon or academic terminology, to facilitate understanding;
- The survey was thoroughly reviewed and tested with a small group of managers possessing characteristics similar to the final sample.

Furthermore, format, spacing and question placement were carefully considered due to their impact on the final results (Krosnick, 1999). Questions were randomized to prevent primacy or recency effects (Krosnick, 1999). The questionnaire was designed to appear professional and visually appealing, featuring ethical references and the University logo on each section to convey the official nature of the research to respondents.

#### *4.3.1 Piloting and pre-testing*

Before the official distribution, the questionnaire was pre-tested to avoid any potential comprehension issues and to ensure its overall functionality. This pilot phase involved both internal experts and a small sample of firms, providing valuable feedback that enabled the refinement of the survey instrument prior to full-scale deployment. No significant problems were found regarding how clear the questions were, their type or format, or the overall length of the questionnaire. Because of this, it was decided to move forward with the official data collection.

#### *4.3.2 Sample identification*

The identification of target firms was carried out through LinkedIn, where companies with at least one of the three key roles (Chief Innovation Officer, Chief Digital Officer, or Chief Sustainability Officer) were searched and

subsequently contacted either via LinkedIn or email. The questionnaire was created using the software QuestionPro. It was initially drafted in Italian, translated into English and then back-translated into Italian to ensure consistency and clarity across both language versions. The final version of the questionnaire was distributed via email using the QuestionPro platform.

#### *4.3.3 Choice of the distribution channel*

A web-based survey was chosen over interviewer-administered methods for several reasons.

First, it allowed for greater geographical reach and access to a broader pool of respondents across different countries and industries, which was essential given the focus on foreign companies in the research. Second, it ensured higher cost-efficiency and time-effectiveness in data collection. Additionally, the online format offered respondents greater flexibility in terms of when and where to complete the survey. Display of response data can be simultaneous with completion of surveys, which further reduces the time required for implementation (Dillman, 2000, p. 352).

### **4.4 Database identification**

#### *4.4.1 Informant quality*

To ensure high informant quality, the questionnaire was delivered to companies that have one or more senior executives holding key decision-making roles related to innovation, digital transformation or sustainability.

More specifically, the individuals should be:

- Chief Innovation Officers (I am the individual in charge of the innovation strategy of the company);
- Chief Digital Officers (I am the individual in charge of the digital strategy of the company);



- Chief Sustainability Officers (I am the individual in charge of the ecological strategy of the company).

Figure 8 shows the percentage of companies with certain C-level leaders in innovation, digital transformation and sustainability. The data indicates that Chief Innovation Officers are the most common, found in 90% of the companies. Next are Chief Digital Officers, present in 75% of the firms. Chief Sustainability Officers, however, are only present in 34% of the companies.

*Figure 8: % of companies with c-level innovation, digital or sustainability leaders.*

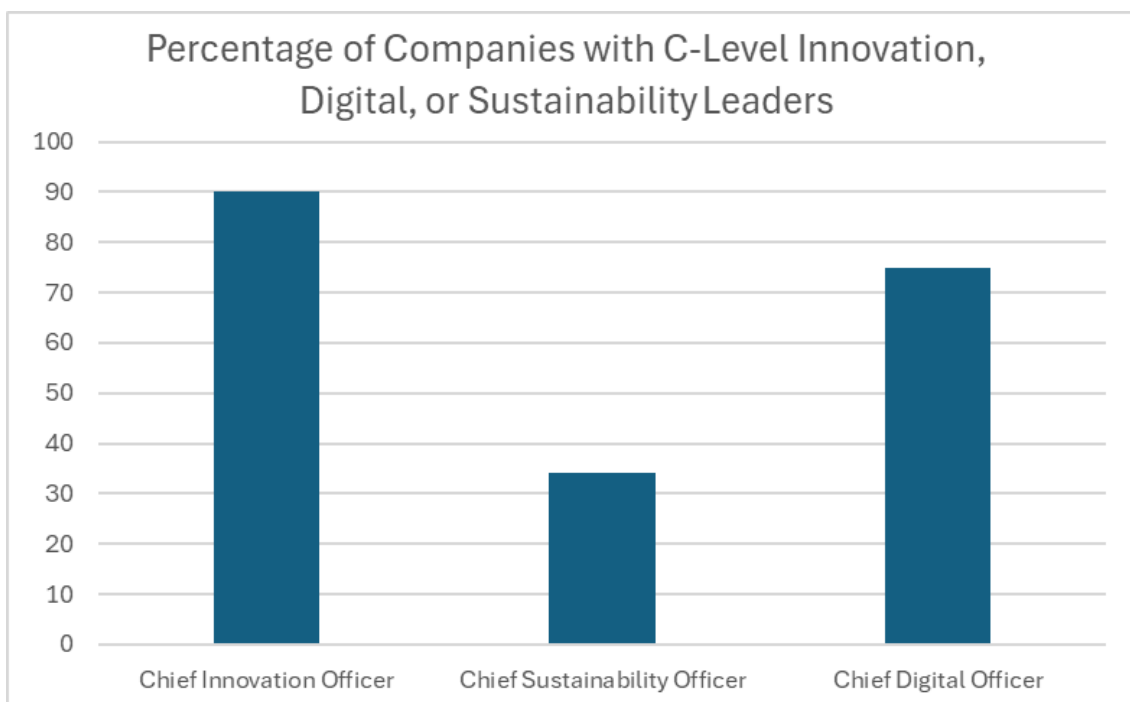
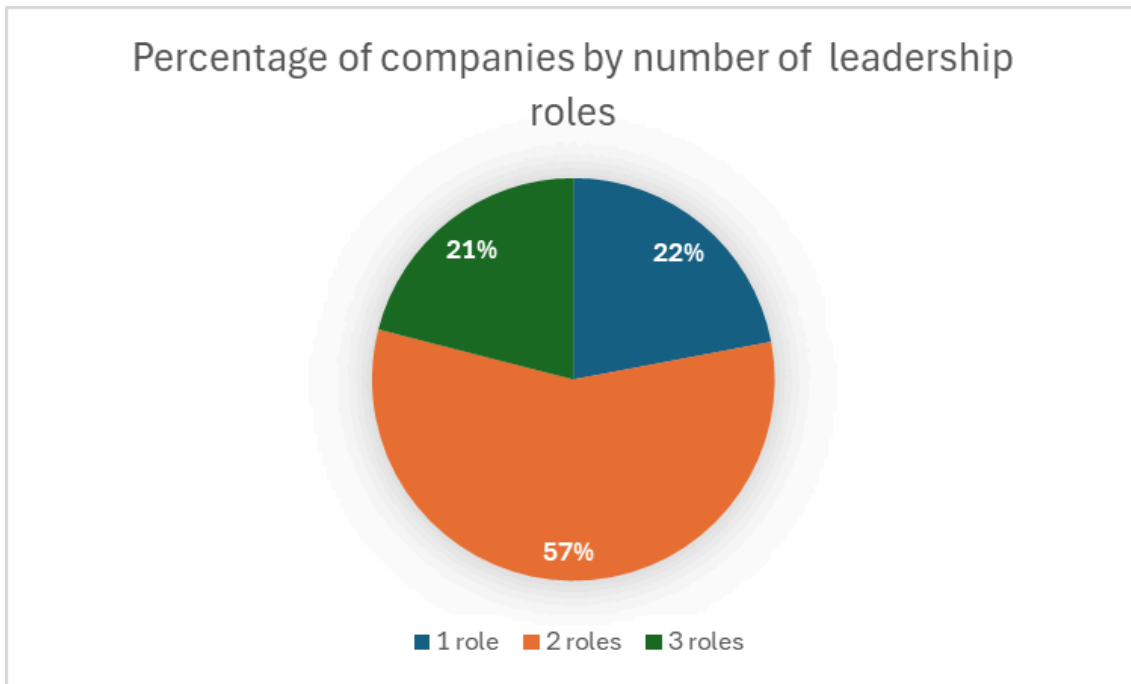


Figure 9 shows the distribution of companies based on the number of C-level leaders they have. The majority of companies (114 out of 175, or 57%) have two of these strategic leadership roles. A smaller portion (42 companies, or 21%) have implemented all three roles. Lastly, 44 companies (22%) have appointed only one of the three leaders, indicating a more focused or limited strategic orientation in these domains.

Figure 9: % of companies by number of leadership roles



#### 4.4.2 Characteristics of the sample

The number of companies who took part in the research was 175.

Table 1 provides the qualitative and quantitative characteristics of the sample.

Table 1: Qualitative and quantitative characteristics of the sample

	Percentage
<b>Characteristic of the respondents</b>	
<b>Gender</b>	
Male	77%
Female	22%
No answer	1%
	<b>100.00%</b>
<b>Age</b>	
Under 25	0.00%
25-35	8.5%
36-45	33%
46-55	39.5%
Older than 55	19%
	<b>100.00%</b>
<b>Tenure</b>	
2000 or before	2.07%
2001	0.00%
2002	1.04%
2003	0.52%
2004	0.00%
2005	0.52%
2006	1.04%
2007	0.52%
2008	0.00%
2009	0.00%
2010	1.04%
2011	1.55%
2012	0.52%
2013	2.59%
2014	1.55%
2015	3.63%
2016	3.63%
2017	7.25%
2018	7.77%
2019	8.29%
2020	11.4%
2021	16.58%
2022	16.06%

2023	12.44%
	<b>100.00%</b>
<b>Reporting structure</b>	
CEO	19%
C-levels	42.5%
Lower level manager	28.5%
Other	10%
	<b>100.00%</b>
<b>Average staff using the intermediate value of the range - How many people are you responsible for?</b>	
None (I have no staff)	10.6%
1 - 5	24.1%
6 - 10	13.6%
11 - 20	12.1%
21 - 30	9%
31 - 40	4.5%
41 - 50	6%
51 - 100	8%
101 - 150	3%
151 - 200	1%
More than 200	8%
	<b>100.00%</b>
<b>Average budget in %</b>	
Less than 1%	22.51%
Around 1%	5.76%
Around 2%	7.33%
Around 3%	7.85%
Around 4%	3.66%
Around 5%	9.95%
Between 6 - 10%	12.57%
Between 11 - 15%	5.24%
Between 16 - 20%	4.71%
Between 21 - 25%	2.62%
More than 25%	17.80%
	<b>100.00%</b>
<b>Characteristic of the companies</b>	

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**Company age**

When was the company founded?

1. Less than one year ago	1.5%
2. 1-5 years ago	2.6%
3. 6-10 years ago	12.6%
4. 11-30 years ago	25.3%
5. 30-100 years ago	34.8%
6. More than 100 years ago	13.1%
	<b>100.00%</b>

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**Ownership type**

Who is in control of the company?

1. A single person, or different people of the same family	35.5%
2. Public Company / Joint stock company / Widespread property	42.5%
3. Other	22%
	<b>100.00%</b>

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**Degree of internationalization**

What is the percentage of your company's revenue that comes from foreign sales?

1. No foreign sales	29.4%
2. 1-10%	15.5%
3. 11-20%	15.5%
4. 21-30%	4.8%
5. 31-40%	4.3%
6. 41-50%	4.3%
7. 51-60%	4.3%
8. 61-70%	5.9%
9. 71-80%	5.3%
10. 81-90%	5.9%
11. 91-100%	4.8%
	<b>100.00%</b>

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**Size of the companies (Average turnover 2022)**

Turnover combined self-reported data and secondary data

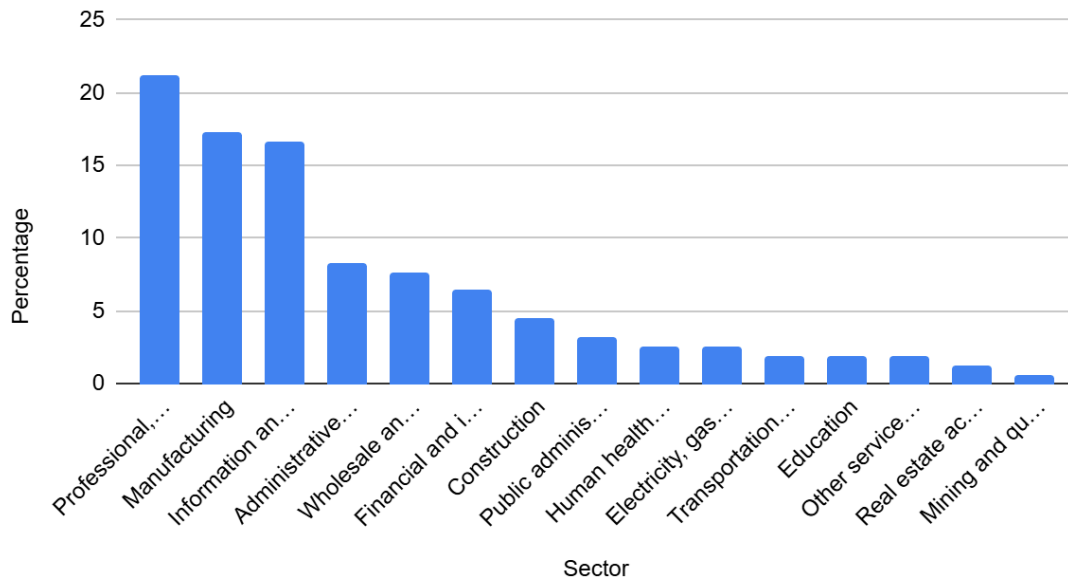
Micro (turnover up to €2 million)	86.19 %
Small (turnover between €2M and €10M)	6.63 %
Medium-sized (turnover between €10M and €50M)	3.31 %
	3.87 %

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Large (turnover above €50M)	<b>100.00%</b>
<b>Industry (see Figure 10)</b>	
Professional, scientific and technical activities	21.43%
Manufacturing	17.53%
Information and communication	16.88%
Administrative and support service activities	8.44%
Wholesale and retail trade; repair of motor vehicles and motorcycles	7.79%
Financial and insurance activities	6.49%
Construction	3.25%
Public administration and defence; compulsory social security	3.25%
Human health and social work activities	2.60%
Electricity, gas, steam and air conditioning supply	2.60%
Transportation and storage	2.60%
Education	2.60%
Other service activities	2.60%
Real estate activities	1.30%
Mining and quarrying	0.65%
	<b>100.00%</b>

*Figure 10: graphical representation of industry composition*

## Sectoral Distribution of Activities



## 4.5 Operationalisation of study constructs

### 4.5.1 Dependent variable

Innovation performance constitutes the main dependent variable in this study, representing the firm's capacity to develop and implement new products, services and organizational processes that enhance competitiveness, respond to market demands and create long-term value. Innovation is widely recognized in the literature as a multidimensional construct that encompasses both the outputs of new products and services as well as the internal processes through which these outputs are generated (OECD, 2013; Damanpour, 1991; Ettlie, 1992; Schumpeter, 1934). Measuring innovation performance requires capturing both these dimensions to provide a holistic understanding of a firm's innovativeness.

*Product innovation* (INNOV\_REV) is defined as the introduction of new goods or services to the market, aimed at meeting customer needs, exploiting market opportunities, or differentiating the firm from competitors (Barras, 1986; García-Morales et al., 2012). In this study, product innovation is operationalized

by assessing the economic impact of innovation on firm revenue. Specifically, respondents were asked: “What percentage of your revenue has been generated in the last three years by innovative products and/or services?” Responses were provided in eleven intervals, from 0% (no revenue from innovative products) to 100% (all revenue from innovative products). For the analyses, responses were recorded and treated using the 1-to-11 scale as presented in the survey.

*Process innovation* (INNOV\_PROC) captures the extent to which a firm’s internal operations and organizational processes have undergone substantial change or renewal (OECD & Eurostat, 2018). Process innovation is critical for improving efficiency, reducing costs and enhancing the quality of products and services (Ettlie, 1992; Tidd, Bessant, & Pavitt, 2005). To measure this dimension, respondents were asked: “How much have your organizational processes undergone radical renewal in the last three years?” Responses were provided on a scale from 0% (no change) to 100% (complete renewal), divided into eleven intervals. In the present study, the responses were coded and analysed using the 1-to-11 scale as reported in the survey.

Table 2 provides a summary of the operationalization of the dependent variables. By capturing both product and process innovation, the study provides a comprehensive perspective on innovation performance, encompassing both market-oriented outcomes and internal operational improvements. This dual approach aligns with theoretical foundations that emphasize the interrelation of product and process innovations in driving competitiveness, firm growth and sustainable development (Schumpeter, 1934; Tidd et al., 2005; Acosta-Prado et al., 2020).



Table 2: Operationalization of Innovation Performance

Dependent variable	Question	Response scale	Interpretation
Product innovation (INNOV_REV)	“What percentage of your revenue has been generated in the last three years by innovative products and/or services?”	0%, 1–10%, 11–20%, ..., 91–100%	Variable capturing the proportion of revenue from innovative products/services
Process innovation (INNOV_PROC)	“How much have your organizational processes undergone radical renewal in the last three years?”	0%, 1–10%, 11–20%, ..., 91–100%	Variable capturing the degree of process innovation

#### 4.5.2 Independent variables

The study includes two main independent variables: sustainability-oriented innovation (SOI) and transformational leadership (TL).

*Sustainability-Oriented Innovation* (SOI) measures the extent to which a firm integrates sustainability into its operations, strategy and innovation processes. The construct is based on a simplified version of Maletić et al. (2016) and includes items related to ecological sustainability, social sustainability, stakeholder engagement and the use of sustainability as a source of differentiation. Specifically, respondents were asked to indicate their level of agreement (1 = strongly disagree, 5 = strongly agree) with the following statements:

- SOI\_1: Improving ecological sustainability (e.g., reduction of environmental impact) is a top priority;
- SOI\_2: We assess customers’ views of green products/services through market analysis;

- SOI\_3: Multiple departments are engaged in sustainability-related initiatives;
- SOI\_4: We consider sustainability as an opportunity for differentiation;
- SOI\_5: Non-market stakeholders are involved in design and development;
- SOI\_6: We actively engage external partners to gather innovative ideas;
- SOI\_7: Improving social sustainability (e.g., inclusion, work-life balance, etc.) is a top priority;
- SOI\_8: Sustainability goals pushed us to a radical transformation.

In this study, a composite score called SOI\_A was calculated by averaging all eight items. This gave a single measure of the firm's overall sustainability-focused innovation.

*Transformational Leadership* (TL) represents the leadership style of top managers, adapted from Stock et al. (2017) and based on the Multifactor Leadership Questionnaire (MLQ) by Bass and Avolio (1995). TL captures the extent to which leaders inspire, motivate and develop their teams to achieve high performance and innovation. Respondents indicated their level of agreement on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) with the following statements:

- LEAD1: I seek differing perspectives when solving problems;
- LEAD2: I get others to look at problems from many different angles;
- LEAD3: I spend time teaching and coaching;
- LEAD4: I treat others as individuals rather than just as a member of a group;
- LEAD5: I help others develop their strengths;
- LEAD6: I am an inspiration to other people;
- LEAD7: I make other people enthusiastic about assignments.

In this study, a composite score called TL was calculated by taking the

average of all seven items. This score gives a single measure of transformational leadership as seen by the respondents.

To assess the reliability of the core constructs used in this study, the internal consistency of each variable is measured. Cronbach's  $\alpha$  and the composite reliability are calculated for each construct to examine how consistently the items measure the underlying concept. Table 3 presents the results for both measures, showing that our independent variables demonstrate satisfactory consistency.

Table 3: Cronbach's  $\alpha$  and Composite Reliability of the Study Constructs

	<b>Cronbach's <math>\alpha</math></b>	<b>Composite Reliability</b>
<b>Sustainability-oriented Innovation (SOI_A)</b>	0.8442	0.837
<b>Transformational Leadership (TL)</b>	0.795	0.809

#### 4.5.3 Control variables

Several control variables were included in the regression models. They were added for three main reasons: to ensure the model is properly specified, to rule out alternative explanations and to strengthen the robustness of the results by reducing potential biases from self-selection or omitted variables (Auh et al., 2019). The control variables used in this study are summarized in Table 4. The control variables used are: age of the firm (COMPANY\_AGE), its size (SIZE), the degree of internationalization (FOREIGN) and whether the firm operates in the manufacturing sector (MANU).

*Age of the company:* COMPANY\_AGE captures the age of the company, which may influence its experience, resources and overall capacity to innovate. Survey

respondents were asked “*When was your company founded?*” and could select among six categories (<1 year; 1–5 years; 6–10 years; 11–30 years; 30–100 years; more than 100 years). This category was coded numerically from 1 to 6, with 1 representing the youngest firms and 6 the oldest.

*Firm turnover:* SIZE represents the size of the company and it is measured by the average turnover generated by the company. Respondents were asked to indicate their company’s total annual revenue for 2022. SIZE has been transformed into a logarithmic form to scale down large values and reduce the chance of having extreme values that might unduly influence the regression results. Missing values for this variable were imputed using the mean of the observed values.

Degree of internationalization: FOREIGN measures how international a company is. It does this by looking at the percentage of the company's revenue that comes from foreign sales. Respondents reported their foreign sales as a percentage of total revenue across eleven intervals (0%; 1–10%; 11–20%; ...; 91–100%). For the analysis, the initial value of each range was used as a representative numeric value (e.g., 1, 11, 21, 31, 41, ...).

*Type of company:* MANU captures whether the company operates in the manufacturing sector or not. Survey respondents were asked to indicate the industry of their company. To simplify the analysis, this variable was coded as a dummy variable, with 1 representing the manufacturing companies and 0 representing all other types of companies.

Table 4: Control variables

Variable	Description	Measurement	Source
<b>COMPANY_</b> <b>AGE</b>	Age of the company	Year of foundation, reported in six categories (<1; 1–5; 6–10; 11–30; 30–100; >100).	Self-reported
<b>SIZE</b>	Firm size	Turnover (2022) transformed into a logarithmic form.	Self-reported
<b>FOREIGN</b>	Degree of internationalization	Percentage of revenue from foreign sales (0–100%), reported in 11 intervals.	Self-reported
<b>MANU</b>	Manufacturing company	Dummy variable: 1 = manufacturer, 0 = other.	Self-reported

#### 4.5.4 Correlation matrix

The correlation matrix for the study variables is reported in Table 5. To assess potential multicollinearity, correlations among the independent variables were examined. All correlations were below 0.32, well below the commonly used thresholds of 0.6–0.7, indicating that multicollinearity is unlikely to be a concern in the current dataset. Therefore, the independent variables can be considered sufficiently distinct for regression analyses. The results show that SOI\_A is positively correlated with INNOV\_PROC ( $r = 0.19$ ,  $p < 0.05$ ), indicating that higher SOI\_A scores are associated with higher levels of process innovation. INNOV\_REV and INNOV\_PROC are strongly positively correlated ( $r = 0.31$ ,  $p < 0.01$ ), suggesting that firms with higher revenue innovation also tend to engage

more in process innovation.

Firm size (SIZE) is positively correlated with company age (COMPANY\_AGE) ( $r = 0.31$ ,  $p < 0.01$ ). This means that larger companies tend to be older.

The remaining correlations are mostly small and not statistically significant, with confidence intervals that include zero. This suggests that these variables have little to no linear relationship with each other.

Table 5: Means, standard deviations and correlations with confidence intervals

Variable	M	SD	1	2	3	4	5	6	7
1. SOI A	3.29	0.83							
2. TL	4.32	0.52	-.00 [-.14, .14]						
3. INNOV_REV	3.94	2.97	.11 [-.04, .26]	.08 [-.07, .22]					
4. INNOV_PROC	5.13	2.73	.19* [.05, .33]	-.00 [-.15, .14]	.31** [.17, .44]				
5. COMPANY_A GE	4.19	1.27	-.12 [-.26, .02]	-.08 [-.22, .06]	.12 [-.03, .27]	-.07 [-.22, .08]			
6. SIZE	4.89	1.76	-.05 [-.20, .09]	-.04 [-.18, .10]	.07 [-.08, .21]	.01 [-.13, .16]	.31** [.18, .43]		
7. FOREIGN	24.68	29.55	.07 [-.08, .21]	.04 [-.10, .17]	.10 [-.05, .24]	.04 [-.11, .19]	-.12 [-.25, .02]	-.01 [-.15, .13]	
8. MANU	0.14	0.35	-.04 [-.18, .11]	-.03 [-.17, .11]	-.02 [-.17, .13]	-.02 [-.17, .13]	.12 [-.02, .26]	.07 [-.07, .20]	-.09 [-.23, .05]

Note. M and SD are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). \* indicates  $p < .05$ . \*\* indicates  $p < .01$ .

## Findings and discussion

This chapter presents the empirical results of the study. First, the regression models and variables included in the analysis are described. Then, the results are reported separately for process innovation and product innovation, followed by an examination of the interaction effects. Finally, the main findings are discussed.

### 5.1 Regression Models

Two separate regressions were performed, one with process innovation (INNOV\_PROC) and one with product innovation (INNOV\_REV) as dependent variable, using Stata 18 (SE, Statistics and Data Science, StataCorp LLC, 2023).

The general form of the regression models is as follows:

$$\begin{aligned} Y_i = & \beta_0 + \beta_1 \text{SOI\_A\_c}_i + \beta_2 \text{TL\_c}_i \\ & + \beta_3 (\text{SOI\_A\_c} \times \text{TL\_c})_i + \beta_4 \text{COMPANY\_AGE}_i \\ & + \beta_5 \text{SIZE}_i + \beta_6 \text{FOREIGN}_i + \beta_7 \text{MANU}_i + \epsilon_i \end{aligned}$$

Where  $Y_i$  represents either product innovation (INNOV\_REV) or process innovation (INNOV\_PROC),  $\beta_0$  is the intercept,  $\beta_1$  to  $\beta_7$  are regression coefficients and  $\epsilon_i$  is the error term.

Before running the regressions, we centered both SOI\_A and TL by subtracting their sample means. This produced the variables SOI\_A\_c and TL\_c. We centered them to lower multicollinearity between the main effects and the interaction term. This also helps to interpret the coefficients more clearly (Aiken & West, 1991). An interaction term was then created by multiplying the centered variables ( $\text{SOI\_A\_c} \times \text{TL\_c}$ ) to examine whether the effect of sustainability-oriented innovation on innovation outcomes depends on the level of transformational leadership. Both models included the centered main variables, the interaction term and firm-level control variables: age of the firm (COMPANY\_AGE), company size (SIZE), degree of internationalization



(FOREIGN) and manufacturing company (MANU).

This modeling strategy, in line with moderation analysis methods in organizational and innovation research, allows for testing both the direct effects of SOI\_A and TL and the moderating impact of leadership on the connection between sustainability-oriented innovation and innovation outcomes (Aiken et West, 1991; Hayes, 2018). The significance and direction of the coefficients will be examined to assess the hypothesized relationships.

The next sections detail the outcomes of the regression analyses.

## **5.2 Regression results**

This section presents the results of the logistic regression for both product innovation (INNOV\_REV) and process innovation (INNOV\_PROC). Table 6 summarizes the estimated coefficients, standard errors and significance levels for all predictors included in the models. The sample is composed of 175 observations.

For each dependent variable we estimated two models. The first model includes only the control variables to create a baseline. This helps us understand how much of the variation is due just to contextual factors. The second model includes the two independent variables (SOI\_A and TL) and the interaction term.

In both model 1 and 2, SIZE has a small positive but non-significant effect, suggesting that firm size does not have a clear impact on product innovation in this sample. COMPANY\_AGE is positive and marginally significant, indicating that older firms may have slightly higher levels of product innovation. FOREIGN is positive but not significant, suggesting no strong effect of foreign ownership. MANU remains non-significant in both models.

When SOI\_A is included in Model 2, it has a positive and marginally significant effect on product innovation, supporting the first hypothesis. TL remains non-significant, indicating no direct effect on product innovation. The interaction term ( $SOI\_A \times TL$ ) is also non-significant, suggesting that TL does not moderate the relationship between strategic orientation and product

innovation in this dataset. The  $R^2$  increases from 0.0307 in Model 1 to 0.0567 in Model 2, showing that adding the independent variables slightly improves the model's explanatory power.

For process innovation (Models 3 and 4), COMPANY\_AGE, SIZE, FOREIGN, and MANU are all non-significant in Model 3. These results indicate that these control variables do not have a notable impact on process innovation.

In Model 4, SOI\_A has a positive and significant effect, while TL shows a negative but non-significant effect. The interaction between SOI\_A and TL is positive and significant, indicating that transformational leadership strengthens the positive effect of strategic orientation on process innovation.

In summary, the results highlight the important role of SOI\_A in supporting innovation. Transformational leadership moderates the relationship for process innovation, enhancing the effect of SOI\_A. Some control variables show minor effects, but their impact is generally smaller compared to the main predictors.

Table 6: Regression Results for Product and Process Innovation

	<b>DV: Product innovation (INNOV_REV)</b>		<b>DV: Process innovation (INNOV_PROC)</b>	
	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>
<b>Constant</b>	2.175 (0.899)*	2.029 (0.909)*	5.473 (0.836)***	5.020 (0.824)***
<b>SOI_A (H1)</b>		0.525 (0.281)†		0.525 (0.255)*
<b>TL</b>		0.446 (0.436)		-0.110 (0.396)
<b>Interaction (H2)</b>		-0.388 (0.659)		1.461 (0.599)**
<b>COMPANY _AGE</b>	0.302 (0.185)*	0.335 (0.186)†	-0.173 (0.173)	-0.116 (0.169)
<b>SIZE</b>	0.051 (0.135)	0.063 (0.136)	0.067 (0.127)	-0.090 (0.123)
<b>FOREIGN</b>	0.012 (0.008)	0.010 (0.008)	0.003 (0.007)	0.005 (0.007)
<b>MANU</b>	-0.202 (0.646)	-0.188 (0.653)	-0.098 (0.601)	0.178 (0.591)
<b>N</b>	175	175	175	175
<b>R2</b>	0.0307	0.0567	0.0083	0.0808

Significance levels: \*\*\* p &lt; 0.001; \*\* p &lt; 0.01; \* p &lt; 0.05; † p &lt; 0.1

### 5.3 Discussion

The regression analyses partially confirm the hypotheses and provide relevant insights into the relationship between sustainability-oriented innovation (SOI), transformational leadership (TL) and firm innovation outcomes.

The findings show a robust positive and significant effect of sustainability-oriented innovation (SOI\_A) on both product and process innovation. This result is consistent with a large body of empirical evidence highlighting the strategic role of sustainability in fostering innovation. Maletič et al. (2014), for instance, demonstrated that organizations embedding sustainability practices, such as eco-friendly design, energy efficiency and ethical supply chain management, reported not only superior financial and operational performance

but also stronger stakeholder relationships. Similarly, Afeltra et al. (2022) found that the integration of environmental, social and economic sustainability dimensions generates benefits that strengthen both competitiveness and organizational efficiency. In the Italian context, LIUC (2023) confirmed that sustainable innovation enables manufacturing firms to enhance efficiency and market competitiveness over the medium to long term. Ceptureanu (2025) further emphasized the role of sustainability in knowledge sharing and organizational learning, showing that it drives improvements in product development, process optimization and resilience. Fernandes (2023) added that SMEs adopting sustainability-oriented innovations are better positioned to adapt to market fluctuations and regulatory challenges, thus reinforcing long-term resilience. In line with this international and national evidence, the present results strengthen the argument that sustainability is a key driver of innovation, confirming Hypothesis 1 and supporting the view that environmentally and socially responsible firms are also more innovative.

In contrast to expectations, the second hypothesis is partially confirmed. Our results reveal that TL shows a significant moderating effect in the only case of process innovation. In particular, the positive interaction between SOI\_A and TL suggests that transformational leadership can amplify the impact of sustainability on process innovation, but not on product innovation.

This aligns with the scientific literature presented in chapter 3 that emphasized the idea that TL creates a supportive climate for experimentation, learning and continuous improvement (Nasir et al., 2022). In this perspective, transformational leaders do not directly generate innovation but act as enablers, enhancing the effectiveness of sustainability initiatives by mobilizing employees and reducing resistance to change. This is consistent with Setyawulan et al. (2024), who found that TL is particularly effective in fostering process improvements and incremental innovations. The discussion integrates these findings with existing literature, highlighting that transformational leadership primarily supports process innovation by fostering a climate of learning and adaptation.

With regard to control variables, firm size shows a non-significant relationship with product innovation and a negative but non-significant effect on process innovation, suggesting that in this dataset size is not a consistent predictor. Firm age is positive and marginally significant for product innovation but non-significant for process innovation, while foreign ownership and MANU are mostly non-significant across models. This indicates that these factors are not systematic predictors of innovation performance in this sample.

These findings show three important insights:

1. Sustainability is confirmed as a fundamental driver of innovation, consistent with extensive evidence from different countries.
2. Transformational leadership does not directly affect innovation alone, but it emerges as an enabling factor that strengthens the relationship between SOI and process innovation, providing a more complex perspective than originally hypothesized.
3. Process innovation and product innovation do not seem to follow the same strategic path. On one hand, the results indicate that TL has a wider effect on process innovation, possibly because process innovations are more related to employees, daily routines, and continuous problem-solving and improvement: activities where TL can inspire, motivate and reduce resistance to change. On the other hand, product innovation often involves higher levels of uncertainty, specialized knowledge, and external collaboration, which are less directly influenced by leadership behaviors alone.
4. Firm size and other controls do not have a strong or consistent effect in this dataset. This means that structural barriers may be less influential than the strategic orientation and leadership variables included. Smaller firms do not demonstrate consistently higher levels of innovation.

## Conclusion

This research aims to investigate the relationship between sustainability-oriented innovation (SOI), transformational leadership (TL) and firm-level innovation outcomes, with a particular focus on both product and process innovation. A multicountry analysis was conducted on a sample of 175 firms undergoing transformation processes, using quantitative methods and regression model estimated with Stata 18, with the aim of testing how sustainability and leadership interact in shaping innovation outcomes.

The results confirm that SOI is a key driver of innovation. It improves both process outcomes and has a positive marginal effect on product innovation. Transformational leadership does not directly influence innovation performance. However, it plays an important supportive role. It strengthens the impact of SOI on process innovation. This shows that leadership is not just an input variable; it is a structural and cultural mechanism. It helps with knowledge sharing, employee engagement, and organizational learning. These factors are essential for turning sustainability initiatives into real innovations.

This analysis also underscores the systemic nature of sustainability-driven innovation. Firms do not operate in isolation: their strategies are influenced by regulatory environments, market expectations and societal norms. Initiatives such as B Lab certifications or circular economy practices illustrate that external validation and stakeholder engagement can significantly enhance the credibility and effectiveness of sustainable innovations. At the same time, this raises critical questions about the future of corporate responsibility: how can organizations balance profitability, innovation and social value in a way that is both credible and scalable? This question highlights the need for a holistic understanding of innovation that encompasses environmental, social and economic dimensions.

Similarly, transformational leadership plays a systemic and moderating role in shaping innovation outcomes within organizations. Leaders who provide a clear vision, intellectual stimulation and individualized consideration create the

cultural and structural conditions necessary for employees to experiment, share knowledge and develop innovative solutions. This study shows that TL significantly moderates the impact of sustainability-oriented initiatives, particularly in process innovation, by facilitating the implementation and integration of new practices across organizational levels. In practice, transformational leaders help firms navigate complex change processes, align team efforts with strategic objectives and foster resilience in the face of uncertainty or resistance. This raises broader questions about leadership in modern organizations: how can leaders cultivate a culture of continuous learning and adaptability that sustains both innovation and sustainability goals? How can leadership development programs be designed to equip managers with the skills to manage multidimensional challenges, including technological, environmental and social transformations? Reflecting on these issues shows that leadership not only drives employee motivation but also plays a key role in turning strategic priorities, like sustainability and innovation, into real and effective results for the organization.

Despite the contributions of this study, several limitations must be recognized. First, the models show limited explanatory power, suggesting that other organizational, cultural, or contextual factors may affect innovation outcomes. Second, the cross-sectional design prevents drawing causal conclusions and limits the ability to observe how sustainability-oriented innovation (SOI) and transformational leadership (TL) change over time. Third, the study depends on self-reported measures for both innovation outcomes and leadership behaviors, which may lead to perceptual bias or social desirability effects. Fourth, although the study used a multicountry sample, differences in national, cultural, or institutional contexts may still limit the generalizability of the findings to specific countries, industries, or organizational settings.

Fifth, while SOI and TL were measured with validated scales, these concepts are complex and have multiple dimensions. Some parts of sustainability practices or transformational leadership may not have been fully captured. Sixth,

the analysis looked only at TL as a moderating factor. Other organizational variables, like organizational culture, absorptive capacity, employee engagement, or change management practices, might also affect the relationship between SOI and innovation.

Seventh, the study only considered product and process innovation, leaving out other types, such as incremental or radical innovation.

Finally, the study did not account for external environmental factors, including market dynamics, regulatory pressures and competitive intensity, which could significantly affect the effectiveness of sustainability-oriented initiatives and leadership practices.

Future research could address these limitations by employing longitudinal or experimental designs, expanding the set of explanatory variables, incorporating additional forms of innovation and examining different industry or country contexts. Such approaches could provide deeper insights into the mechanisms through which sustainability and leadership interact to drive both incremental and radical innovation, offering a more comprehensive understanding of the conditions that foster long-term firm competitiveness and societal impact.

In conclusion, this study shows that sustainability-oriented innovation drives both product and process innovation, while transformational leadership enables organizations to translate sustainability initiatives into more meaningful outcomes. Together, they highlight that fostering innovation sustainably requires an integrated approach, where strategy, culture and leadership converge to create long-term value for both firms and society.



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# Appendix

## Survey

Leading the momentous change: a survey on Innovation, Digital Transformation and Sustainability leaders

### Introduction

Aims of the survey.

1. Investigate current trends and future perspectives of C-level managers and Top executives responsible for managing innovation, sustainability, and/or digital transformation, regardless of the job title of people in charge of these responsibilities.
2. Identify best practices and provide recommendations for the professional development of these roles.
3. Deliver clear, actionable suggestions for the development of effective business strategies related to these topics.

Audience: Who should fill out the questionnaire? Managers with the highest decision-making authority in the company regarding innovation, digital transformation, or (ecological or social) sustainability. Typically, we are referring to individuals in the 'Chief X Officer' position (e.g., Chief Innovation Officer, Chief Digital Officer, Chief Sustainability Officer) or those with similar responsibilities (e.g., Head of...). If your company does not have specific roles like these, we would like to hear from the CEO or other top-level executives who are familiar with the company's strategies. Your insights will be extremely beneficial to this survey! Why should you join?

1. You will receive the complete report, including all details and findings (the public version is only a summary).
2. It only takes a few minutes: no more than ten minutes.
3. All responses are strictly CONFIDENTIAL;
4. If you are interested, you can join a community of professionals in these roles (optional) and/or access additional resources related to these topics developed by

our research centre.

More info at <https://www.itir.io/projects/leading-the-momentous-change/>

### **Your key responsibilities**

Do you have relevant responsibilities in any of the following areas? (You may choose more than one option.)

1. Innovation
2. Environmental and/or social sustainability
3. Digitalization
4. None of the above

### **Personal Information**

First Name

Last Name

Job Title:

### **Gender**

Gender

1. Male (1 in the survey)
2. Female (0 in the survey)
3. I prefer not to say.

### **Age**

How old are you?

1. Under 25
2. 25-35
3. 36-45
4. 46-55
5. Older than 55

### **Tenure**

When did you start the current job?

1. 2000 or before
2. 2001
3. 2002

4. 2003
5. 2004
6. 2005
7. 2006
8. 2007
9. 2008
10. 2009
11. 2010
12. 2011
13. 2012
14. 2013
15. 2014
16. 2015
17. 2016
18. 2017
19. 2018
20. 2019
21. 2020
22. 2021
23. 2022
24. 2023

### **Reporting structure**

Please indicate your current reporting structure:

1. I am directly reporting to the CEO only
2. I am reporting to another functional head (functional reporting)
3. I am reporting to multiple individuals (matrix reporting )
4. I am the CEO (the highest decision-making authority)
5. Other

### **Staff**

How many people are you responsible for?

1. None (I have no staff)
2. 1 - 5
3. 6 - 10
4. 11 - 20
5. 21 - 30
6. 31 - 40
7. 41 - 50
8. 51 - 100
9. 101 - 150
10. 151 - 200
11. More than 200

**Budget**

On average, what is the budget of your unit as a percentage of the company's revenue?

1. Less than 1%
2. Around 1%
3. Around 2%
4. Around 3%
5. Around 4%
6. Around 5%
7. Between 6 - 10%
8. Between 11 - 15%
9. Between 16 - 20%
10. Between 21 - 25%
11. More than 25%

**Leadership style (TRANSFORMATIONAL LEADERSHIP):** The measure of transformational leadership was an adaptation of Stock et al.'s (2017) construct, which is based on the multifactor leadership questionnaire (MLQ) by B. Bass and Avolio (1995). How much do you agree with the following statements about how you lead your team:

		1	2	3	4	5
LEAD1	I seek differing perspectives when solving problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LEAD2	I get others to look at problems from many different angles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LEAD3	I spend time teaching and coaching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LEAD4	I treat others as individuals rather than just as a member of a group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LEAD5	I help others develop their strengths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LEAD6	I am an inspiration to other people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LEAD7	I make other people enthusiastic about assignments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Company age**

Company age self-reported, can be compared with secondary data. When was your company founded?

1. Less than one year ago
2. 1-5 years ago
3. 6-10 years ago
4. 11-30 years ago
5. 30-100 years ago
6. More than 100 years ago

### **Turnover 2022**

Self-reported turnover to compare with secondary data

What is the annual revenue of your company? (2022)

### **Degree of internationalization**

Popular measure: Foreign sales over Total sales. What is the percentage of your company's revenue that comes from foreign sales?

1. No foreign sales
2. 1-10%
3. 11-20%
4. 21-30%
5. 31-40%
6. 41-50%
7. 51-60%
8. 61-70%
9. 71-80%

10. 81-90%

11. 91-100%

**Innovation performance (product innovation)**

Measure for innovation performance (product innovation): literature available using this measure and in combination with process innovation. What percentage of your revenue has been generated in the last three years by innovative products and/or services?

1. No revenue comes from innovative products or services

2. 1-10%

3. 11-20%

4. 21-30%

5. 31-40%

6. 41-50%

7. 51-60%

8. 61-70%

9. 71-80%

10. 81-90%

11. 91-100%

**Innovation performance (process innovation)**

Measure for innovation performance (process innovation): literature available using this measure and in combination with product innovation. How much have your ORGANISATIONAL PROCESSES undergone radical renewal in the last three years? (Select a range where 0 = not at all while 100 = completely

1. No change in our business processes

2. 1-10%

3. 11-20%

4. 21-30%

5. 31-40%

6. 41-50%

7. 51-60%

8. 61-70%

9. 71-80%

10. 81-90%

11. 91-100%

### **Sustainability (SOI)**

Measure for sustainability-oriented innovation simplified measure of Maletic et al (2016) - 10.1080/14783363.2015.1064767. How much do you agree with the following statements about how your organisation operates in terms of sustainability?\* Non-market stakeholders are individuals or groups, like NGOs, community organisations, or regulators, who influence or are influenced by a business but are not directly engaged in transactions or economic interactions with that business.

		1	2	3	4	5
SOI_1	Improving ecological sustainability (e.g. reduction of environmental impact) is a top priority	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SOI_2	We assess customers' views of green products/services through market analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SOI_3	Multiple departments are engaged in sustainability-related initiatives.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SOI_4	We consider sustainability as an opportunity for differentiation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SOI_5	Non-market stakeholders* are involved in design and development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SOI_6	We actively engage external partners to gather innovative ideas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SOI_7	Improving social sustainability (e.g. inclusion, worklife balance, etc.) is a top priority	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SOI_8	Sustainability goals pushed us to a radical transformation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



