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Greener Together:
Exploring How Open Innovation Drives Corporate Sustainability

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Abstract

Corporate sustainability has become a strategic imperative, driven by external pressures and internal incentives. This thesis explores the powerful synergy between open innovation (OI) and corporate sustainability, investigating how companies can leverage collaborative approaches to address complex environmental and social challenges. Traditional, closed innovation models often prove insufficient for achieving the systemic transformations needed for a sustainable future. This research adopts a qualitative approach, combining a comprehensive literature review with in-depth case studies of Unilever, Tesla, and Enel. These cases exemplify diverse OI strategies in real-world sustainability contexts: Unilever's outside-in approach through its Foundry, Tesla's inside-out patent strategy, and Enel's coupled open innovation model. Key findings highlight the importance of strategic alignment between OI initiatives and overall sustainability goals, dedicated infrastructure, a collaborative internal culture, and effective partner management. The results demonstrate that strategically implemented OI can accelerate progress towards sustainability, fostering innovation, reducing costs, and enhancing competitiveness. However, success requires careful consideration of intellectual property, a long-term commitment, and tailored approaches to specific challenges.

Key Words

Open Innovation, Corporate Sustainability, Collaboration, Sustainability Strategies

OUTLINE

List of Abbreviations

CS ..... *Corporate Sustainability*
ESG..... *Environmantal, Social and Governance*
EV..... *Electric Vehicle*
IP ..... *Intellectual Property*
OI ..... *Open Innovation*
TBL..... *Triple Bottom Line*

1. Introduction

In January 2025, President Donald Trump once again withdrew the United States, one of the world's largest greenhouse gas emitters, from the Paris Agreement (Bearak, 2025). The decision to leave this international accord to combat climate change, has several far-reaching implications. By removing itself from this global commitment, the U.S. not only signals a potential increase in its own emissions but also places a significantly larger burden on other nations and actors to compensate for this shortfall. It represents a retreat from global leadership on a critical issue, possibly encouraging other countries to weaken their own commitments (Gibson, 2025). The withdrawal not only underscores the volatile nature of global climate policy but also dramatically intensifies the urgency for heightened responsibility on all actors – individuals, governments, and especially businesses – to address the escalating climate crisis.

The Paris Agreement, adopted by 196 Parties at the UN Climate Change Conference in 2015, represents a significant step towards a collective action against global warming (UNFCCC, n.d., *The Paris Agreement*). The nearly universal participation in this agreement underscores the widespread recognition of the climate crisis and the urgent need for a coordinated global response. The agreement establishes a framework for countries to work together, setting increasingly ambitious targets for emissions reduction and adaptation to the impacts of climate change. It's overarching goal of limiting global warming to well below 2°C, preferably 1.5°C, above pre-industrial levels (United Nations, 2015; UNFCCC, n.d., *The Paris Agreement*). This collaborative spirit – the recognition that no single entity can solve this global crisis alone – provides a crucial lesson for the corporate world.

Just as nations must collaborate on a global scale, businesses must embrace collaborative approaches to drive meaningful progress toward sustainability. This is where the concept of open innovation becomes essential. Open innovation offers a fundamentally different approach to problem-solving and innovation than traditional, closed models. Rather than relying solely on internal research and development, companies embracing open innovation actively seek and integrate external ideas, technologies, and resources, while also sharing their own knowledge with others (Chesbrough, 2003). This collaborative model, which can involve a wide range of partners holds promise for tackling the complex, multi-faceted challenges of sustainability.

This thesis explores how companies can leverage open innovation to drive corporate sustainability, investigating what organizational and strategic elements are critical for maximizing its positive and mitigating potential negative impacts. The goal is to examine how

companies can use open innovation to enhance their sustainability efforts and address sustainability challenges. It explores the strategic value of collaboration and external knowledge integration in corporate sustainability initiatives, highlighting why traditional innovation models are often insufficient. By analyzing how open innovation facilitates sustainability and presenting real-world case studies, this research provides insights into its benefits, challenges, and strategic implications. Ultimately, the thesis aims to inform corporate decision-makers on the potential of open innovation in driving sustainability, offering a deeper understanding rather than a prescriptive framework for implementation.

To achieve this, a qualitative research approach is adopted, combining a comprehensive review of academic literature with in-depth case study analyses. The literature review will draw upon peer-reviewed journals, books, corporate reports, and industry publications to establish a robust theoretical foundation in both open innovation and corporate sustainability. The case studies – focusing on Unilever, Tesla, and Enel – will provide practical insights into how diverse companies are applying open innovation models to address specific sustainability challenges. This combined approach allows for a nuanced understanding of both the theoretical underpinnings and the real-world applications of open innovation for sustainability.

This thesis begins by establishing the core principles of corporate sustainability and the driving forces behind its increasing importance (Chapter 2). Next, the concept of open innovation is introduced, detailing its various forms and outlining its potential advantages and limitations (Chapter 3). The crucial link between innovation and sustainability is then explored, first by examining the fundamental role of innovation in addressing sustainability challenges (Chapter 4.1), and then by demonstrating how open innovation, specifically, acts as a powerful enabler for achieving sustainability goals (Chapter 4.2). This is supported by the in-depth case studies of Unilever, Tesla and Enel (Chapter 4.3.). A comparative analysis of the findings follows, identifying key organizational and strategic elements for success (Chapter 5). Finally, the thesis concludes by summarizing the main findings, discussing their practical implications for businesses, and suggesting avenues for future research (Chapter 6).

2. Corporate Sustainability

Due to the escalation of environmental issues in recent decades, sustainability has turned into a key priority for businesses, shaping corporate strategy, regulatory policies, and consumer expectations. This chapter begins by establishing the fundamentals of corporate sustainability and its growing importance in the global context, followed by an exploration of the external

pressures that compel companies to adopt sustainable practices. Finally, the chapter examines the internal drivers and strategic benefits that make sustainability a desirable and advantageous approach for businesses.

2.1 Fundamentals and Importance

Sustainability has emerged as a critical response to pressing global challenges, including climate change, resource depletion, and social inequality (Adolph & Beckmann, 2024). The increasing recognition of the environmental, social, and economic impacts of business activities necessitates a shift towards more sustainable practices (Payán-Sánchez et al., 2021). This concept, evolving from the post-World War II conservation and environmental movements, gained prominence between 1980 and 1990, when influential reports highlighted the serious risks posed by population growth, resource consumption, and environmental degradation (Kidd, 1992). Scientific evidence continues to underscore the urgency, with reports indicating accelerated global warming, severe ocean warming, and significant wildlife population decline (Bansal, 2019). These findings highlight that business and society are consuming resources faster than the earth can replenish them, jeopardizing the needs of future generations (Bansal, 2019). As former UN Secretary-General Ban Ki-Moon stated, "There is no Plan B for action, as there is no Planet B" (as cited in George et al., 2016, p. 1893).

The foundational concept of sustainable development, as defined in the Brundtland Report (1987), is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, as cited in Scoones, 2007, p. 590). This definition emphasizes both intergenerational equity—ensuring future generations have necessary resources—and intragenerational equity, focusing on the equitable distribution of resources within the current generation (Bansal, 2019). Sustainable development necessitates balancing economic growth with ecological limits, addressing challenges at both societal and corporate levels to ensure the preservation of ecological systems and natural resources for continued economic and social well-being (Stojanović et al., 2024).

Corporate sustainability (CS) has emerged as a crucial mechanism for businesses to integrate these broader sustainability principles into their strategies (Saeed Alameri et al., 2024). While often used interchangeably with corporate responsibility, CS initially focused on environmental concerns, while corporate responsibility addressed societal issues (Bansal & Song, 2017). These fields have converged, recognizing the interconnectedness of environmental and social systems (Bansal & Song, 2017). Although a universally accepted definition is lacking, and

many synonymous terms exist, the core principle of corporate sustainability remains consistent: balancing economic, social, and environmental needs to ensure long-term viability (Moore et al., 2017; Montiel & Delgado-Ceballos, 2014). This multi-dimensional approach extends beyond traditional economic responsibilities to include environmental, social, and corporate governance (ESG) considerations, requiring a long-term perspective and recognizing the interdependence of these dimensions (Adolph & Beckmann, 2024; Park, 2023).

The Triple Bottom Line (TBL) framework (Elkington, 1997) provides a model for corporate sustainability, emphasizing that success should be measured not only by financial performance but also by social and environmental impact (Ebner & Baumgartner, 2006; Norman & Macdonald, 2004). The TBL encompasses economic sustainability (long-term profitability), social sustainability (responsibility towards employees and communities), and environmental sustainability (resource conservation and minimizing ecological impact) (Alhaddi, 2015). Building on the TBL, ESG reporting frameworks are used by companies for the disclosure of data covering business operations and opportunities and risks that are related to the environmental, social, and governance aspects of the business. This reflects a moral responsibility toward society that extends beyond maximizing shareholder profit (Park, 2023).

This holistic approach represents a shift from the traditional shareholder-value model, which prioritizes financial performance above all else, recognizing the interconnectedness of business and society (Dürr, 2024). This evolution is partly a response to corporations increased economic and political power, driven by globalization, which, while lowering trade barriers, has also exacerbated environmental and societal challenges (Lozano, 2015). Consequently, businesses are increasingly held accountable for their role in addressing these challenges, making CS not just a desirable option but a strategic imperative.

2.2 External Drivers for Corporate Sustainability

Corporate sustainability is no longer solely a voluntary endeavor. A multitude of external pressures now compel companies to integrate ESG considerations into their core strategies. These drivers stem from evolving societal expectations, increasingly stringent regulatory frameworks, and growing investor demands for transparency and accountability. Businesses that fail to adapt face significant risks, including reputational damage, financial penalties, and limited access to capital (Aydoğmuş et al., 2022; Eliwa et al., 2019; Kassinis & Vafeas, 2006; Norman & Macdonald, 2004).

Societal expectations regarding corporate responsibility have significantly transformed, moving away from the traditional view that a company's sole responsibility was to generate shareholder profits (Friedman, 1962, as cited in Moir, 2001; Carroll, 1991). Businesses are now viewed as interwoven with society (Wood, 1991, as cited in Moir, 2001), with stakeholders – including consumers, employees, communities, and NGOs – demanding that companies address their social and environmental impacts (Moir, 2001). This necessitates a shift to a stakeholder-centric model that balances the needs of all stakeholders (Freeman & McVea, 2001, as cited in Jabbour et al., 2020). The concept of Corporate Social Responsibility reflects this evolving expectation, encompassing a company's economic, legal, ethical, and philanthropic responsibilities (Carroll, 1991). Corporate Social Responsibility has evolved from a discretionary practice to a structured component of corporate strategy, fueled by international sustainable development agreements (Latapí Agudelo et al., 2019).

Regulatory and compliance requirements represent another significant external driver. Governments worldwide are implementing stricter regulations mandating sustainability reporting and corporate due diligence. The European Union, with the EU Green Deal and the Corporate Sustainability Reporting Directive, is introducing mandatory, standardized disclosures to increase transparency (Nix et al., 2022, as cited in Dürr, 2024). The EU Deforestation Regulation, for example, requires companies to demonstrate that their supply chains are deforestation-free, or they will face substantial financial penalties (European Commission, 2023). This shift from voluntary to mandatory reporting is driven by the recognition that the macroeconomic costs of environmental destruction and social crises are becoming increasingly severe (Dürr, 2024). Broader legal frameworks and international agreements, such as the Montreal Protocol (1987), which successfully reduced ozone-depleting substances, also influence corporate behavior. Many countries employ "carrot-and-stick" policies, combining penalties, such as taxes on pollution or fines for non-compliance, with incentives, like tax breaks, subsidies for green technologies, and grants for sustainable practices, to steer corporate behavior toward sustainability (Zolfagharinia et al., 2023).

Investor pressure is another powerful external driver. Financial markets increasingly prioritize sustainability, with institutional investors incorporating ESG factors into their investment decisions. Companies with strong sustainability policies are viewed as lower-risk and more resilient (Thun et al., 2024). Due to this perception of being low-risk investments, firms with higher ESG performance often benefit from reduced borrowing costs (Eliwa et al., 2019).

Additionally, credit rating agencies are also increasingly integrating ESG factors into their assessments, further influencing companies' access to capital (Thun et al., 2024).

The external drivers for corporate sustainability are multifaceted and increasingly powerful. Societal expectations, regulatory frameworks, and investor demands are converging to create an environment where sustainability is no longer optional but a fundamental business imperative. Companies must adapt to these pressures, not only to comply with regulations and maintain legitimacy but also to secure their long-term financial viability and societal license to operate (Lozano, 2015; Schaltegger & Hörisch, 2017).

2.3 Internal Drivers for Corporate Sustainability

While external pressures undoubtedly compel companies to adopt sustainable practices, a growing body of evidence demonstrates that internal drivers – strategic, financial, and operational benefits – are equally influential in motivating CS. Companies are increasingly recognizing that sustainability is not merely a compliance burden or a matter of ethical responsibility, but rather a source of competitive advantage, innovation, and long-term value creation (Ebner & Baumgartner, 2006; Camilleri, 2017; Lo & Sheu, 2007; Oliveira et al., 2023; Saeed Alameri et al., 2024).

This proactive approach to sustainability allows firms to differentiate themselves in the market, build brand trust, and foster customer loyalty (Baumgartner & Rauter, 2016; Park, 2023; Saeed Alameri et al., 2024). Consumer demand for sustainable brands is rising. A significant percentage of consumers, particularly millennials, are willing to pay more for sustainable offerings and express an emotional connection to companies and products perceived as sustainable (Eliwa et al., 2019). This shift in consumer preferences provides a clear financial incentive and a substantial revenue opportunity for companies to adopt sustainable practices.

The debate over whether "doing good" leads to "doing well" has persisted, but a substantial body of literature indicates that sustainability does indeed bring operational and financial benefits (Park, 2023). Companies that integrate sustainability into their core business strategies often experience improved financial performance, better access to capital, and reduced risk exposure (Aydoğmuş et al., 2022; Camilleri, 2017; Lo & Sheu, 2007; Thun et al., 2024; Zhou et al., 2022). Sustainability initiatives can lead to significant cost savings through improved resource efficiency, waste reduction, and energy optimization (Baumgartner & Rauter, 2016; Lozano, 2015; Schaltegger & Hörisch, 2017). Furthermore, strong ESG performance is positively correlated with firm value and profitability (Aydoğmuş et al., 2022; Lo & Sheu,

2007). As highlighted in the previous chapter, institutional investors prioritize sustainability; this external pressure also acts as an internal driver, motivating companies to improve their ESG performance to attract investment, gain access to capital on more favorable terms, and potentially achieve better credit ratings (Thun et al., 2024; Eliwa et al., 2019). Governments also offer incentives, such as tax breaks and subsidies —the "carrot" aspect of the previously mentioned policies— to encourage sustainable practices, further reinforcing this internal driver (Zolfagharinia et al., 2023).

Sustainability also drives innovation and fosters competitive advantage. Companies that embrace sustainability are more likely to develop new business models, eco-friendly products, and circular economy initiatives (Baumgartner & Rauter, 2016; Camilleri, 2017; Ioannou & Serafeim, 2019; Oliveira et al., 2023). This includes developing new technologies and processes that minimize environmental impact and maximize resource utilization, potentially leading to first-mover advantages in emerging markets (Oliveira et al., 2023). Firms adopting circular economy models or integrating unique corporate purpose statements gain a difficult-to-imitate competitive edge (Ioannou & Serafeim, 2019).

Ethical leadership—leadership that prioritizes ethical conduct and social responsibility—plays a crucial role in driving internal adoption of corporate sustainability (Lozano, 2015). Beyond ethical considerations, internal drivers such as risk management and reputation protection motivate companies to embrace sustainability (Lozano, 2015; Baumgartner & Rauter, 2016). These internal motivations often lead to enhanced employee attraction and retention, stronger employee motivation and commitment, improved risk management, and increased profits (Lozano, 2015).

Internal drivers play a crucial and increasingly dominant role in promoting corporate sustainability. Companies are recognizing that sustainability is not just a response to external pressures but a strategic asset that offers significant financial, operational, and reputational benefits. The integration of ESG factors into business strategy is becoming a standard practice, reflecting a shift towards a more holistic approach to corporate success, where sustainability is not just a cost, but a source of value creation (Aydoğmuş et al., 2022; Camilleri, 2017; Ioannou & Serafeim, 2019).

CS has transitioned from a peripheral concern to a fundamental strategic priority, driven by both external pressures and internal incentives. Businesses must navigate an evolving landscape where societal expectations, regulatory frameworks, and investor demands require transparency

and accountability in sustainability efforts. At the same time, sustainability is increasingly recognized as a catalyst for competitive advantage, financial resilience, and long-term value creation. The convergence of these external and internal drivers underscores that corporate sustainability is not merely a compliance obligation but a crucial necessity that fosters innovation, operational efficiency, and stakeholder trust. Ultimately, corporate sustainability is no longer optional; it is essential for long-term business viability and for creating a more sustainable and equitable future.

3. Open Innovation

Open Innovation (OI) represents a paradigm shift in how companies conceptualize and manage the innovation process. This chapter introduces Open Innovation by first establishing its fundamentals and importance, including its evolution and core definitions. It then explores the different types of Open Innovation and finally concludes by discussing the potential benefits and inherent challenges associated with adopting Open Innovation.

3.1 Fundamentals and Importance

In today's ever-evolving business landscape, characterized by dynamic marketplaces and changing customer demands, innovation is paramount for organizational survival and competitive advantage (Crossan & Apaydin, 2010, Tidd & Bessant, 2018). Joseph Schumpeter, considered the "father" of innovation theory (Kochetkov, 2023), originally defined innovation as "doing things differently". This involves creating new products, processes, markets, or organizational structures (Schumpeter, 1939, as cited in Crossan & Apaydin, 2010, p. 1155). Schumpeter's contributions, emphasizing both the entrepreneur's role and the innovative capacity of large firms, laid the groundwork for a field of inquiry that has been central to academia for decades (Kochetkov, 2023). Due to its vital role, the study of innovation is both broad and deep, with subsequent scholars exploring various innovation types and different sources (Fagerberg, 2006). Over the years, companies have adopted various approaches to innovation, gradually moving from more rigid, internally focused models to more flexible and collaborative strategies (Baregheh et al., 2009). This shift sets the stage for the emergence of OI, which represents a new way of thinking about how innovation is sourced, developed, and implemented.

Open Innovation has become increasingly central to business operations, influencing corporate strategy and impacting regulatory frameworks (Payán-Sánchez et al., 2021). It represents a fundamental shift from the traditional, closed model of innovation (Chesbrough, 2003). The

traditional approach was characterized by a strong emphasis on internal R&D, strict protection of intellectual property (IP), and a vertically integrated structure where companies controlled most aspects of the innovation process, from idea generation to commercialization (Chesbrough, 2003; van de Vrande et al., 2009). It was prevalent throughout much of the 20th century, exemplified by firms like Bell Labs and Xerox (Chesbrough, 2003).

Several factors converged to challenge the dominance of the closed innovation model. Advancements in communication technologies and globalization enabled firms to collaborate across geographical and organizational boundaries (Bogers et al., 2018; Dahlander & Gann, 2010). Stronger IP rights regimes and technology standards provided a framework for knowledge exchange (Chesbrough, 2003). Increased workforce mobility led to a greater diffusion of knowledge across firm boundaries (Bogers et al., 2018). Furthermore, shortened product life cycles and intensified competition created pressure for faster innovation (Gassmann & Enkel, 2004). These combined forces revealed the limitations of relying solely on internal resources.

Coined by Henry Chesbrough (2003), the term "Open Innovation" initially described “a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology” (p. 1). Subsequent refinements broadened the concept, defining OI as a "distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model" (Chesbrough & Bogers, 2014, p. 12). This highlights the strategic management of both inflows and outflows of knowledge, recognizing that valuable ideas can both originate from and be commercialized through external sources (Chesbrough & Bogers, 2014; Gassmann & Enkel, 2004). The central principle is that firms should actively seek and utilize external knowledge, creating a more permeable boundary between the organization and its environment (Chesbrough et al., 2006; Gassmann & Enkel, 2004).

The increasing importance of OI reflects a shift towards more collaborative and agile innovation strategies (Lopes & de Carvalho, 2018; West & Bogers, 2014). The growing volume of academic research on OI, and its adoption by companies across various sectors, reflects its importance as both a field of study and a management practice (Payán-Sánchez et al., 2021). Governments and public institutions have also acknowledged the potential of OI, encouraging collaborative initiatives (Bogers et al., 2018). The European Commission's "Open Innovation,

Open Science, Open to the World" framework (2016), exemplifies this trend, aiming to promote open and collaborative approaches to research and innovation across Europe.

3.2 Types

Open Innovation is not a uniform concept; rather, it encompasses a range of approaches for managing the flow of knowledge across organizational boundaries (Chesbrough & Bogers, 2014). While the overarching principle of leveraging both internal and external resources remains constant, the specific mechanisms and strategic orientations can vary (Chesbrough, 2003; Gassmann & Enkel, 2004). Various frameworks have been proposed to categorize OI (Huizingh, 2011). Among these, the classification into outside-in, inside-out, and coupled processes has become a widely adopted model (Chang, 2020; Arcese et al., 2015; Lopes et al., 2017; West & Bogers, 2014; Bogers et al., 2017). Chesbrough (2003) initially identified the *outside-in* and *inside-out* processes, while Gassmann and Enkel (2004) extended this framework by adding the *coupled* process (Chesbrough et al., 2014). Due to its wide adoption, this classification will be the focus of this section.

3.2.1 Outside-In Open Innovation

The outside-in process, also referred to as inbound open innovation, focuses on enriching a company's internal knowledge base by actively seeking and integrating external knowledge, ideas, and technologies (Chang, 2020; Chesbrough & Crowther, 2006; Gassmann & Enkel, 2004). This approach acknowledges that valuable expertise and innovation potential often reside outside the firm's boundaries (Chesbrough, 2003; Lopes et al., 2017). Companies that prioritize the outside-in process often exhibit characteristics such as high knowledge intensity, a need for specialized expertise, or operate in industries with highly modular products (Gassmann & Enkel, 2004). They actively scan their external environment, engaging with a variety of sources, including customers, suppliers, universities, research institutions, competitors, and even seemingly unrelated industries (Enkel et al., 2009; Gassmann & Enkel, 2004; Rauter et al., 2019).

Common mechanisms for outside-in innovation include:

- **Customer Integration:** Actively involving customers in the innovation process, through methods like lead user research, focus groups, or co-creation platforms, provides valuable insights into unmet needs and emerging market trends (Abulrub and Lee, 2012; Arnold, 2017; Gassmann & Enkel, 2004).

- **Supplier Integration:** Collaborating closely with suppliers allows companies to tap into their specialized knowledge and capabilities, leading to improvements in product design, manufacturing processes, and supply chain efficiency (Gassmann & Enkel, 2004).
- **External Knowledge Sourcing:** This encompasses a broad range of activities, including technology scouting, licensing-in of IP, participating in research consortia, and establishing dedicated teams or individuals located in innovation hubs to identify and connect with emerging technologies and startups (Abulrub and Lee, 2012; Dodgson et al., 2006; Gassmann & Enkel, 2004).
- **Crowdsourcing:** Leveraging the collective intelligence of a large, undefined group of individuals, often through online platforms, to generate ideas, solve problems, or develop new products and services (Arcese et al., 2015; Howe, 2008).

3.2.2 Inside-Out Open Innovation

The inside-out process, also known as outbound open innovation, focuses on the external exploitation of internally generated knowledge and technologies (Gassmann & Enkel, 2004; Chang, 2020; Chesbrough & Crowther, 2006). Companies that emphasize the inside-out process are often research-driven, with significant investments in R&D and a portfolio of intellectual property that extends beyond their immediate business needs. This approach recognizes that not all internally developed innovations fit a company's core business strategy or can be effectively brought to market through its existing channels (Gassmann & Enkel, 2004). By externalizing these underutilized assets, companies can generate additional revenue streams and expand their market reach (Enkel et al., 2009).

Common mechanisms for inside-out innovation include:

- **Out-Licensing:** Granting other organizations the right to use a company's IP (patents, trademarks, copyrights) in exchange for royalties or other forms of compensation (Gassmann & Enkel, 2004; Chang, 2020).
- **Spin-offs:** Creating new, independent companies to develop and market technologies or business ideas that do not align with the parent company's core strategy (Abulrub and Lee, 2012).
- **Technology Sales:** Directly selling IP or technological assets to other firms (Abulrub and Lee, 2012)

- **Open Source:** A collaborative development approach where the source code, designs, or blueprints of a product (typically software or hardware) are made freely available to the public, allowing for use, modification, and redistribution, often under specific licensing terms that encourage further sharing and collaboration (Abulrub and Lee, 2012; Opensource.com, n.d).
- **Cross-Industry Application:** Developing existing technologies or products in one industry and applying them to a different industry to create new market opportunities (Gassmann & Enkel, 2004).
- **Corporate Venturing:** Investing in external startups or new ventures to gain access to emerging technologies or markets, or to find new avenues for the use of internal technology (Vanhaverbeke et al., 2008).

3.2.3 Coupled Open Innovation

The coupled process represents the most integrated form of Open Innovation, combining both outside-in and inside-out approaches (Gassmann & Enkel, 2004; Chang, 2020). It emphasizes co-creation and collaboration with external partners throughout the entire innovation process, from idea generation to bringing the product or service to the market (Enkel et al., 2009). The coupled process is particularly relevant in industries characterized by complex technologies, systemic challenges, or rapidly evolving markets. This approach recognizes that the most valuable innovations often emerge from the synergistic interaction of diverse knowledge sources and capabilities (Gassmann & Enkel, 2004). It requires a "give and take" relationship, where partners are both contributing and receiving knowledge, resources, or other benefits. It's not a one-way transaction, but a reciprocal exchange (West & Bogers, 2014).

Common mechanism of the coupled process include:

- **Joint Development:** Working closely with partners, such as suppliers, customers, or even competitors, to co-develop new products, services, or processes (Abulrub and Lee, 2012; Gassmann & Enkel, 2004).
- **Strategic Alliances:** Forming long-term partnerships with complementary organizations to share resources, knowledge, and risks (Gassmann & Enkel, 2004; Payán-Sánchez et al., 2018).
- **Innovation Networks:** Participating in broader networks or ecosystems of innovation, where multiple actors collaborate on shared challenges or opportunities (Gassmann & Enkel, 2004)

- **Co-Creation:** Directly involving customers or end-users in the design and development of new offerings, ensuring that innovations are aligned with their needs and preferences (Arcese et al., 2015; Arnold, 2017).
- **Joint Ventures:** Creating a new, jointly owned company with one or more external partners to pursue a specific business opportunity (Abulrub and Lee, 2012; Enkel et al., 2009)

3.3 Benefits and Challenges

Open Innovation has transitioned from a theoretical concept to a strategic approach for firms seeking to enhance their innovation capabilities and maintain competitiveness (Chesbrough, 2017). By integrating external knowledge sources with internal research and development, organizations can potentially accelerate innovation, enhance product quality, and reduce costs (Cheng & Huizingh, 2014). However, alongside these potential advantages, OI also presents significant challenges, including intellectual property concerns, integration difficulties, and organizational resistance (Chesbrough & Appleyard, 2007; Dahlander & Gann, 2010; Enkel et al., 2009).

One of the primary benefits of OI is the enhancement of innovation performance. Access to diverse external knowledge sources allows firms to tap into the expertise of universities, startups, suppliers, and customers, enriching their internal knowledge base and fostering creativity (Cheng & Huizingh, 2014; Dąbrowska et al., 2024). This can lead to breakthrough innovations and disruptive technological advancements (Sivam et al., 2019). OI can also accelerate the innovation process, significantly reducing time-to-market (Cheng & Huizingh, 2014; Chesbrough & Appleyard, 2007). This is crucial in industries with short product life cycles (Gassmann & Enkel, 2004). By leveraging existing external technologies and R&D, firms can bypass lengthy development cycles and expedite commercialization (Cheng & Huizingh, 2014; Chesbrough & Appleyard, 2007).

Financial benefits are another significant driver for OI adoption. Collaboration with external partners enables firms to share the costs and risks of research and development (Gassmann & Enkel, 2004; Lichtenthaler, 2008; Rauter et al., 2019). This shared responsibility enhances financial sustainability and facilitates access to external funding opportunities (Dąbrowska et al., 2024). Furthermore, inside-out OI, through mechanisms such as out-licensing and spin-offs, allows companies to generate new revenue streams from internally developed technologies that fall outside their core business focus (Abulrub and Lee, 2012; Gassmann & Enkel, 2004;

Lichtenthaler, 2008). In addition, OI enhances an organization's ability to adapt to changing market conditions (Dodgson et al., 2006; West & Bogers, 2014). Connections with a diverse network of external partners provide early access to emerging trends and technologies. The ability to tap into "crowd wisdom" through outside-in approaches like crowdsourcing further enhances this adaptability (Arcese et al., 2015; Cappa et al., 2016).

However, OI is not without its challenges. A primary concern is the potential for loss of control over IP; sharing knowledge with external partners inherently increases the risk of IP leakage or misappropriation, making robust IP management strategies, including patents, licensing agreements, and non-disclosure agreements, essential (Chesbrough & Appleyard, 2007; Chang, 2020; Dahlander & Gann, 2010; Enkel et al., 2009; Lichtenthaler, 2008; Rauter et al., 2019; Sivam et al., 2019). Integrating externally sourced knowledge and technologies into internal processes presents another set of complexities, including aligning external innovations with existing business models, ensuring effective collaboration between internal and external teams, as well as managing relationships with multiple partners and coordinating activities across organizational boundaries (Chesbrough, 2017; Cheng & Huizingh, 2014; Dąbrowska et al., 2024; Dahlander & Gann, 2010; Rauter et al., 2019; Toldbod & Laursen, 2024). Furthermore, finding the right partners for Open Innovation and effectively filtering and assimilating valuable insights from a potentially vast amount of external information can often prove to be difficult (Dahlander & Gann, 2010). Finally, organizational and cultural resistance to external ideas, often termed the "Not-Invented-Here" syndrome, can impede the successful adoption of OI, requiring a cultural shift, strong leadership support, and incentives that encourage openness and collaboration, in addition to this, over-reliance on external sources of innovation could potentially weaken a firm's internal R&D capabilities and long-term competitiveness, making it critical to find the optimal balance between internal and external knowledge sourcing (Chesbrough & Appleyard, 2007; Dąbrowska et al., 2024; Dahlander & Gann, 2010; Sivam et al., 2019).

Open Innovation represents a fundamental paradigm shift in how organizations approach innovation. Moving beyond the isolated, vertically integrated models of the past, OI embraces a collaborative and networked approach, reflecting broader changes in the global innovation landscape driven by technological advances, institutional reforms, and increasing interconnectedness. It encompasses diverse approaches, with outside-in, inside-out, and coupled processes offering distinct ways to manage knowledge flows and engage with partners. Each mode enables organizations to address innovation challenges, create value, and adapt.

While OI offers significant advantages, including enhanced innovation, reduced costs, and increased agility, its implementation requires careful strategic management. Firms must carefully weigh the benefits against the inherent risks and develop strategies to mitigate challenges related to IP protection, integration, organizational resistance, and coordination complexity. Successfully navigating these challenges is crucial for realizing the full potential of OI and for thriving in today's complex and dynamic markets.

4. Open Innovation and Corporate Sustainability

Building upon the established foundations of corporate sustainability and the principles of open innovation, this chapter explores the synergistic intersection of these two critical concepts. This chapter begins by establishing the fundamental need for innovation in achieving sustainability, emphasizing the limitations of closed, traditional approaches. Subsequently, the chapter explores how open innovation, specifically, acts as a powerful enabler for sustainability across various dimensions. Finally, the chapter presents compelling case studies that illustrate the practical application and impact of open innovation in diverse sustainability contexts.

4.1 The Role of Innovation in Achieving Sustainability

Achieving sustainable development presents a significant challenge to businesses that requires a long-term perspective (Bos-Brouwers, 2010). The increasing complexity of products and services, rapidly changing market demands, and growing societal pressure necessitate a fundamental shift in how companies operate (Rauter et al., 2019). Traditional strategies often prove insufficient to address the root causes of global sustainability problems (Bansal, 2002; Kennedy et al., 2017). While compliance with environmental and social regulations is undoubtedly important, a purely "compliance-driven" approach often doesn’t result in the needed improvement. Companies tend to do the minimum required to avoid penalties or meet basic standards, rather than proactively seeking transformative changes that would fundamentally alter their business models or address the root causes of unsustainability (Pichlak & Szromek, 2021). This represents a "doing less harm" rather than a "doing good" strategy. This narrow focus, combined with a lack of sufficient knowledge on how to integrate social and environmental aspects into core business processes, represents a significant barrier (Nidumolu et al., 2009, as cited in Lopes et al., 2017). The inherent complexity of sustainability issues further complicates matters. Sustainability encompasses environmental, social, and economic dimensions, each presenting its own set of interrelated challenges (Bansal, 2002; Elkington, 1994, as cited in Lopes et al., 2017; George et al., 2016). The interconnected nature of these

challenges impedes a transition towards a truly sustainable future and require a fundamental shift in how we overcome them.

Innovation is a critical driver of this transformation (Adams et al., 2016; Chesbrough, 2003). By fostering innovation, companies can develop and implement new products, processes, and business models that directly address sustainability challenges (Cillo et al., 2019; Hansen et al., 2009; Hermundsdottir & Aspelund, 2021). This might involve creating eco-efficient technologies that minimize resource consumption and waste generation (Pichlak & Szromek, 2021), developing socially responsible products, or designing circular economy models (Lopes & de Carvalho, 2018). It also includes fostering new forms of collaboration between businesses, governments, and civil society (Adams et al., 2016; George et al., 2016; Hansen et al., 2009), promoting changes in consumer behavior towards more sustainable consumption patterns, and developing new organizational structures that prioritize social and environmental goals alongside economic ones (Harsanto et al., 2022; Lopes et al., 2017). Furthermore, innovation enables companies to proactively adapt to evolving regulatory landscapes and shifting consumer preferences, creating a competitive advantage while contributing to a more sustainable future (Arcese et al., 2015; Hermundsdottir & Aspelund, 2021).

The link between innovation and sustainability is well-established, with numerous studies demonstrating a positive and significant relationship between innovation practices and enhanced sustainability performance across environmental, social, and economic dimensions (Kuzma et al., 2020; Maier et al., 2020; Silvestre & Ţîrcă, 2019). Innovation is not simply a tool for achieving incremental improvements; it is a fundamental driver of the systemic changes required to address the complex challenges of sustainable development and is essential for achieving a truly sustainable future. (Leach et al., 2012; Seebode et al., 2012).

The transition to a sustainable future necessitates a profound shift from traditional, unsustainable practices. Innovation, in its many forms, is the fundamental engine driving the systemic changes necessary for a sustainable future, empowering businesses to address complex challenges and create a future where economic prosperity, environmental protection, and social equity are intertwined.

4.2 Open Innovation as an Enabler for Sustainability

The role of innovation in addressing the multifaceted challenges of sustainable development is crucial. However, closed innovation models are often insufficient to achieve the systemic transformations that are required for a more sustainable way of operating (Chang, 2020; Lopes

et al., 2017; Rauter et al., 2019). The complexity, uncertainty, and scale of sustainability issues require radical or disruptive innovations that fundamentally alter existing systems, technologies, or business models (George et al., 2016, as cited in Bogers et al., 2020; Hansen et al., 2009; Kennedy et al., 2017). Open Innovation - with its collaborative nature - offers a powerful tool for driving this type of transformative change (Kimpimäki et al., 2022; Lopes & de Carvalho, 2018).

OI recognizes that the knowledge and capabilities necessary to drive significant progress towards sustainability often reside outside the firm's boundaries (Chesbrough, 2003; Lopes et al., 2017). By actively engaging with a diverse network of external stakeholders – including other companies, startups, universities, research institutions, customers, suppliers, and even competitors – companies can tap into a vast pool of knowledge, expertise, and resources (Arcese et al., 2015; Hansen et al., 2009; Lopes & de Carvalho, 2018; Rauter et al., 2019). This approach facilitates the co-creation of solutions that are more likely to be effective, scalable, and widely adopted (Arnold, 2017; Cappa et al., 2016; Payán-Sánchez et al., 2018). This is particularly crucial when addressing, as George et al. (2016) call them, "grand challenges" – significant, global problems, such as climate change, poverty and resource scarcity, that require coordinated and sustained effort from multiple stakeholders across different sectors (George et al., 2016 as cited in Bogers et al., 2020).

Recognizing the potential benefits of integrating sustainability and open innovation, Bogers et al. (2020) introduced the concept of Sustainable Open Innovation (SOI), which explicitly links the principles of Open Innovation with the goals of sustainable development (Bogers et al., 2020 as cited in Kimpimäki et al., 2022). Bogers et al. (2020) define SOI as "a distributed innovation process which is based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization’s business model, thereby contributing to development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (p.1507). This definition combines the core principles of OI with the widely accepted Brundtland Commission definition of sustainable development (WCED, 1987). SOI emphasizes the purposive management of knowledge flows across organizational boundaries to not only create economic value, but also to generate positive environmental and social impacts (Adams et al., 2016; Harsanto et al., 2022). It moves beyond simply "doing less harm" to actively "doing good" by fostering innovation that addresses the root causes of unsustainability (Kimpimäki et al., 2022).

Open Innovation provides a powerful and necessary framework for fostering corporate sustainability. It moves beyond the limitations of traditional, closed innovation models by embracing collaboration, knowledge sharing, and a broader stakeholder approach. By leveraging external knowledge and resources, companies can accelerate the development and implementation of sustainable solutions, driving positive environmental and social impact while simultaneously enhancing their own long-term competitiveness and resilience. The integration of OI models is not simply an option, but a strategic imperative for businesses seeking to thrive in a world increasingly defined by sustainability challenges.

4.3 Open Innovation for Sustainability: Case Studies

The urgent need for sustainable business practices demands innovative solutions, and open innovation offers a powerful pathway. To illustrate the diverse ways companies can leverage this approach, this chapter presents three in-depth case studies: Unilever, Tesla, and Enel. These companies, leaders in their respective industries, were selected to showcase the varied applications of OI – from Unilever's outside-in approach through the Unilever Foundry, to Tesla's inside-out strategy of open-sourcing patents, to Enel's coupled approach, integrating external and internal innovation for a sustainable energy transition. Each case highlights unique organizational structures, strategic considerations, and outcomes, providing a rich tapestry of real-world examples to illuminate the potential – and the complexities – of using OI to drive corporate sustainability. The following analysis will delve into these individual experiences, preparing the ground for a synthesized discussion of key insights and implications.

4.3.1 Case Study 1: The Unilever Foundry

Unilever is a global consumer goods company with a history spanning over 100 years. It is one of the world's largest consumer goods businesses, recognized for its diverse brand portfolio and a corporate philosophy centered on purpose-driven growth. With products sold in 190 countries and a turnover of €60.8 billion in 2024, Unilever's portfolio includes 30 "Power Brands" that cater to consumers' daily needs (Unilever, n.d., *At a glance*). These brands span five Business Groups: Beauty & Wellbeing (e.g., Dove, Sunsilk), Personal Care (e.g., Rexona, Axe), Home Care (e.g., OMO, Domestos), Foods (e.g., Knorr, Hellmann's), and Ice Cream (e.g., Magnum, Ben & Jerry's). Innovation is central to Unilever's operations, supported by a significant R&D investment of €987 million (Unilever, n.d., *At a glance*).

Sustainability Challenge

Unilever acknowledges the urgent need to address climate change, and its commitment extends to protecting and regenerating nature, both within and beyond its value chain (Unilever, n.d., Sustainability). The company faces multiple, interconnected sustainability challenges. A primary concern is the plastics challenge, driving the need for innovative, scalable solutions (Unilever, n.d., *Sustainability*). Improving livelihoods across its global value chain is another significant focus, alongside collaborating with suppliers to reduce emissions from raw materials, ingredients, and packaging by 2030 (Unilever, n.d., *Sustainability*; Unilever, 2022). Specifically, the need for sustainable beauty solutions is highlighted, with a focus on biodegradable and sustainable ingredients and packaging for Beauty & Personal Care products (Unilever, 2022). Unilever has established ambitious sustainability goals, including achieving zero emissions from its operations by 2030, halving the full value chain emissions per consumer use by 2030, reaching net-zero emissions across the value chain by 2039, making all product formulations biodegradable by 2030, and reducing virgin plastic use by 50% by 2025 (Unilever, 2022).

Open Innovation Approach

Unilever employs an outside-in open innovation approach, primarily through its global collaborative innovation platform, The Unilever Foundry, launched in 2014 (Suazo, 2023; The Unilever Foundry, n.d., *Collaborate*). The Foundry brings an external perspective to help Unilever teams tackle major challenges and enhance long-term strategies through collaborations with startups, scaleups, and innovation experts (The Unilever Foundry, n.d., *How we work*; Unilever, 2022).

The Foundry's innovation process is built on three pillars (The Unilever Foundry, n.d., *How we work*):

1. **Collaboration Strategy:** Co-creating solutions with Unilever leaders, aligning with strategic priorities, understanding challenges, and establishing a framework for external collaboration.
2. **Ecosystem Access:** Cultivating relationships within the external innovation ecosystem, bridging the gap between Unilever and external partners, translating needs, demonstrating collaboration methods, and enabling value creation.
3. **Validation:** Establishing a process to assess, test, and determine the potential value of new solutions, creating a tailored integration pathway into the business.

The Foundry operates on a "pitch-pilot-partner" model (Suazo, 2023). Startups pitch their concepts, successful pitches enter pilot programs with Unilever brands, and successful pilots can lead to long-term partnerships. Key collaborators include startups, scaleups, academic spinouts, innovative organizations, VC firms, accelerators, incubators, academics, investors, and government bodies (The Unilever Foundry, n.d., *How we work*; The Unilever Foundry, n.d., *Innovation Through Collaboration*). The Foundry does not take equity or IP, providing non-dilutive capital through pilots, co-research, and co-development (The Unilever Foundry, n.d., *How we work*). The Positive Beauty Growth Platform, a Foundry initiative, specifically targets sustainable beauty, seeking partnerships with startups developing biodegradable and sustainable cosmetic ingredients or packaging (Unilever, 2022).

Impact & Results

The Unilever Foundry has made a tangible impact on Unilever's sustainability efforts by facilitating collaborations that directly address key environmental and social challenges. Since 2014, over 400 strategic collaborations have been forged, accelerating Unilever's science and technology programs and delivering tangible benefits (The Unilever Foundry, n.d., *How we work*; Unilever, 2022).

General Impact for the Company:

- **Accelerated Innovation and Time-to-Market:** The Foundry's "pitch-pilot-partner" model streamlines the process of engaging with external innovators, allowing Unilever to more rapidly test and implement new solutions (The Unilever Foundry, n.d., *How we work*). This accelerated pace provides a competitive advantage in the fast-moving consumer goods sector.
- **Access to Cutting-Edge Technologies and Expertise:** The Foundry connects Unilever with startups and scaleups possessing technologies and specialized expertise not readily available internally (The Unilever Foundry, n.d., *Innovation through collaboration*). This is particularly valuable in rapidly evolving fields like biotechnology and sustainable materials (Unilever, n.d., *Innovate with us*).
- **Exploration of New Business Models:** The Foundry's focus extends beyond incremental product improvements to encompass disruptive innovations and new business models, such as Direct-to-Consumer initiatives and personalized offerings (The Unilever Foundry, n.d., *How we work*).

- **Development of New Revenue Streams:** Collaborations facilitated by the Foundry have contributed to the growth of new business areas, such as Unilever's plant-based food business (The Unilever Foundry, n.d., *Innovation through collaboration*).
- **Enhanced Brand Reputation:** By actively pursuing sustainability and partnering with innovative startups, Unilever strengthens its image as a forward-thinking and responsible company, appealing to environmentally and socially conscious consumers (Suazo, 2023).

Sustainability Impact:

- **Waste Reduction and Circular Economy:** The upcycling of Unilever's factory plastic waste into emergency shelters demonstrates a direct impact on reducing waste and contributing to social good (The Unilever Foundry, n.d., *How we work*; The Unilever Foundry, n.d., *Innovation Through Collaboration*). This exemplifies a circular economy approach, turning waste into a valuable resource.
- **Sustainable Product Development:** The Foundry's focus on circular packaging, novel ingredients, and regenerative agriculture directly supports Unilever's goals for reducing its environmental footprint (The Unilever Foundry, n.d., *Collaborate*; The Unilever Foundry, n.d., *Innovation Through Collaboration*). The Positive Beauty Growth Platform, with its focus on biodegradable ingredients and sustainable packaging, showcases this commitment in the Beauty & Personal Care sector (Unilever, 2022).
- **Accelerated Sustainable Innovation:** The "pitch-pilot-partner" model enables rapid testing and scaling of sustainable solutions. The high engagement with the Positive Beauty Growth Platform (nearly 300 startup applications) demonstrates the effectiveness of this approach in attracting innovative solutions to specific sustainability challenges (Unilever, 2022).
- **Social Impact:** Unilever's open innovation platform also tackles the social aspects of sustainability, such as its efforts to reduce sodium levels in food products, thereby promoting healthier consumer options (Arcese et al., 2015).

Unilever's commitment to open innovation, exemplified by the Unilever Foundry, showcases a proactive approach to tackling complex sustainability challenges. Their collaborations are not just isolated projects; they are strategically aligned with Unilever's broader sustainability goals, contributing to the company's progress towards net-zero emissions, reduced plastic use, and a more sustainable value chain (Unilever, 2022). By opening up their innovation, Unilever has

gained access to a wider pool of ideas, technologies, and expertise, accelerating its progress towards a more sustainable business model.

4.3.2 Case Study 2: Tesla's Open Patent Strategy

Tesla, Inc., founded in 2003, is an American automotive and clean energy company. While primarily known for its electric vehicles (EVs), Tesla's mission extends to accelerating the world's transition to sustainable energy. The company designs, develops, manufactures, sells, and leases electric vehicles, battery energy storage systems, and solar energy generation products (Tesla, n.d., *About*). Tesla's early focus on core technologies like battery systems, thermal management, and powertrain designs established its position as a technological leader in the EV market (Tran, 2025; Statista, 2025).

Sustainability Challenge

Tesla's core sustainability challenge is to combat climate change by reducing global reliance on fossil fuels, with a primary focus on the transportation sector (Shariat & Gholizadeh Dastjerd, 2024; Wang et al., 2022). This sector is a major contributor to greenhouse gas emissions, and the widespread adoption of EVs is seen as a critical step towards decarbonization (Tesla, n.d., *Impact*). Tesla recognized that addressing this significant challenge required a fundamental shift, accelerating EV development and adoption across the entire automotive industry, not just within Tesla's own operations (Wang et al., 2022).

Open Innovation Approach

"All Our Patent Are Belong To You" (as cited in Wang et al., 2022, p.7). With this declaration, made in a blog post in June 2014, Tesla CEO Elon Musk announced a radical open innovation strategy: the company would make their patents available to everyone and not initiate patent lawsuits against anyone using its EV-related technology in "good faith" (Wang et al., 2022; Shariat & Gholizadeh Dastjerd, 2024). This patent pledge represented a form of inside-out open innovation. Tesla was making its internal IP freely available to the external world.

Musk articulated a clear primary motivation: to accelerate the global transition to sustainable transport by fostering widespread EV adoption (Hill, 2016). In 2014, when Tesla announced its patent pledge, the EV market was still in its early stages, facing substantial obstacles to mainstream acceptance, including high costs, range anxiety, and a lack of charging infrastructure (Wang et al., 2022). He believed Tesla alone could not produce EVs fast enough to combat the "carbon crisis" and that holding onto patents would be like "lay[ing] intellectual

property landmines... to inhibit others," (as cited in Hill, 2016, p. 193) which was contrary to Tesla's goal. Musk emphasized that Tesla's real competition was not other EV makers, but the "enormous flood of gasoline cars" (ABC News, 2014). Initially, Tesla had pursued patents defensively, fearing established automakers would copy their technology. The Open Patent Pledge marked a shift to proactively accelerating the entire industry's move to sustainable transport (Wesoff, 2014).

The "good faith" clause was a key element. It specified that users of Tesla's patents were required to refrain from certain actions. They could not assert any IP rights against Tesla or third parties using Tesla's EV technologies, challenge any of Tesla's patents, or market or sell imitations of Tesla products (Venner Shipley LLP, 2023; Wang et al., 2022). This conditional openness was designed to encourage widespread industry collaboration while simultaneously protecting Tesla's core business interests. The open patents primarily covered key EV technologies, including battery systems, charging infrastructure, and electric drivetrains (Tran, 2025; Wang et al., 2022).

Impact & Results

Tesla's open patent strategy, a bold move that diverged significantly from established IP norms in the automotive industry, has had a range of impacts, both for the company itself and for the broader goal of advancing sustainable transportation (Shariat & Gholizadeh Dastjerd, 2024).

General Impact for the Company:

- **Brand Enhancement:** The patent pledge resulted in considerable positive publicity for Tesla, establishing the company as a leader in the movement towards sustainable transportation (Shariat & Gholizadeh Dastjerd, 2024). This strengthened Tesla's brand image and appealed to environmentally conscious consumers.
- **Market Expansion:** By lowering barriers to entry for other EV manufacturers, Tesla's strategy was intended to stimulate the overall growth of the EV market (Wang et al., 2022). A larger EV market would indirectly benefit Tesla through increased demand for its vehicles and charging infrastructure.
- **Technological leadership:** Tesla has positioned itself as a pioneer and leader in the electric vehicle industry, holding a significant share of the global BEV market (Wang et al., 2022; Statista, 2025).
- **Driving Standards:** Tesla influenced the direction of the electric vehicle charging ecosystem (Wang et al., 2022).

Sustainability Impact:

- **Accelerated EV Adoption:** The central objective of the patent pledge was to accelerate the development and adoption of EVs. This would directly contribute to reducing greenhouse gas emissions from the transportation sector (Wang et al., 2022; Tran, 2025).
- **Stimulated Innovation:** By opening its patents, Tesla aimed to foster industry-wide innovation in crucial areas such as battery technology and charging infrastructure (Tran, 2025; Wang et al., 2022). This broader innovation effort could result in more efficient, affordable, and sustainable EV solutions.
- **Reduced reliance on fossil fuel:** By opening its patents, Tesla facilitated other companies entering the EV market and therefore contributed to the reduction of reliance on fossil fuels. (Wang et al., 2022).
- **Collaboration promotion:** Tesla fostered an ecosystem for open innovation by promoting cooperation with partners (Wang et al., 2022).

Tesla's open patent strategy is a noteworthy approach to open innovation, specifically aimed at tackling the major sustainability challenge of transitioning to a cleaner transportation system. By conditionally sharing its IP, Tesla sought to accelerate this transition on a global scale. Beyond the stated goal of promoting sustainability, it is reasonable to assume that strategic considerations also played a role. These likely included improving Tesla's brand image, stimulating growth in the overall EV market (from which Tesla would benefit), and potentially establishing its technology as an industry benchmark (Kreth, 2024). It is hard to attribute the EV market's undeniable growth since 2014 solely to Tesla's pledge. A confluence of factors, including government incentives, progress in battery technology, and rising consumer awareness of climate change, have undoubtedly contributed. Nonetheless, Tesla's initiative represents a departure from conventional IP norms and a bold experiment in leveraging open innovation for a more sustainable future.

4.3.3 Case Study 3: Enel’s Open Innovability Approach

Enel is a multinational energy company and a leading integrated player in the global power and gas markets, operating in over 34 countries across five continents (Enel Group, 2022; Enel Group, n.d., *Enel in the world*; Lippolis, 2023). Founded in 1962 and later privatized, Enel is vertically integrated across the energy value chain and is Italy's largest utility company (Enel Group, 2022; Lippolis, 2023). As a global leader in renewable energy, Enel has a history of technological innovation, including early solar and wind power plants (Enel Group, n.d., *Our*

history; Lippolis, 2023). The company has expanded into e-mobility, energy storage, big data, and smart city technologies (Lippolis, 2023). Enel is recognized for its sustainability commitment, holding positions in major ESG ratings (Enel North America, n.d., *Environmental Sustainability;* Lippolis, 2023).

Sustainability Challenge

Enel recognizes that building a more sustainable world is one of the most relevant targets, aligned with the United Nations' Agenda 2030 – a global plan of action with 17 Sustainable Development Goals (SDGs) aimed at achieving peace and prosperity for people and the planet (Lippolis, 2023). The company faces the challenge of transitioning to a sustainable energy model in a context of converging crises, including the pandemic, climate change, economic uncertainty, and conflicts (Enel, 2022; Enel Group, n.d., *Energy*). Specifically, Enel aims to decarbonize energy generation and electrify consumption, while promoting a just transition that leaves no one behind (Enel, 2022). The energy sector has been identified as an underdeveloped area in research on Sustainable Open Innovation, making Enel's challenge even more significant. The shift from a shareholder-oriented to a broader stakeholder-oriented model is a critical aspect of this challenge, requiring radical and constant innovation to mitigate business risks and create shared economic and social value (Lippolis, 2023).

Open Innovation Approach

Enel employs a coupled open innovation approach, characterized by bidirectional flows of knowledge and active collaboration with external stakeholders, forming strategic partnerships to co-develop solutions. This approach is central to Enel's "Open Power" strategy, adopted in 2015, which emphasizes openness to new technologies, new partnerships, and new ways of managing and using energy (Enel, 2022; Lippolis, 2023). The Open Power vision explicitly uses Open Innovation to drive sustainability.

Key elements of Enel's open innovation approach are:

- **Innovation Ecosystem:** Enel has cultivated a vast and diverse innovation ecosystem. This ecosystem encompasses over 500,000 individuals, including participants from various countries, universities, and approximately 600 startups (Enel, 2022; Lippolis, 2023). This broad network provides Enel with access to a wide range of perspectives, expertise, and potential solutions.

- **Crowdsourcing Platform (openinnovability.com):** This digital platform serves as a central hub for open innovation activities. It enables Enel to directly interact with startups, industrial partners, SMEs, research centers, universities, and individual entrepreneurs (Enel, 2022; Lippolis, 2023). Through this platform, Enel can post challenges, solicit ideas, and manage collaborations, fostering a dynamic exchange of knowledge and resources (Enel, n.d., *Challenges*).
- **Innovation Hubs and Labs:** These physical spaces act as crucial interfaces between Enel and the external innovation community. Hubs serve as "antennas," connecting Enel with emerging trends and technologies within specific innovation ecosystems (Enel Group, n.d., *Innovation Hubs)*. Labs provide startups and other innovators with the facilities and resources to test and develop their solutions in collaboration with Enel (Lippolis, 2023).
- **Innovation by vendors:** Enel fosters co-innovation with suppliers along the value chain (Lippolis, 2023).
- **ENEL Foundation**: To foster academic relations and scientific research, supporting research and talent development in areas like sustainable materials and energy (Lippolis, 2023, Enel Group, n.d., *Enel Foundation partners*).
- **Corporate Venture Client Model:** Rather than acquiring equity stakes in startups, Enel adopts a "corporate venture client" approach. This means Enel focuses on becoming a major customer for promising startups, providing them with opportunities to pilot and scale their solutions. This approach fosters co-innovation and co-development, allowing Enel to access cutting-edge technologies while supporting the growth of innovative companies (Enel, 2022; Lippolis, 2023).
- **Internal Innovation Processes:** Enel's Innovation Projects Management system provides a structured approach for managing the entire innovation lifecycle, from idea generation and scouting to execution, monitoring, and testing (Lippolis, 2023). The "PowerG" program encourages internal innovation, allowing employees to pitch ideas (Enel North America, n.d., *Environmental Sustainability*).

Impact & Results

Enel's open innovation approach has yielded significant results, both in terms of business benefits and sustainability improvements.

General Impact for the Company:

- **Global Leadership:** Enel has become the world's largest private operator in the renewable energy sector (Enel, 2022; Lippolis, 2023).
- **Innovation-Driven Growth:** The creation of new businesses like Gridspertise (grid digitalization) and QEd (a revolutionary grid digitalization solution), and the development of a thermal storage system with an Israeli startup, demonstrate tangible business outcomes from open innovation collaborations (Enel, 2022; Lippolis, 2023).
- **Enhanced Competitiveness:** Enel's ability to monitor technological discontinuities and social inequalities, and to innovate to transform them into competitive advantages, highlights the strategic value of its open innovation approach (Enel, 2022).
- **Strong ESG Performance:** Enel is recognized as a best practice in sustainability and holds positions in major ESG ratings (Enel North America, n.d., *Sustainability Reporting and Resources*; Lippolis, 2023).

Sustainability Impact:

- **Decarbonization:** Enel has significantly reduced its dependence on fossil fuels and decarbonized its energy generation, with absolute greenhouse gas emissions across its value chain decreasing by 26.3% in 2023 compared to the previous year (Enel, 2022; Enel Group, n.d., *Sustainability Report 2023*; Lippolis, 2023). This is directly beneficial for the environment as it reduces greenhouse gas emissions, a major contributor to climate change.
- **Electrification:** The company has actively promoted the electrification of consumption. Shifting energy consumption from fossil fuels to electricity (especially electricity generated from renewable sources) is crucial for reducing emissions in sectors like transportation and heating (Enel, 2022; Lippolis, 2023).
- **Renewable Capacity:** Enel achieved 63.3% net efficient installed renewable capacity in 2022 and aims to reach 76 GW by the end of 2027 (Enel, 2022; Enel Group, n.d., *Renewable Energy World*). This high percentage of renewable energy in its portfolio directly translates to a lower carbon footprint and a more sustainable energy supply.
- **Contribution to SDGs:** Enel's open innovation practices contribute to the UN's SDGs Agenda 2030. By actively pursuing solutions in areas like renewable energy, energy access, and sustainable cities, Enel directly supports the achievement of specific SDGs (Lippolis, 2023).

- **Circular Economy:** The expansion of 3SUN to become the largest solar panel factory in Europe, incorporating innovative technology, exemplifies Enel's advancement towards a circular economy (Enel Group, 2022). The focus on new, innovative technologies within this facility indicates a commitment to resource efficiency and reduced environmental impact.

Enel's coupled approach demonstrates the powerful synergy between OI and corporate sustainability. The "Open Power" strategy, with its emphasis on collaboration and external knowledge exchange, has enabled Enel to accelerate its transition to a sustainable energy model, achieving significant business and environmental benefits. Enel's journey provides a valuable blueprint for other companies seeking to leverage OI as a strategic tool for achieving sustainable development, highlighting that this approach is not only about addressing internal sustainability challenges but also about contributing to a broader, more sustainable future.

5. Discussion of Results

The case studies of Unilever, Tesla, and Enel offer valuable insights into how companies can leverage open innovation to advance their sustainability agendas. While each company adopted a distinct approach tailored to its specific context and objectives, several overarching themes and critical considerations emerge.

A primary lesson is the importance of strategic alignment. Open Innovation initiatives must be intrinsically linked to a company's overarching sustainability goals. Unilever's Foundry, with its focus on areas like sustainable packaging and biodegradable ingredients, directly supports the company's broader commitments to reducing its environmental footprint (Unilever, 2022). Enel's "Open Power" strategy, incorporating open innovation as a core tenet, is fundamentally intertwined with its mission to decarbonize energy generation and promote a just transition (Enel, 2022; Lippolis, 2023). Tesla's patent pledge, while more indirect, was explicitly aimed at accelerating the global shift to sustainable transport (Hill, 2016). This strategic alignment provides focus, ensures that resources are directed toward meaningful outcomes, and fosters a company-wide commitment to sustainability.

The establishment of dedicated infrastructure is another key factor. Unilever's Foundry serves as a structured platform for managing external collaborations, streamlining the process of identifying, testing, and integrating innovative solutions (Suazo, 2023; The Unilever Foundry, n.d., Collaborate). Enel's network of Innovation Hubs and Labs, coupled with its crowdsourcing platform, provides both physical and digital spaces for interacting with a vast innovation

ecosystem (Enel, 2022; Enel, n.d., *Challenges;* Lippolis, 2023). These dedicated mechanisms demonstrate a commitment to OI, provide clear points of contact for external partners, and enable efficient management of collaborations.

A collaborative internal culture is equally crucial. OI requires a willingness to embrace external perspectives, share knowledge, and break down internal silos. Enel's "Innovability" culture, which permeates the entire organization, exemplifies this mindset (Enel, 2022; Lippolis, 2023). Unilever's "pitch-pilot-partner" model fosters a collaborative environment where internal teams work closely with external startups (Suazo, 2023). This internal openness is essential for effectively integrating external ideas and maximizing the benefits of collaboration.

Effective partner management is also a critical consideration. Building strong, trust-based relationships with external collaborators is essential for long-term success. Unilever's approach of providing non-dilutive capital and focusing on mutually beneficial partnerships exemplifies this principle (The Unilever Foundry, n.d., How we work). Enel's "corporate venture client" model, where the company becomes a major customer for promising startups, fosters co-development and shared value creation (Enel, 2022; Lippolis, 2023).

The case studies also highlight the importance of carefully considering IP strategies. While openness can be a powerful enabler of innovation, companies must balance this with the need to protect their core business interests. Tesla's "good faith" clause in its patent pledge represents a strategic approach to managing this tension, encouraging collaboration while safeguarding against potential misuse of its IP (Venner Shipley LLP, 2023; Wang et al., 2022). Unilever's Foundry, by not taking equity or IP, simplifies collaborations and encourages participation from startups (The Unilever Foundry, n.d., How we work).

Measuring the impact of open innovation efforts is crucial for continuous improvement and demonstrating the value of these initiatives. Unilever tracks the number of collaborations, the acceleration of science and technology programs, and the tangible sustainability benefits, such as waste reduction and sustainable product development (The Unilever Foundry, n.d., How we work; Unilever, 2022). Enel monitors its progress in decarbonization, renewable energy capacity, and contribution to the UN's Sustainable Development Goals (Enel, 2022; Lippolis, 2023). While Tesla's impact is more challenging to quantify directly, indicators like citations of its patents by other companies suggest a broader influence on the EV industry (Statista, 2024).

The contrasting sustainability impacts of the three companies highlight the complexities of measuring and attributing outcomes. Enel and Unilever, with their more direct engagement in specific sustainability projects, demonstrate more tangible and readily measurable results. Enel's reduction in greenhouse gas emissions and increase in renewable energy capacity (Enel, 2022; Enel Group, n.d., *Sustainability Report 2023*; Lippolis, 2023), and Unilever's progress in sustainable packaging and waste reduction (The Unilever Foundry, n.d., *How we work*; The Unilever Foundry, n.d., *Innovation Through Collaboration*), are clear examples. Tesla's inside-out approach, while intended to have a broad, systemic impact, presents greater challenges in terms of measurement and attribution. While the EV market has undoubtedly grown since Tesla's patent pledge, attributing this growth solely to Tesla's actions is difficult, given the multitude of contributing factors. This underscores the importance of considering the specific context and goals of each OI approach when evaluating its effectiveness.

The three cases also reveal both opportunities and limitations. Unilever's focused, outside-in approach is highly effective for addressing specific, well-defined sustainability challenges within its value chain. However, it may be less suited to driving radical, industry-wide transformations. Tesla's inside-out approach, while potentially impactful on a broader scale, carries inherent risks associated with relinquishing control over IP. Enel's coupled approach, fostering a dynamic ecosystem of collaboration, offers a balanced approach but requires significant investment in infrastructure and a strong commitment to building and maintaining relationships.

For businesses seeking to integrate OI for corporate sustainability, several strategic factors are crucial for success. These include strong leadership commitment, a clear articulation of the company's sustainability vision, a willingness to invest in dedicated infrastructure and resources, and a culture that embraces openness and collaboration. Mitigating risks associated with opening up innovation requires careful consideration of IP strategies, robust partner selection processes, and clear agreements that define roles, responsibilities, and expectations. Measuring sustainability impact can be challenging, particularly for initiatives with broad, systemic goals. Companies need to establish appropriate metrics and tracking mechanisms, recognizing that some impacts may be indirect and difficult to quantify precisely.

The case studies reinforce the argument that Open Innovation provides a powerful tool for driving corporate sustainability. However, its success is highly dependent on strategic execution and organizational readiness. There is no one-size-fits-all approach; the optimal strategy must be tailored to the company's specific context, sustainability goals, and the nature of the

challenges it faces. For corporate decision-makers, the key takeaway is that OI, when thoughtfully implemented and strategically aligned, can unlock significant opportunities to accelerate progress towards a more sustainable future, but it requires a long-term commitment, a willingness to adapt, and a deep understanding of both the potential benefits and the inherent challenges.

6. Conclusion

This thesis has explored how companies can leverage Open Innovation to drive corporate sustainability, investigating the critical organizational and strategic elements necessary to maximize its benefits and mitigate potential challenges. The research, grounded in a comprehensive theoretical framework and enriched by in-depth case studies of Unilever, Tesla, and Enel, demonstrates that OI, when strategically implemented, offers a powerful approach to advancing corporate sustainability agendas. It provides a direct response to the core research question, revealing the diverse ways in which collaborative innovation can contribute to a more sustainable business landscape.

The experiences of Unilever, Tesla, and Enel provide compelling evidence that diverse approaches to OI – whether outside-in, inside-out, or coupled – can be effectively tailored to address specific sustainability challenges. Unilever's Unilever Foundry exemplifies how focused, external collaborations can yield tangible results in areas like sustainable packaging and waste reduction. Tesla’s bold move to open source its patents, aiming to accelerate the broader electric vehicle market, showcases a more radical, systemic approach, although one with inherent difficulties in directly quantifying its impact. Enel's comprehensive innovation ecosystem, characterized by bidirectional knowledge exchange and co-creation, demonstrates the potential for sustained, long-term transformation. These diverse examples underscore that OI is not a one-size-fits-all solution, but rather a versatile framework that can be adapted to various contexts and objectives.

Crucially, the research highlights that OI for sustainability transcends the mere adoption of tools and techniques. It necessitates a fundamental shift in organizational mindset, embracing collaboration, transparency, and a broader stakeholder perspective. Successful implementation hinges on dedicated infrastructure, such as Unilever's Foundry or Enel's Innovation Hubs and platform, to effectively manage external collaborations. Equally vital is a collaborative internal culture that values openness to external ideas and actively dismantles internal silos. Furthermore, companies must carefully navigate intellectual property considerations, balancing

the benefits of openness with the imperative to protect core business interests, as exemplified by Tesla's "good faith" clause.

This thesis contributes to the existing body of knowledge by offering a more integrated and practical perspective on the intersection of open innovation and corporate sustainability. While existing literature often explores these concepts, few studies provide equal analytical depth to both. Many tend to focus primarily on either sustainability, treating open innovation as a supporting tool, or on open innovation, with sustainability as a potential application. This leaves a gap in fully integrated research that comprehensively examines both the theoretical underpinnings and the practical application of open innovation for sustainability. Furthermore, there is a notable scarcity of extensive, real-world case studies that delve deeply into how companies are actually applying these principles. By thoroughly examining both the theoretical foundations and offering concrete case studies, this thesis bridges the gap between abstract concepts and corporate realities, providing insights that are both academically rigorous and practically relevant for business practitioners.

The implications of this research extend beyond individual companies. This thesis contributes to the broader discussion on sustainability and corporate responsibility by underscoring the crucial role of collaboration and knowledge sharing in addressing complex, systemic challenges. The findings suggest that a more open, networked approach to innovation is not merely beneficial for individual businesses, but rather essential for achieving the transformative changes needed to create a more sustainable and equitable future. The transition to a sustainable economy requires collective action, and OI provides a framework for fostering this crucial collaboration across industries, sectors, and stakeholders.

However, this research is not without its limitations. While the in-depth case studies of Unilever, Tesla, and Enel provide valuable insights, the limited number restricts the generalizability of the findings. Different industries and organizational contexts may present unique challenges and opportunities that are not fully captured within this scope. Another key limitation lies in the reliance on publicly available data. Assessing the real, long-term sustainability impact of OI strategies is difficult without access to internal company metrics, comprehensive stakeholder feedback, or longitudinal data. This reliance on external sources may introduce potential biases, and the long-term effects of certain initiatives, particularly the concrete impact of Tesla's patent pledge, remain challenging to assess definitively. Measuring sustainability impact, particularly in complex systems, presents inherent difficulties, and the attribution of specific outcomes solely to open innovation efforts can be problematic.

Building upon this research, several promising avenues for future exploration emerge. There remains a pressing need for more in-depth case study research. Only through detailed, context-rich examples can we begin to fully understand the nuances of implementing OI for sustainability and offer businesses tangible, evidence-based guidance. Future research would greatly benefit from close collaboration with companies to gain access to internal data and enable more robust impact assessment. Another particularly compelling area for future investigation is the role of digital technologies in further enhancing OI for sustainability. The rise of artificial intelligence, blockchain, and data analytics offers new possibilities for connecting diverse stakeholders, facilitating knowledge sharing, and accelerating the development and diffusion of sustainable solutions. Specifically, exploring the potential of open-source and AI-driven Open Innovation approaches could reveal new pathways for accelerating sustainable innovation.

In conclusion, Open Innovation offers a vital pathway for companies to integrate sustainability into their core business models, fostering not only internal improvements but also contributing to the resolution of broader societal challenges. The diverse experiences of Unilever, Tesla, and Enel underscore the impactful ways this approach can be implemented, emphasizing the critical need for strategic alignment, dedicated infrastructure, and a collaborative organizational culture. While challenges and limitations exist, the potential of OI to drive transformative change towards a more sustainable future is undeniable, and further research, particularly into the evolving role of digital technologies, promises to unlock even greater opportunities.

7. Declaration of Use of Generative AI Tools in Final Degree Projects

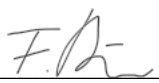
WARNING: At the University, we consider ChatGPT and similar tools to be very useful in academic life. However, their use is always the responsibility of the student, as the answers they provide may not be accurate. In this regard, the use of such tools to generate code for the Final Degree Project is NOT permitted, as these tools are not reliable for that task. Even if the code works, there is no guarantee that it is methodologically correct, and it is highly likely that it is not.

I, Fiona Dürr, a student of E4 at Universidad Pontificia Comillas, hereby declare that in presenting my Final Degree Project titled "Greener Together: Exploring How Open Innovation Drives Corporate Sustainability", I have used the Generative Artificial Intelligence tool ChatGPT or similar AI tools only in the context of the activities described below:

1. Research idea brainstorming: Used to generate and outline possible research areas.
2. Literary and language style editor: To improve the linguistic and stylistic quality of the text.
3. Reviewer: To receive suggestions on how to improve and refine the work at different levels of rigor.
4. Translator: To translate texts from one language to another.

I affirm that all information and content presented in this work are the result of my own research and individual effort, except where otherwise indicated and proper credit has been given (I have included appropriate references in the FYP and explicitly stated how ChatGPT or similar tools were used). I am aware of the academic and ethical implications of submitting non-original work and accept the consequences of any violation of this declaration.

Date: 26.03.2025

Signature: 

8. References

ABC News. (2014, June 13). *What does billionaire Elon Musk have to gain from giving away Tesla's patents?* Retrieved March 14, 2025, from https://abcnews.go.com/Business/elon-musk-gain-giving-teslas-patents/story?id=24111407

Abulrub, Abdul-Hadi G., and Junbae Lee. "Open Innovation Management: Challenges and Prospects." *Procedia - Social and Behavioral Sciences*, The First International Conference on Leadership, Technology and Innovation Management, 41 (January 1, 2012): 130–38. https://doi.org/10.1016/j.sbspro.2012.04.017.

Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., & Overy, P. (2016). Sustainability-oriented Innovation: A Systematic Review. *International Journal of Management Reviews*, *18*(2), 180–205. https://doi.org/10.1111/ijmr.12068

Adolph, J., & Beckmann, M. (2024). Corporate sustainability strategy: From definitional ambiguity toward conceptual clarification. *Business Strategy and the Environment*, *33*(5), 4708–4729. https://doi.org/10.1002/bse.3722

Alhaddi, H. (2015). Triple Bottom Line and Sustainability: A Literature Review. *Business and Management Studies*, *1*(2), Article 2. https://doi.org/10.11114/bms.v1i2.752

Arcese, G., Flammini, S., Lucchetti, M. C., & Martucci, O. (2015). Evidence and Experience of Open Sustainability Innovation Practices in the Food Sector. *Sustainability*, *7*(7), Article 7. https://doi.org/10.3390/su7078067

Arnold, M. (2017). Fostering sustainability by linking co-creation and relationship management concepts. *Journal of Cleaner Production*, *140*, 179–188. https://doi.org/10.1016/j.jclepro.2015.03.059

Aydoğmuş, M., Gülay, G., & Ergun, K. (2022). Impact of ESG performance on firm value and profitability. *Borsa Istanbul Review*, *22*, S119–S127. https://doi.org/10.1016/j.bir.2022.11.006

Bansal, P. (2002). The corporate challenges of sustainable development. *Academy of Management Perspectives*, *16*(2), 122–131. https://doi.org/10.5465/ame.2002.7173572

Bansal, P. (Tima). (2019). Sustainable Development in an Age of Disruption. *Academy of Management Discoveries*, *5*(1), 8–12. https://doi.org/10.5465/amd.2019.0001

Bansal, T., & Song, H.-C. (2017). Similar But Not the Same: Differentiating Corporate Sustainability from Corporate Responsibility. *Academy of Management Annals*, *11*, 105–149. https://doi.org/10.5465/annals.2015.0095

Baregheh, A., Rowley, J., & Sambrook, S. (2009). Towards a Multidisciplinary Definition of Innovation. *Management Decision*, *47*. https://doi.org/10.1108/00251740910984578

Baumgartner, R. J., & Rauter, R. (2016). Strategic perspectives of corporate sustainability management to develop a sustainable organization. *Journal of Cleaner Production*, *140*, 81–92. https://doi.org/10.1016/j.jclepro.2016.04.146

Bearak, M. (2025, January 29). Trump Orders a U.S. Exit From the World's Main Climate Pact. *The New York Times.* Retrieved March 16, 2025, from https://www.nytimes.com/2025/01/20/climate/trump-paris-agreement-climate.html

Bogers, M., Chesbrough, H., & Moedas, C. (2018). Open Innovation: Research, Practices, and Policies. *California Management Review*, *60*, 5–16. https://doi.org/10.1177/0008125617745086

Bogers, M., Chesbrough, H., & Strand, R. (2020). Sustainable open innovation to address a grand challenge: Lessons from Carlsberg and the Green Fiber Bottle. *British Food Journal*, *ahead-of-print*. https://doi.org/10.1108/BFJ-07-2019-0534

Bogers, M., Zobel, A.-K., Afuah, A., Almirall, E., Brunswicker, S., & Dahlander, L. (2017). The open innovation research landscape: Established perspectives and emerging themes across different levels of analysis. *ResearchGate*. http://dx.doi.org/10.1080/13662716.2016.1240068

Bos-Brouwers, H. E. J. (2010). Corporate sustainability and innovation in SMEs: Evidence of themes and activities in practice. *Business Strategy and the Environment*, *19*(7), 417–435. https://doi.org/10.1002/bse.652

Camilleri, M. A. (2017). Corporate sustainability and responsibility: Creating value for business, society and the environment. *Asian Journal of Sustainability and Social Responsibility*, *2*(1), 59–74. https://doi.org/10.1186/s41180-017-0016-5

Cappa, F., Del Sette, F., Hayes, D., & Rosso, F. (2016). How to Deliver Open Sustainable Innovation: An Integrated Approach for a Sustainable Marketable Product. *Sustainability*, *8*(12), Article 12. https://doi.org/10.3390/su8121341

Carroll, A. (1991). The Pyramid of Corporate Social Responsibility: Toward the Moral Management of Organizational Stakeholders. *Business Horizons*, *34*, 39–48. https://doi.org/10.1016/0007-6813(91)90005-G

Chang, C.-H. (2020). Green Open Innovation Activities and Green Co-Innovation Performance in Taiwan's Manufacturing Sector. *International Journal of Environmental Research and Public Health*, *17*. https://doi.org/10.3390/ijerph17186677

Cheng, C., & Huizingh, E. (2014). When Is Open Innovation Beneficial? The Role of Strategic Orientation. *Journal of Product Innovation Management*, *31*. https://doi.org/10.1111/jpim.12148

Chesbrough, H. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology.* Harvard Business School Press.

Chesbrough, H. (2017). The Future of Open Innovation: The future of open innovation is more extensive, more collaborative, and more engaged with a wider variety of participants. *Research-Technology Management*, *60*(1), 35–38. https://doi.org/10.1080/08956308.2017.1255054

Chesbrough, H. W., & Appleyard, M. M. (2007). Open Innovation and Strategy. *California Management Review*, *50*(1), 57–76. https://doi.org/10.2307/41166416

Chesbrough, H., & Bogers, M. (2014). *Explicating Open Innovation: Clarifying an Emerging Paradigm for Understanding Innovation* (SSRN Scholarly Paper No. 2427233). https://papers.ssrn.com/abstract=2427233

Chesbrough, H., Vanhaverbeke, W., & West, J. (2006). *Open Innovation: Researching A New Paradigm*. Oxford university press.

Chesbrough, H., Vanhaverbeke, W., & West, J. (2014). *New Frontiers in Open Innovation*. OUP Oxford.

Cillo, V., Petruzzelli, A. M., Ardito, L., & Del Giudice, M. (2019). Understanding sustainable innovation: A systematic literature review. *Corporate Social Responsibility and Environmental Management*, *26*(5), 1012–1025. https://doi.org/10.1002/csr.1783

Crossan, M., & Apaydin, M. (2010). A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature. *Journal of Management Studies*, *47*, 1154–1191. https://doi.org/10.1111/j.1467-6486.2009.00880.x

Dąbrowska, J., Keränen, J., & Mention, A.-L. (2024). Beyond the Buzz: Unpacking the Forms and Practices of Dedicated Open Innovation Functions. *California Management Review*, *67*(1), 114–137. https://doi.org/10.1177/00081256241276566

Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy*, *39*(6), 699–709. https://doi.org/10.1016/j.respol.2010.01.013

Dogson, M., Gann, D. M., & Salter, A. J. (2006). The Role of Technology in the Shift Towards Open Innovation: The Case of Procter & Gamble. *2006*, *36*, 333–346.

Dürr P (2024) Social Entrepreneurship und Nachhaltiges Wirtschaften: Von der Nische in den Mainstream. In Kenel P, Eschweiler J, Hackenberg H, Wihlenda M (Hrsg.) *Social Entrepreneurship in Deutschland: Handbuch für Wissenschaft und Praxis*. Bielefeld: transcript. p. 61-80.

Ebner, D., & Baumgartner, R. (2006). The relationship between sustainable development and corporate social responsibility. *Corporate Responsibility Research Conference (CRRC)*.

Eliwa, Y., Aboud, A., & Saleh, A. (2019). ESG practices and the cost of debt: Evidence from EU countries. *Critical Perspectives on Accounting*, *79*, 102097. https://doi.org/10.1016/j.cpa.2019.102097

Elkington, J. (1994). Towards the Sustainable Corporation: Win-Win-Win Business Strategies for Sustainable Development. *California Management Review*, *36*(2), 90–100. https://doi.org/10.2307/41165746

Elkington. (1997). *Cannibals with Forks The Triple Bottom Line of 21st Century Business. Capstone, Oxford. - References—Scientific Research Publishing*. https://www.scirp.org/reference/referencespapers?referenceid=2092269

Enel Group. (n.d.). *Sustainability Report 2023*. Retrieved March 10, 2025, from

Enel North America. (n.d.). *Environmental Sustainability*. Retrieved March 8, 2025, from https://www.enelnorthamerica.com/sustainability/environmental-sustainability

Enel North America. (n.d.). *Sustainability Reporting and Resources*. Retrieved March 9, 2025, from https://www.enelnorthamerica.com/sustainability/reporting-and-resources

Enel. (2022). *Open power for a brighter future. We Empower Sustainable Progress.* https://openinnovability.enel.com/content/dam/open-innovability/documenti/sostenibilit%C3%A0-2023/ENEL_04_PERFORMANCE_4.7_Innovation.pdf

Enel. (n.d.). *Challenges*. Open Innovability. Retrieved March 9, 2025, from https://openinnovability.enel.com/challenges?

Enkel, E., Gassmann, O., & Chesbrough, H. (2009). Open R&D and open innovation: Exploring the phenomenon. *R&D Management*, *39*(4), 311–316. https://doi.org/10.1111/j.1467-9310.2009.00570.x

European Commission. (2023). *Regulation on deforestation-free products.* European Commission. Retrieved 03.03.2023, from https://environment.ec.europa.eu/topics/forests/deforestation/regulation-deforestation-free-products_en

Fagerberg, J. (2006). Innovation: A Guide to the Literature. In J. Fagerberg & D. C. Mowery (Eds.), *The Oxford Handbook of Innovation* (p. 0). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199286805.003.0001

Freeman, R. E., & McVea, J. (2001). *A Stakeholder Approach to Strategic Management* (SSRN Scholarly Paper No. 263511). https://doi.org/10.2139/ssrn.263511

Friedman, M. (1970, September 13) *A Friedman doctrine-- The Social Responsibility of Business Is to Increase Its Profits—The New York Times*. Retrieved March 7, 2025, from https://www.nytimes.com/1970/09/13/archives/a-friedman-doctrine-the-social-responsibility-of-business-is-to.html

Gassmann, O., & Enkel, E. (2004). Towards a theory of open innovation: three core process archetypes. *R&D management conference*. 6, 1-18.

Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. *R&D Management*, *40*(3), 213–221. https://doi.org/10.1111/j.1467-9310.2010.00605.x

George, G., Howard-Grenville, J., Joshi, A., & Tihanyi, L. (2016). Understanding and Tackling Societal Grand Challenges through Management Research. *Academy of Management Journal*. https://doi.org/10.5465/amj.2016.4007

Gibson, K. (2025, January 21). *The Trump administration's retreat from global climate leadership.* Center of American Progress; Center of American Progress. Retrieved March 22, 2025, from https://www.americanprogress.org/article/the-trump-administrations-retreat-from-global-climate-leadership/#:~:text=Jan%2021%2C%202025-,The%20Trump%20Administration's%20Retreat%20From%20Global%20Climate%20Leadership,America's%20economic%20and%20environmental%20future.

Hansen, E. G., Grosse-Dunker, F., & Reichwald, R. (2009). Sustainability innovation cube—A framework to evaluate sustainability-oriented innovations. *International Journal of Innovation Management*, *13*(04), 683–713. https://doi.org/10.1142/S1363919609002479

Harsanto, B., Mulyana, A., Faisal, Y. A., & Shandy, V. M. (2022). Open Innovation for Sustainability in the Social Enterprises: An Empirical Evidence. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(3), Article 3. https://doi.org/10.3390/joitmc8030160

Hermundsdottir, F., & Aspelund, A. (2021). Sustainability innovations and firm competitiveness: A review. *Journal of Cleaner Production*, *280*, 124715. https://doi.org/10.1016/j.jclepro.2020.124715

https://www.enel.com/content/dam/enel-com/documenti/investitori/sostenibilita/2023/sustainability-report_2023.pdf

Huizingh, E. K. R. E. (2011). Open innovation: State of the art and future perspectives. *Technovation*, *31*(1), 2–9. https://doi.org/10.1016/j.technovation.2010.10.002

Ioannou, I., & Serafeim, G. (2019). *Corporate Sustainability: A Strategy?* (SSRN Scholarly Paper No. 3312191). https://doi.org/10.2139/ssrn.3312191

Jabbour, A., Vazquez-Brust, D., Jabbour, C., & Ribeiro, D. (2020). The interplay between stakeholders, resources and capabilities in climate change strategy: Converting barriers into cooperation. *Business Strategy and the Environment*, *29*. https://doi.org/10.1002/bse.2438

Kassinis, G., & Vafeas, N. (2006). Stakeholder Pressures And Environmental Performance. *Academy of Management Journal*, *49*(1), 145–159. https://doi.org/10.5465/amj.2006.20785799

Kennedy, S., Whiteman, G., & van den Ende, J. (2017). Radical Innovation for Sustainability: The Power of Strategy and Open Innovation. *Long Range Planning*, *50*(6), 712–725. https://doi.org/10.1016/j.lrp.2016.05.004

Kidd, C. V. (1992). The evolution of sustainability. *Journal of Agricultural and Environmental Ethics*, *5*(1), 1–26. https://doi.org/10.1007/BF01965413

Kimpimäki, J.-P., Malacina, I., & Lähdeaho, O. (2022). Open and sustainable: An emerging frontier in innovation management? *Technological Forecasting and Social Change*, *174*, 121229. https://doi.org/10.1016/j.techfore.2021.121229

Kochetkov, D. M. (2023). Innovation: A state-of-the-art review and typology. *International Journal of Innovation Studies*, *7*(4), 263–272. https://doi.org/10.1016/j.ijis.2023.05.004

Kreth, M. (2024, November 16). The genius behind Tesla's "Patent Giveaway": How Elon Musk played the game to win big. *Medium*. https://medium.com/@mk_26304/the-genius-behind-teslas-patent-giveaway-how-elon-musk-played-the-game-to-win-big

Kuzma, E., Padilha, L. S., Sehnem, S., Julkovski, D. J., & Roman, D. J. (2020). The relationship between innovation and sustainability: A meta-analytic study. *Journal of Cleaner Production*, *259*, 120745. https://doi.org/10.1016/j.jclepro.2020.120745

Latapí Agudelo, M. A., Jóhannsdóttir, L., & Davídsdóttir, B. (2019). A literature review of the history and evolution of corporate social responsibility. *International Journal of Corporate Social Responsibility*, *4*(1), 1. https://doi.org/10.1186/s40991-018-0039-y

Leach, M., Rockström, J., Raskin, P., Scoones, I., Stirling, A. C., Smith, A., Thompson, J., Millstone, E., Ely, A., Arond, E., Folke, C., & Olsson, P. (2012). Transforming Innovation for Sustainability. *Ecology and Society*, *17*(2). https://www.jstor.org/stable/26269052

Lichtenthaler, U. (2008). Open Innovation in Practice: An Analysis of Strategic Approaches to Technology Transactions. *IEEE Transactions on Engineering Management*, *55*(1), 148–157. https://doi.org/10.1109/TEM.2007.912932

Lippolis, S., Ruggieri, A., & Leopizzi, R. (2023). Open Innovation for sustainable transition: The case of Enel "Open Power." *Business Strategy and the Environment*, *32*(7), 4202–4216. https://doi.org/10.1002/bse.3361

Lo, S.-F., & Sheu, H.-J. (2007). Is Corporate Sustainability a Value-Increasing Strategy for Business? *Corporate Governance: An International Review*, *15*, 345–358. https://doi.org/10.1111/j.1467-8683.2007.00565.x

Lopes, A. P. V. B. V., & de Carvalho, M. M. (2018). Evolution of the open innovation paradigm: Towards a contingent conceptual model. *Technological Forecasting and Social Change*, *132*, 284–298. https://doi.org/10.1016/j.techfore.2018.02.014

Lopes, C. M., Scavarda, A., Hofmeister, L. F., Thomé, A. M. T., & Vaccaro, G. L. R. (2017). An analysis of the interplay between organizational sustainability, knowledge management, and open innovation. *Journal of Cleaner Production*, *142*, 476–488. https://doi.org/10.1016/j.jclepro.2016.10.083

Lozano, R. (2015). A Holistic Perspective on Corporate Sustainability Drivers. *Corporate Social Responsibility and Environmental Management*, *22*(1), 32–44. https://doi.org/10.1002/csr.1325

Maier, D., Maier, A., Aşchilean, I., Anastasiu, L., & Gavriş, O. (2020). The Relationship between Innovation and Sustainability: A Bibliometric Review of the Literature. *Sustainability*, *12*(10), Article 10. https://doi.org/10.3390/su12104083

Moir, L. (2001). What do we mean by corporate social responsibility? *Corporate Governance: The International Journal of Business in Society*, *1*(2), 16–22. https://doi.org/10.1108/EUM0000000005486

Montiel, I., & Delgado-Ceballos, J. (2014). Defining and Measuring Corporate Sustainability: Are We There Yet? *Organization & Environment*, *27*(2), 113–139. https://doi.org/10.1177/1086026614526413

Moore, J. E., Mascarenhas, A., Bain, J., & Straus, S. E. (2017). Developing a comprehensive definition of sustainability. *Implementation Science*, *12*(1), 110. https://doi.org/10.1186/s13012-017-0637-1

Nidumolu, R., Prahalad, C. K., & Rangaswami, M. R. (2009). Why sustainability is now the key driver of innovation Harvard Business Review. *Disruptive Innovation*. 87, 25-34

Nix, D. P., Niklaus, C., Nay, T., Canipa-Valdez, P. D. M., & Canipa-Valdez, D. P. N., Christine Niklaus, Tanja Nay und Prof Dr Marco. (2022, October 25). Eine kurze Geschichte zur Nachhaltigkeit. *GoingPublic.de*. https://www.goingpublic.de/being-public/eine-kurze-geschichte-zur-nachhaltigkeit/

Norman, W., & Macdonald, C. (2004). Getting to the Bottom of "Triple Bottom Line." *Business Ethics Quarterly*, *14*, 243–262. https://doi.org/10.2307/3857909

Oliveira, U., Menezes, R., & Aprigliano, V. (2023). A systematic literature review on corporate sustainability: Contributions, barriers, innovations and future possibilities. *Environment, Development and Sustainability*, *26*. https://doi.org/10.1007/s10668-023-02933-7

Opensource.com. (n.d.). *What is open source?* Retrieved March 13, 2025, from https://opensource.com/resources/what-open-source

Park, S. R., & Jang, J. Y. (2021). The Impact of ESG Management on Investment Decision: Institutional Investors' Perceptions of Country-Specific ESG Criteria. *International Journal of Financial Studies*, *9*(3), Article 3. https://doi.org/10.3390/ijfs9030048

Park, S.-B. (2023). Bringing strategy back in: Corporate sustainability and firm performance. *Journal of Cleaner Production*, *388*, 136012. https://doi.org/10.1016/j.jclepro.2023.136012

Payán-Sánchez, B., Belmonte-Ureña, L. J., Plaza-Úbeda, J. A., Vazquez-Brust, D., Yakovleva, N., & Pérez-Valls, M. (2021). Open Innovation for Sustainability or Not: Literature Reviews of Global Research Trends. *Sustainability*, *13*(3), Article 3. https://doi.org/10.3390/su13031136

Payán-Sánchez, B., Plaza-Úbeda, J., Pérez-Valls, M., & Carmona-Moreno, E. (2018). Social Embeddedness for Sustainability in the Aviation Sector. *Corporate Social Responsibility and Environmental Management*, *25*. https://doi.org/10.1002/csr.1477

Pichlak, M., & Szromek, A. R. (2021). Eco-Innovation, Sustainability and Business Model Innovation by Open Innovation Dynamics. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(2), Article 2. https://doi.org/10.3390/joitmc7020149

Rauter, R., Globocnik, D., Perl-Vorbach, E., & Baumgartner, R. J. (2019). Open innovation and its effects on economic and sustainability innovation performance. *Journal of Innovation & Knowledge*, *4*(4), 226–233. https://doi.org/10.1016/j.jik.2018.03.004

Resplandy, L., Keeling, R. F., Eddebbar, Y., Brooks, M. K., Wang, R., Bopp, L., Long, M. C., Dunne, J. P., Koeve, W., & Oschlies, A. (2018). Quantification of ocean heat uptake from

changes in atmospheric O2 and CO2 composition. *Nature*, *563*(7729), 105–108. https://doi.org/10.1038/s41586-018-0651-8

Rodrigues, M., & Franco, M. (2019). The Corporate Sustainability Strategy in Organisations: A Systematic Review and Future Directions. *Sustainability*, *11*(22), Article 22. https://doi.org/10.3390/su11226214

Saeed Alameri, S. A., Mawlood AL-Barazanchi, S. J., Ibrahim Al-Obaidi, N. K., & Salman, R. (2024). Advancements in Corporate Sustainability Practices: A Systematic Review of Strategies Aligned with Sustainable Development Goals. *Journal of Modern Project Management*, *12*(2), 68–81. https://doi.org/10.19255/JMPM3505

Schaltegger, S., & Hörisch, J. (2017). In Search of the Dominant Rationale in Sustainability Management: Legitimacy- or Profit-Seeking? *Journal of Business Ethics*, *145*. https://doi.org/10.1007/s10551-015-2854-3

Schumpeter, J. A. (1939). *Business cycles: A theoretical, historical, and statistical analysis of the capitalist process* (Vols. 1–2). New York: McGraw-Hill.

Scoones, I. (2007). Sustainability. *Development in Practice*, *17*(4–5), 589–596. https://doi.org/10.1080/09614520701469609

Seebode, D., Jeanrenaud, S., & Bessant, J. (2012). Managing innovation for sustainability. *R&D Management*, *42*(3), 195–206. https://doi.org/10.1111/j.1467-9310.2012.00678.x

Silvestre, B. S., & Ţîrcă, D. M. (2019). Innovations for sustainable development: Moving toward a sustainable future. *Journal of Cleaner Production*, *208*, 325–332. https://doi.org/10.1016/j.jclepro.2018.09.244

Sivam, A., Dieguez, T., & Pinto Ferreira, L. (2019). Key settings for successful Open Innovation Arena. *Journal of Computational Design and Engineering*, *6*. https://doi.org/10.1016/j.jcde.2019.03.005

Statista (2025, January 14). *Tesla and BYD claim a third of the global BEV market.* Statista Daily Data. https://www.statista.com/chart/27733/battery-electric-vehicles-

manufacturers/#:~:text=As%20of%20September%202024%2C%20Tesla,EV%20Volumes%20published%20on%20CleanTechnica.

Statista. (2024, May 8). *Leading companies building on Tesla's patent portfolio as of April 2023.* Retrieved March 15, 2025, from https://www.statista.com/statistics/1318332/leading-companies-building-on-tesla-s-patent-portfolio/

Stojanović, A., Milošević, I., Arsić, S., & Mihajlović, I. (2024). Cross-Country Study of Corporate Social Responsibility and Sustainable Development in Various Industries. *Engineering Management Journal*, *36*(3), 259–271. https://doi.org/10.1080/10429247.2023.2264156

Suazo, R. (2023, June 21). *The Unilever Foundry: Driving Growth and Sustainability Through Cutting-Edge Partnerships*. Bundl. Retrieved March 3, 2025, from https://www.bundl.com/articles/the-unilever-foundry-driving-growth-and-sustainability-through-cutting-edge-partnerships

Tesla. (n.d.). *About*. Retrieved March 15, 2025, from https://www.tesla.com/about

Tesla. (n.d.). *Impact*. Retrieved, March 15, 2025, from https://www.tesla.com/impact

The Montreal Protocol on Substances That Deplete the Ozone Layer. (1987). *United States Department of State*. Retrieved March 7, 2025, from https://www.state.gov/the-montreal-protocol-on-substances-that-deplete-the-ozone-layer/

The Unilever Foundry. (n.d.). *Collaborate* | Foundry. Retrieved March 3, 2025, from https://www.theunileverfoundry.com/collaborate.html

The Unilever Foundry. (n.d.). *How we work*. Retrieved March 3, 2025, from https://www.theunileverfoundry.com/how-we-work.html

The Unilever Foundry. (n.d.). *Innovation through collaboration*. Retrieved March 3, 2025, from https://www.theunileverfoundry.com/home.html

Thun, T. W., Schneider, A., Kayser, C., & Zülch, H. (2024). The role of sustainability integration into the corporate strategy – A perspective on analysts' perceptions and buy recommendations. *Heliyon*, *10*(3). https://doi.org/10.1016/j.heliyon.2024.e25008

Tidd, J., & Bessant, J. (2018). Innovation Management Challenges: From Fads to Fundamentals. *International Journal of Innovation Management*, *22*(5), N.PAG-N.PAG. https://doi.org/10.1142/S1363919618400078

Toldbod, T., & Laursen, L. N. (2024). Time and the sequential integration of management controls in open innovation between Unilever and its partners: A procedural perspective. *Management Accounting Research*, 100901. https://doi.org/10.1016/j.mar.2024.100901

Tran, B. (2025, February 15). *The patent strategy behind Tesla's EV battery breakthrough*. PatentPC. https://patentpc.com/blog/the-patent-strategy-behind-teslas-ev-battery-breakthrough

Unilever. (2022, March 10*). Startups and scaleups invited to partner with Unilever on sustainable beauty solutions* | Unilever. Retrieved March 3, 2025, from https://www.unilever.com/news/press-and-media/press-releases/2022/startups-and-scaleups-invited-to-partner-on-sustainable-beauty-solutions/

Unilever. (n.d.). *At a glance* | Unilever. Retrieved March 3, 2025, from https://www.unilever.com/our-company/at-a-glance/

Unilever. (n.d.). *Innovate with us*. Retrieved March 4, 2025, from https://www.unilever.com/our-company/innovation-and-rd-at-unilever/innovate-with-us/

Unilever. (n.d.). *Sustainability*. Retrieved March 4, 2025, from https://www.unilever.com/sustainability/

United Nations Framework Convention on Climate Change. (n.d). *The Paris Agreement.* UNFCCC. Retrieved March 15, 2025, from https://unfccc.int/process-and-meetings/the-paris-agreement

United Nations. (2015). Paris Agreement. United Nations Framework Convention on Climate Change. Retrieved from https://unfccc.int/sites/default/files/english_paris_agreement.pdf

van de Vrande, V., de Jong, J. P. J., Vanhaverbeke, W., & de Rochemont, M. (2009). Open innovation in SMEs: Trends, motives and management challenges. *Technovation*, *29*(6), 423–437. https://doi.org/10.1016/j.technovation.2008.10.001

Vanhaverbeke, W., Vrande, V., & Chesbrough, H. (2008). Understanding the Advantages of Open Innovation Practices in Corporate Venturing in Terms of Real Options. *Creativity and Innovation Management*, *17*, 251–258. https://doi.org/10.1111/j.1467-8691.2008.00499.x

Venner Shipley LLP. (2023, August 10). *Does Tesla's open source patent philosophy mean they are free to use?*. Venner Shipley. Retrieved March 15, 2025 from https://www.vennershipley.com/insights-events/does-teslas-open-source-patent-philosophy-mean-they-are-free-to-use/

Wang, J., Duan, Y., & Liu, G. (2022). A Study of Specific Open Innovation Issues from Perspectives of Open Source and Resources—The Series Cases of Tesla. *Sustainability*, *14*(1), Article 1. https://doi.org/10.3390/su14010142

Wesoff, E. (2014, June 16). *Tesla's Elon Musk Declares 'All Our Patent Are Belong To You'* Retrieved March 15, 2025 from https://www.greentechmedia.com/articles/read/teslas-elon-musk-declares-all-our-patent-are-belong-to-you

West, J., & Bogers, M. (2014). Leveraging External Sources of Innovation: A Review of Research on Open Innovation. *Journal of Product Innovation Management*, *31*(4), 814–831. https://doi.org/10.1111/jpim.12125

Wood, D. J. (1991). Corporate Social Performance Revisited. *The Academy of Management Review*, *16*(4), 691–718. https://doi.org/10.2307/258977

World Commission on Environment and Development (WCED). (1987). Our common future. United Nations. Retrieved from https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

Zhou, G., Liu, L., & Luo, S. (2022). Sustainable development, ESG performance and company market value: Mediating effect of financial performance. *Business Strategy and the Environment*, *31*(7), 3371–3387. https://doi.org/10.1002/bse.3089

Zolfagharinia, H., Zangiabadi, M., & Hafezi, M. (2023). How much is enough? Government subsidies in supporting green product development. *European Journal of Operational Research*, *309*(3), 1316–1333. https://doi.org/10.1016/j.ejor.2023.02.011