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"How can managers and employees use the potential benefits of AI-driven decision-making to ensure and support sustainability through corporate digital responsibility?"

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Abstract

This paper explores how managers and employees can leverage AI-driven decision-making to promote ethical-sustainable AI (ESAI) through corporate digital responsibility (CDR). Specifically, the primary objective of this thesis is to identify the necessary factors for implementing ESAI, with an emphasis on the role of CDR. By fostering a culture of CDR, organizations can not only achieve sustainable outcomes in solving complex problems but also enhance their reputation and stakeholder trust. This research proposes a comprehensive Three-level Framework for ESAI implementation, addressing the External Environment, Organizational, and Individual levels. By examining these interconnected layers, this study offers a holistic approach to fostering ESAI practices. Concluding with practical recommendations, the paper provides managers and employees with strategic guidelines to prioritize ESAI, thereby ensuring ESAI utilization within corporate settings. This paper is also one of the first ones to consider the effects of the AI Act, published during the period of the analysis.

Keywords

Contents

1. INTRODUCTION

In an era marked by unprecedented opportunities thanks to the technological advancement of Industry 4.0, Artificial Intelligence (AI) can be considered one of the main and leading characters of this industrial transformation (Ahmed et al., 2022). The integration of AI in the decision-making of firms has emerged as a transformative force, offering businesses unprecedented opportunities for optimization and innovation (Cavazza et al., 2023). However, this surge in AI-driven decision-making also brings forth a spectrum of uncertainties and risks that must be carefully navigated (Cavazza et al., 2023). Some examples of such challenges associated with the integration of AI into corporate decision-making processes encompass the crucial aspects of maintaining fairness, accountability, transparency, and trust (Altenburger, 2023). Furthermore, uncertainties may emerge from the collaboration between AI and human capabilities, the evolving skill requirements for jobs, and the potential environmental impact (Mazzi, 2023). Beyond these considerations, it is imperative to address ethical concerns, including but not limited to human rights, data security, and privacy, which are at risk due to the unchecked utilization of AI (Bonsón et al., 2022). Nonetheless, this entails balancing profits with ethics, managing privacy risks, and allocating resources effectively. These challenges highlight the trade-offs between financial gains and sustainable and ethical considerations in AI implementation (Puntoni et al., 2020, Hagendorff et al., 2020, Lobschat et al., 2021, Wirtz et al., 2022).

As organizations navigate the dynamic landscape of decision-making, a critical intersection has emerged, one where the potential benefits of AI-driven decision-making converge with the imperative of ensuring and supporting sustainability. Neglecting sustainability jeopardizes business viability in an increasingly conscious world. Companies that ignore environmental and social impacts risk losing customer trust and facing legal repercussions (Finnell et al., 2023). Moreover, companies committed to sustainability are pushed not only by international treaties, national regulatory frameworks, the United Nations, and other global entities but also by the imperative to remain competitive, necessitating a workforce proficient in addressing sustainability concerns (Yong et al., 2019). Research shows that sustainable models drive competitiveness and innovation (Çop et al., 2020) while neglecting sustainability leads to underperformance in terms of cash flow and finance (Liu et al., 2020). Embracing sustainability fosters long-term profitability and operational efficiency making it a crucial strategy for business survival (Ghobakhloo et al., 2020, Finnell et al., 2023). For these reasons, a new revolution called Industry 5.0 has emerged, envisioned as a paradigm that extends beyond the traditional aims of industry, aiming to foster societal well-being alongside

economic growth (Maddikunta et al., 2022). It prioritizes sustainability by ensuring production practices align with environmental concerns while also emphasizing the welfare of industry workers. This contrasts with the predominant focus of Industry 4.0 on digitalization and AI-driven technologies primarily aimed at enhancing production efficiency and flexibility, potentially at the expense of social equity and environmental sustainability. Industry 5.0 underscores the significance of research and innovation in guiding the industry toward a sustainable and equitable future within the constraints of our planet. (Xu et al., 2021). Some examples of AI's advantages in different sectors[1] are observable. In the domain of energy efficiency, AI can help in predicting and optimizing energy consumption patterns, as evidenced by Google's DeepMind optimizing data center cooling systems and Tesla leveraging AI for autonomous driving features that enhance driving efficiency in electric vehicles. Smart grids benefit from AI's ability to analyze data from diverse sources, aiding in efficient supply-demand management, a concept Microsoft employs in its data centers. In renewable energy, AI plays a crucial role in predicting and optimizing output, exemplified by GE Renewable Energy's use of AI in wind turbines for performance enhancement and predictive maintenance. For climate change mitigation, AI examines greenhouse gas emissions and weather patterns, with IBM's Watson contributing to weather forecasting and climate modeling.

Sustainable agriculture sees AI analyzing soil data, predicting crop yields, and enabling precise weed removal through technologies like those implemented by Farmwise. Waste management is optimized with AI's analysis of production, collection, and disposal data, and companies like Waste Robotics utilize AI to enhance recycling efficiency. In water management, AI studies usage, quality, and availability data, while Ocean Cleanup deploys AI for tracking and collecting plastic waste in oceans. Lastly, in biodiversity conservation, AI investigates species data, informing strategies for protecting critical habitats, as seen in Conservation International's use of advanced algorithms for analyzing biodiversity data.

As organizations are increasingly recognizing the vital connection and advantages between AI and sustainability for business viability, emphasizing the need to integrate ethical concerns into frameworks mandates a transformation in economic business models to ensure long-term success. The inadequacies of the current economic business models shed light on the necessity of transformation through AI to ensure the long-term success of the organization and society. In this sense, it is important to define a new intelligent relationship between humans and technology to

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[1] https://2030.builders/8-ways-ai-can-contribute-to-environmental-conservation/#:~:text=Sustainable%20Development%20Goals%20and%20AI&text=For%20example%2C%20AI%20can%20help,sustainable%20use%20of%20natural%20resources.

program AI algorithms along the lines of new economic logic. This is particularly important because if sustainable and ethical concerns are not considered and established inside the organizations' framework and orientation, the business models will fail (Schmidpeter et al., 2023).

Recent literature and research investigations have directed their attention toward the integration of AI and decision-making, specifically highlighting its positive impacts on sustainability, for example application of AI to improve Environmental Social and Governance (ESGs) measurement, supporting societies in attaining Sustainable Development Goals (SDGs), helping firms managing their Corporate Social Responsibility (CSR), earning trust and sustainable prosperity, enhance firm's reputation and customer retention. (Vocelka et al., 2023, Hassan et al., 2023, Vargas-Hernández 2022, Fluharty-Jaidee et al., 2023, Agrawal et al., 2022). Literature has contributed significantly to explaining and highlighting the inherent risks, challenges, and uncertainties associated with the application of AI in decision-making, acknowledging its potential to solve sustainability-related issues (Altenburger et al., 2023; Bonsón et al., 2022; Galaz et al., 2021; Singh et al., 2023; Bartneck et al., 2021) and introduce the novel concept of Corporate Digital Responsibility (CDR) (Bonsón et al., 2022). Further support is found in literature emphasizing the critical need to manage the adoption of AI responsibly and ethically (Narayanan 2023, Mazzi 2023, Bartneck et al., 2021). Within a sustainability framework, some literature explores the role of AI as an enabler or inhibitor of sustainability (Kulkarni et al., 2023, Vinuesa et al., 2020, Hao et al., 2023), while other studies delve into the data topic in areas such as customer relationships, environmental considerations, and the governance impact of supply chains (Chatterjee et al., 2022, Hao et al., 2023). Moreover, there are scholarly contributions proposing frameworks tailored to the intersection of AI and decision-making for sustainability (Sjödin et al., 2023).

However, while considerable progress has been made in the integration of AI within organizational decision-making processes, there remains space for in-depth exploration of how to consider sustainability and ethical perspectives when implementing these technologies (Galaz et al., 2021). For instance, extensive research is crucial to investigate the dynamics among managers, employees, and AI systems in collaborative decision-making settings. It is crucial to consider the relationship between humans and AI: while there is an awareness of the enhancements AI can provide, employees are equally concerned about potential ethical issues it may create. (Kulkarni et al., 2023, Galaz et al., 2021, Altenburger, 2023). An imperative consideration is understanding their perspectives on the efficacy of decision-making methodologies implemented within the organizational framework, with a specific focus on comprehending whether AI serves as an enabler

or inhibitor in this context (Ivanov 2023, Matin et al., 2023,). In addition, correlated with the latter point, it is important to delve into and understand the implications and influences of organizational capabilities and resources on the results of AI decision-making processes (Ivanov, 2023, Isensee et al., 2021).

The increasing importance of sustainability as a critical aspect in organizations and future business models (Schmidpeter et al., 2023) necessitates a thorough exploration of these dimensions to advance our understanding of the broader ecological footprint and the societal implications associated with the growing role of AI in organizational decision-making. Hence, further research is forthcoming in the field of sustainability impacts of AI-driven decision-making. This entails a comprehensive examination of the environmental, social, and economic consequences engendered by the incorporation of AI in decision-making contexts (Isensee et al., 2021, Taboada et al., 2023, Matin et al., 2023). Therefore, in light of the above gaps, in the context of this qualitative study, the purpose of this thesis is to furnish a comprehensive answer to the following research question:

"How can managers and employees use the potential benefits of AI-driven decision-making to ensure and support sustainability through corporate digital responsibility?"

By addressing this research question, this study endeavors to delve deeper into the multifaceted contribution of AI in decision-making processes. Specifically, it examines how to consider sustainability and ethics concerns when using AI; it analyses the intricate roles of managers and employees in shaping AI-powered decision-making, with a concurrent focus on its impact on ethical and sustainability considerations; finally, it unravels the implications of a firm's capabilities and resources in the implementation of AI. Theoretical insights unravel the nuanced dynamics, examining whether AI functions as an enabler or inhibitor of sustainability. This exploration enhances comprehension of the broader societal implications embedded within organizational decision-making processes influenced by AI. This study's findings explore the role of CDR in enhancing ethical and sustainable considerations during the implementation of AI within organizations. It analyzes the specific roles of managers and employees, offering insights into how organizations can adopt AI while prioritizing sustainability objectives. Additionally, the analysis examines the necessary capabilities and resources, offering firms valuable perspectives on the essentials needed to implement sustainable AI. Furthermore, these findings provide novel avenues

for further research in the realm of sustainable AI, thus contributing to ongoing discourse and exploration in this critical domain.

In the upcoming paragraphs of this study, in particular in the second section, a comprehensive theoretical background is laid out concerning the main topic of AI. This involves an exploration of their significance, benefits, applications, and challenges, as well as an examination of the intersection between AI and the concept of sustainability. Subsequently, the third part of the document delineates the research methodology, encompassing the research design, context, tools, and approach to data analysis. Following this, the results of the research are elucidated. The fourth part of the study presents the results of the analysis, followed by the fifth part which illustrates a thorough discussion of the analysis, grounded in the results obtained from the research. Next, the sixth chapter offers the limitations and suggestions for future research. Finally, the concluding chapter highlights the overall findings and presents the conclusive remarks of this thesis.

2. THEORETICAL BACKGROUND

2.1 Artificial Intelligence

2.1.1 Definition of AI

AI is one of the main actors in the so-called Industry 4.0 revolution (Ahmed et al., 2022). Its rapid growth in organizational settings over the past decades (Bonsón et al., 2022) confirms the importance of AI (nowadays and in the future) for businesses. Bartneck et al. (2021) state that "AI is not just a technology that concerns engineers and technical staff. It is a matter of business" (p. 45). AI, broadly defined, falls within the context of computer science and focuses on creating machines capable of emulating human cognitive processes like learning, reasoning, and self-correction (Cavazza et al., 2023). In particular, intelligence is evidenced by the ability to act appropriately in different circumstances, adapt to changing environments and goals, learn from experience, and make suitable choices within perceptual and computational limitations (Bartneck et al., 2021). Whilst numerous authors present diverse interpretations and definitions of this concept, one of the basic elements common to most of the definitions is that AI revolves around creating intelligent agents capable of goal attainment, aligning AI choices with its perception and cognitive constraints that, not only follows predetermined rules, but also learns, senses, plans, and adapts based on experience (Bartneck et al., 2021).

AI applications have advanced in automatically recognizing patterns in data, offering valuable support to achieve remarkable success, accuracy, and quality in different applications. Some examples are industrial robotics that operates and controls robots in different industries automatically; enhancement in transportation capabilities by using advanced computer vision-based systems for automated detection and tracking of vehicles; the employment of AI for predictive maintenance to discover patterns and predict malfunctions in training methods resulting in cost savings, extended predictability, and increased system availability (Ahmed et al., 2022).

2.1.2 Challenges Connected with AI

Considering that AI has rapidly become more prevalent in organizational settings over the past decade, there is growing apprehension about potential threats to human rights, data security, privacy, and other ethical considerations that may arise from the unchecked employment of AI. In particular, the technologies that are the grounds for broader societal concerns are those disruptive AI with a vast level of automation, data collection, and manipulation (Bonsón, 2022). Thus,

recognizing that AI extends beyond the conventional technical sphere is relevant to assess it from a business perspective. It is noteworthy that the integration of AI into decision-making processes introduces intrinsic business-related risks, biases, and uncertainties. Particularly relevant is the so-called ethical concern of the "Black Box effect" of AI, that is the absence of understanding regarding the decision-making process of an algorithm and our inability to foresee the resulting outcome (Tzimas, 2021). Thus, firms encounter significant challenges during the implementation of AI, particularly in ensuring fairness, accountability, and transparency (Altenburger et al., 2023). The perspective of employees is central in this context, as they are one of the main stakeholders of the firms and they typically play a primary role in direct interactions with AI systems. In fact, employees are sensible to technologies and systems, they prefer trustworthy, useful, and affordable systems, incentivizing businesses to prioritize trust-building. This involves ensuring benevolence, fairness, and explicability in AI systems through logs and explanations for accountability (Bartneck et al., 2021). Uncertainty surrounding AI capabilities in business fosters doubts and worries, stemming from fears of job displacement, concerns about input data quality, flawed or biased algorithms, and the potential for outcomes that may confound workflow designers (Singh et al., 2023). A misalignment of trust between employees and AI systems becomes a problem for organizations because such an environment is not ideal for business performance and outcomes (Singh et al., 2023). Therefore, building and maintaining trust in decision-making driven by AI becomes crucial. These concerns are spread and touch various levels and groups within companies, fostering doubts and suspicions about the reliability and equity of AI-based decision-making systems (Altenburger et al., 2023).

Instead, at the organizational level, it is possible to distinguish particularly two main business-related risks that arise from AI: ethical risks and general risks (Bartneck et al., 2023). The first one includes for example damage to reputation, impact on stock prices, and legal fines; and general business risks encompass functional, systemic, fraud, and safety risks. For these reasons, it is important to adopt AI responsibly, prioritizing ethical considerations, promoting fairness and transparency, and considering potential economic and social impacts. This requires a strong business model aligned with principles of responsible business and sustainability. A framework by Narayanan et al. (2023) highlights two key concepts that should help in implementing the so-called "Responsible AI Business Model". This includes firstly the "responsible AI business model canvas", emphasizing not-for-profit models, non-conflict data monetization, and a community-driven approach. The second concept is "responsible AI decision canvas" which guides decision-makers toward principled decision-making at crucial business junctures.

2.1.3 Corporate Digital Responsibility

To address the ethical and sustainable challenges connected with AI, a new concept arose: Corporate Digital Responsibility (CDR). The CDR is defined by the CDR Manifesto (2022) as a set of practices and behaviors that support organizations using data and digital technologies in socially, economically, and environmentally responsible ways[2]. Consequently, this concept indicates companies bear responsibility for the impact of their operations on employees, suppliers, customers, society, and the environment. This includes areas such as data-driven decision-making, promoting equality, digital education, shaping the future of work, and contributing to ecological transformation through digitalization (Bonsón, 2022). Acknowledging these requirements, organizations are moving increasingly in the direction of taking accountability for digital concerns and disclosing them in a specific manner. If on one side there are companies that are required to be more transparent on how and why they are using AI, on the other side there's the need to offer and clearly state guidance on what and how to report contributing to preventing undesirable events, benefitting society as a whole (Bonsón, 2022).

To embrace this new concept, organizations can integrate into their strategic framework a dedicated emphasis on prioritizing transparency, fairness, and accountability in their actions and choices of AI-driven decision-making. This approach aims to identify and mitigate biases and risks, thereby ensuring a responsible and ethical implementation, security, privacy, and highlighting data quality (Hao et al., 2023). Particularly crucial is this latter aspect of data quality as they are at the basis of the implementation and employment of AI. Companies are challenged in the availability of training data and acquiring sufficiently large data sets (Altenburger, 2023). Furthermore, the importance of data is even more observable from the outcomes that AI delivers as "Without appropriate input data, the system will provide inappropriate output" (Chatterjee et al., 2022, p. 149). About this, the handling of security and privacy issues associated with customer data and privacy is strictly interrelated with the quality and amount of data. It is observed that when organizations ensure and demonstrate safe treatment without compromising their privacy, customers are more willing to share their data with confidence, resulting consequently in higher volume and higher-quality data (Chatterjee et al., 2022).

However, implementing CDR poses multifaceted challenges for firms, encompassing various factors that hinder their efforts toward ethical and responsible digital practices. These challenges include the dilemma of leveraging customer data and technology to drive profits, even at the expense of

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[2] https://corporatedigitalresponsibility.net/cdr-manifesto-english

ethical considerations surrounding privacy and fairness (Puntoni et al., 2020). Additionally, while cost-saving measures through process optimization and automation are desirable, they often come with CDR-related risks such as privacy violations and transparency concerns (Hagendorff et al., 2020). Furthermore, firms may struggle to allocate sufficient resources and establish a strong CDR culture, encountering internal reluctance, insufficient investment in technical capabilities, and challenges in overseeing external business partners (Lobschat et al., 2021). These barriers underscore the complex trade-offs firms face between financial gains and ethical considerations in the implementation of CDR (Wirtz et al., 2022).

2.2   AI and Sustainability

2.2.1 Sustainability

As organizations strive to address the challenges and responsibilities associated with AI implementation embracing CDR, they increasingly turn their focus toward the application of AI-based technologies in addressing contemporary global challenges with a sustainability objective (Galaz et al., 2021). For instance, AI plays a crucial role in promoting sustainability and circularity by facilitating smart decision-making and predictive maintenance, thereby optimizing efficiencies and reducing waste (Sjödin et al., 2023). Consequently, AI is getting increased attention in research connected to environmental and sustainability sciences, contributing to a growth of investments in sectors critical for sustainability. (Galaz et al., 2021).

It is necessary to initially grasp the meaning of sustainability and how it is applied in this study. Sustainability is "a term linked to the action of man in relation to his environment. Within the ecological discipline, sustainability refers to biological systems that can conserve diversity and productivity over time" (Vargas-Hernández et al., 2022, p. 37). Furthermore, Wilson et al., (2022) underline "development that meets the needs of the present without compromising the ability for future generations to meet their own needs" (p. 2-3), then highlighting that the concept of sustainability is commonly recognized through three interconnected pillars: environmental, social, and economic sustainability. These pillars form the foundation of the sustainable development paradigm, and the relationships among them can be conceptualized in diverse ways. The intricate interdependencies between environmental preservation, societal well-being, and economic prosperity highlight the holistic nature of sustainability.

Nowadays, the concept of sustainability has been embedded inside organizations, shaping their principles and operational strategies and connecting the physical environment to economic activities and policies, a connection that is fostered through the effective operations of businesses. Organizations bear the social and corporate responsibility of generating value for the common good, and their assessment should consider their influence on economic growth, environmental sustainability, and social development (Vargas-Hernández et al., 2022). Furthermore, to emphasize its significance in shaping organizational strategies, it is necessary to articulate that "Environmental, Social, and Governmental Reporting and Sustainability (…) investors are becoming more interested in these areas, and regulation is continuing to evolve for publicly traded companies" (Fluharty-Jaidee et al., 2023, p. 89). Therefore, in order to align with the preferences of their stakeholders, companies are becoming increasingly compelled to incorporate sustainability in their business model, consequently influencing their decision-making processes.

When considered within the business domain, sustainability is frequently associated with three interconnected notions: Environmental, Social, and Corporate Governance (ESG), Sustainable Development Goals (SDGs), and Corporate Social Responsibility (CSR). Specifically, the ESG are the three main topic areas that companies are expected to report in to capture all the non-financial risks and opportunities inherent to a company's day-to-day activities. ESG offers substantial potential for integrating greater sustainability into organizational decision-making. It has proven effective in boosting customer retention and acquisition, fostering collaboration, and positively impacting corporate reputation (Hassan et al., 2023). The SDGs are a set of 17 global goals adopted by the United Nations in September 2015. They are part of the 2030 Agenda for Sustainable Development, which is a universal call to action to end poverty, protect the planet, and ensure prosperity for all by the year 2030. The SDGs address a wide range of social, economic, and environmental challenges and are interconnected in their approach to achieving sustainable development[3]. Finally, as defined by the United Nations Industrial Development Organization (UNIDO) "Corporate Social Responsibility is a management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders" [4].

What is expected is that the firm pursues methods to positively impact the stakeholders and the environment. Therefore, the CSR of the companies will gain further importance through AI and

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[3] https://sdgs.un.org/goals

[4] https://www.unido.org/our-focus/advancing-economic-competitiveness/competitive-trade-capacities-and-corporate-responsibility/corporate-social-responsibility-market-integration/what-csr

become central when it comes to the sustainable transformation of our economy, with the challenge of integrating those two fields ethically and responsibly (Schmidpeter et al., 2023).

2.2.2 AI Opportunities and Framework Related to Sustainability

AI holds potential for environmental sustainability by reducing product waste and emissions (Hao et al., 2023), optimizing the use of energy, water, and land, and finally facilitating environmental governance. Likewise, its functions are also exploited in managing, conserving, and regenerating resources (Kulkarni et al., 2023). In the social dimension, AI contributes by ensuring product security, quality, and societal well-being (Hao et al., 2023). Furthermore, AI can support society by facing the issues of poverty, quality education, clean water and sanitation, affordable and clean energy, and improving the eco-friendliness of cities. It can help in the distribution of resources to those in need, fosters a circular economy for sustainability, and integrates functions to provide holistic societal support (Kulkarni et al., 2023). From a governance perspective, AI triggers agile practices, cost reduction, sustainable supplier selection, and supply chain risk management, promoting efficiency and responsible governance (Hao et al., 2023). AI serves as a valuable instrument by recognizing the correlations within huge amounts of data, presenting an opportunity to address and solve social and environmental challenges, ultimately contributing to the achievement of the SDGs (Altenburger 2023). However, it is particularly important to specify that there is the risk of the purported transfer context bias, which in AI occurs when systems designed for a specific context are wrongly applied to another, potentially leading to flawed and harmful outcomes. Even in a suitable context, interpretation bias may arise if AI systems operate strictly as programmed by their developers, causing challenges in the utility and comprehension of the technology (Galaz et al., 2021).

Mazzi (2023) proposes the adoption of an ethical framework for AI and SDGs to be used as a benchmark in three levels. The first one is "New AI" which is the process of designing and training AI and the reason why it is employed in the business; the second level is "Applied AI" which concerns AI's capabilities in terms of functions and impacts of its application; finally, "Potential AI" concerning what AI can do for other sectors, purposes or else. Embracing the proposed three-level mindset enables the integration of enhancements addressing internal and external adverse effects into the broader framework of the business vision. Aligning the new possibilities offered by AI with the decision-making of organizations becomes a crucial factor for firms, especially when it comes to sustainability. The literature has suggested frameworks designed for this convergence of AI and decision-making in the context of sustainability. In particular, Sjödin et al. (2023) introduce a novel framework for an AI-enabled Circular Business Model (AI-CBM) grounded in the dynamic capabilities

of the firm, aimed at enhancing innovation among industrial manufacturers engaged in digital servitization. This approach seeks to combine AI and circularity principles to yield positive economic, environmental, and social outcomes. The literature suggests that AI capabilities play a crucial role in promoting sustainability and circularity by addressing inefficiencies at a systemic level. The research identifies dynamic capabilities as a promising analytical framework for examining sensing, seizing, and reconfiguring capabilities. Sensing involves identifying AI-enabled CBM opportunities through market intelligence, seizing entails developing innovative solutions, and reconfiguring focuses on ensuring ongoing competitiveness by adapting to changing environments. These are associated with the capitalization of AI-enabled CBM opportunities, where the three dynamic capabilities are essential: value discovery for identifying prospects, value realization for developing and implementing solutions, and value optimization for continuous adaptation and value creation as knowledge evolves over time (Sjödin et al., 2023).

2.3   CDR for Ethical-Sustainable AI

In light of these ethical and business-related concerns (fairness, accountability, transparency, trust, financial performance, reputation, and legal risks) about AI's potential for environmental sustainability, societal well-being, and governance, it is necessary to delve deeper into understanding the wide scope and characteristics of digital issues by adopting the perspective of CDR (Wirtz et al., 2022), and comprehending how to implement AI systems sustainably and ethically. To evaluate the extent to which companies are adequately addressing sustainability and ethical concerns related to AI, it is suggested that attention should be directed toward these several key factors: availability of data, fairness, accountability, transparency, and trust. To address these key factors the ingredients that help an organization to manage AI implementation sustainably and ethically are considered to be: management and employees attitude, and organizational capabilities and resources.

In general, managers' actions and values significantly impact organizational outcomes due to their influential status. So, managers play a crucial role in CDR-related decision-making, highlighting the importance of top management commitment strongly influencing the organization's CDR culture. An ethical engagement from top management shows taking the trust seriously and being responsible and accountable to data owners by ensuring effective control and use of data assets (Herden et al., 2021). Such an approach may prioritize CDR over corporate profit considerations, fostering a robust CDR culture across all departments (Lobschat et al., 2021). Moreover, the presence of a Chief Digital Officer (CDO) or Chief Information Officer (CIO) often indicates structural changes within companies,

typically seen in larger corporations with the financial capacity for such shifts. These changes are well viewed for demonstrating ethical behavior to investors and stakeholders (Weber-Lewerenz, 2021) allowing them to gain and maintain their trust and besides, with CDR becoming a competitive advantage and differentiator for organizations (Herden et al., 2021).

Moving on to the employee's perspective, they play a crucial role in shaping a company's CDR culture. For an organization to demonstrate digital responsibility, both its managers and employees must align their behaviors with the specific norms set by the organization. Thus, CDR norms become a form of applied ethics that influence employees' ethical behavior through formal and informal structures. A higher involvement leads to better responses to internal ethical challenges (Lobschat et al., 2021). Furthermore, adopting positive employee attitudes toward CDR initiatives is essential for cultivating a culture that prioritizes stakeholder interests. Successful companies understand this and foster a corporate culture where employees are aligned and identified with these initiatives, contributing to their overall success (Weber-Lewerenz, 2021). By cultivating an organizational environment rooted in ethical principles and transparency, companies can not only enhance their reputation but also shape their behavior in alignment with societal expectations. Transparent reporting serves as a tangible demonstration of a company's commitment to ensuring that the management of personal data is consistent with the expectations of those providing it (Cheng et al., 2023). In addition to ensuring innovation and sustainability (Weber-Lewerenz, 2021), the relationship between culture, values, and corporate responsibility emphasizes the need for organizations to prioritize ethical practices, with culture influencing how CDR is shaped by and is able to shape corporate behavior (Lobschat et al., 2021).

To conclude the theoretical background, organizations must develop new capabilities and resources to capture the advantages of AI and ensure that it is implemented sustainably (Sjödin et al., 2023). However, there remains ambiguity surrounding the specific capabilities and resources essential for this purpose (Ivanov, 2023). Hence, it becomes paramount to delineate and identify these crucial elements. Furthermore, it is particularly significant to delve into the reasons why certain firms encounter challenges in acquiring or sustaining these capabilities and resources.

3. METHODOLOGY

3.1   Research Design

This research aims to delve into how companies address sustainability and ethical considerations concerning AI through the viewpoints of managers and employees within these organizations regarding the adoption of CDR.

To gain these insights, a qualitative approach has been chosen as the most appropriate method for gathering pertinent information. Qualitative methodology aims to provide comprehensive and vivid insights into the analyzed problem, prioritizing in-depth and illustrative information to thoroughly understand its various dimensions (Quieros et al., 2017). Moreover, due to AI's relatively new and emerging domain, a qualitative approach fits better in the study to understand the settings and go more in-depth into the phenomenon (Adams, 2015). The validity of the findings is ensured through internal validity, confirmed by data saturation, the credibility of the collected data, and the accuracy of definitions; while the reliability of the findings is ensured through the reproducibility and internal consistency of the instrument. The results also follow the principles of credibility and confirmability as the data's authenticity and interpretations are ensured, and the study's conclusions are derived from participants' perspectives. Furthermore, the results can be viewed in a transferability way, as they could be carefully generalized to the broader population (Farghaly et al., 2018).

3.1.1 Sampling

The sample for this research consists of 13 people experts in AI and/or CDR and CSR, and workers with a role connected with AI. The participants should have been working inside the organization for a period longer than one year to guarantee reliability. To establish contact with them, it was leveraged the personal network and recommendations from individuals who know someone knowledgeable in the field. For what concern the size of the organizations, no conditions and limitations were applied. The participants voluntarily took part in this project and their contribution remained anonymous. The interviewees received a copy of the findings as well as direct access to the paper once published and upon request. Also, participants consented to the ethical rules established by the University of Twente. The present thesis received consent from the Ethics Committee of the University of Twente to conduct the interviews and surveys.

3.1.2 Sample

The pool of interviewees consisted of different backgrounds that enabled to gather a variety of perspectives, comprehending: AI developers (3), consultants (3) professors experts in AI and CDR (3), and people working with AI and/or CDR-related tasks (4). The interviewees come from Italy (5), the UK (3), Germany (2), the Netherlands (1), Norway (1), and the US (1). In *Table 1* is possible to see the sample overview.

Table 1: Sample overview

	Role	Firm
I1	Software Developer	SMEs
I2	Data Scientist	SMEs
I3	ML Data Engineer	Big Firms
I4	Responsible AI lead & Senior Data Scientist	Big Firms
I5	Senior Manager Change Management	SMEs
I6	Consultant Responsible AI & Digital Ethics	SMEs
I7	Data Intelligence Strategist Manager	Big Firms
I8	IT Consultant	Big Firms
I9	Professor AI Governance and Ethics	Academic
I10	Founder	SMEs
I11	Assistant Professor for Digital Transformation & Responsible Organization	Academic
I12	Chair Professor CDR	Academic
I13	Head of the Market Division of the CDR Office	Big Firms

3.1.3 Semi-structured Interviews

The qualitative method chosen is semi-structured interviews since this approach guarantees some level of standardization while allowing also for flexibility (Miles & Hubermann, 1994). This interview format enables the interviewee to pose pre-prepared questions and also to delve deeper into intriguing responses that may arise during the discussion. In contrast, unstructured interviews lack predetermined questions, while structured interviews adhere strictly to predetermined questions in a specific order and quantity. Following initial contact via email or phone, a total of 13 semi-structured interviews were conducted in English and Italian as the interviewer is an Italian native and the interviewees are from different countries, including Italy. The interview phase ended due to data saturation, following Corbin and Strauss (1990) which highlights that there is no fixed number of interviews required; the process stops when new categories cease to emerge from interview coding. The interviews were conducted in the online platform Microsoft Teams, since it is more convenient for all parties, both economically and in terms of time consumption. While the online approach may lack the interpersonal connection between interviewer and interviewee, video conferencing also offers the possibility of observing participants' body language and expressions, enabling the interviewer to gather pertinent data effectively (Sah et al., 2020). They lasted, on average, one hour and were recorded and transcribed directly on Microsoft Teams favoring the coding of those through Atlas.ti software.

The interview guide (*Appendix 1*) shows a set of questions asked to the interviewees and upon which the whole colloquy was based. Given the semi-structured format, follow-up questions played a crucial role in eliciting additional insights or clarifying ambiguous responses, thus influencing the interview flow based on participant answers. Regarding the question structure, the interview was divided into 3 main parts, guaranteeing a well-organized discussion: introduction, intermediate, and concluding questions (Charmaz, 2006).

3.2   Data Analysis

The collected data were analyzed employing the Grounded Theory method, selected for its ability to uncover new patterns and processes relevant to the current research topic (Corbin and Strauss, 1990), in combination with the Gioia Method (Gioia et al., 2013), which allowed for the identification of common themes.

Grounded Theory is characterized by the interconnectedness of data collection and analysis (Corbin and Strauss, 1990). So, the analysis begins concurrently with data collection, progressing interview by interview. This method involves first-order codes, second-order themes, and aggregate

dimensions. First-order codes entail the initial coding of raw data, where researchers identify and label specific elements or concepts without preconceived notions. Second-order themes go beyond individual codes, focusing on grouping and organizing them into broader themes or categories. This stage allows researchers to uncover patterns and relationships within the data. Aggregate dimensions emerge as the highest level of abstraction, encapsulating the main themes or concepts identified through second-order analysis (Wolfswinkel et al.,2013).

4. RESULTS

This study aims to analyze how managers and employees can implement ethical-sustainable AI (ESAI), with a particular focus on the role of CDR. In order to do this, semi-structured interviews were conducted to better capture the perspectives of the participants. This chapter presents the 1st-order concepts and 2nd-order themes identified through the qualitative data analysis of the semi-structured interviews, organized and structured into aggregate dimensions (*Table 2*). Despite the research question distinguishing between managers and employees, the content of the interviews was very similar. Consequently, it was decided not to separate the two categories.

Table 2: Data Structure

1st Order Themes	2nd Order Themes	*Aggregate Dimensions*
1a. Legal Enforcement and Regulation of AI	**1. External Enabling Factors**	*AI development and implementation*
1b. AI Risk Assessment		
2a. Sustainability By and In Digital: Using and Create Responsible AI	**2. AI impact**	
2b. AI Negative Effects on Sustainability		
2c. AI Benefits on Sustainability		
3a. Positive Attitude Towards Change	**3. Change Management**	*Organizational Ecosystem*
3b. Resistance to Change		
4a. Bad Influence on Culture	**4. Organizational Culture**	
4b. Ethical and Organizational Values		
4c. Positive Attitude		
5a. Influence of Top Management on Ethical-Sustainable AI: Top-down Approach	**5. Top Management and Employees**	
5b. Influence of Employees on Ethical-Sustainable AI: Bottom-up Approach		

5c. Nearest Leadership		
6a. Cognitive Competencies	**6. Organizational Capabilities**	*Organizational Resources and capabilities*
6b. Strategic Capabilities		
6c. Technical Competences		
7a. Financial Differences between Big Enterprises and SMEs	**7. Organizational Resources**	
7b. Structural Differences between Big Enterprises and SMEs		
7c. Financial Resources		
7d. Human Capital		
8a. Availability of Protected Data	**8. Facilitators of CDR**	*Role of CDR*
8b. Concretization of CDR		
8c. Corporate Synergy		
8d. Education Initiatives		
8e. Initial Steps Towards CDR		
9a. Conceptual Problems of CDR	**9. Inhibitors and Problems with CDR**	
9b. Financial-Economical Concern of CDR		
9c. Organizational Management Problems of CDR		

4.1   AI Development and Implementation

The interviews conducted underscore the effects of ***AI Development and Implementation*** that help in the implementation of ESAI. ***AI Development and Implementation*** refer to the factors that affect and influence ESAI in the phase of setting up the AI and in the employment of AI. In this sense, the first category based on the interviewees is the role of **External Enabling Factors**, such as the new European legislation on AI. The AI Act is a European Union regulation on AI that aims to introduce a common legal and regulatory framework, to ensure that AI systems in the EU are safe and respect fundamental rights and values. In particular, the majority of respondents notice how there should be **Legal Obligations Enforcement**. Hence, *"responsible AI in firms will not happen if companies are not obliged to do so. There should be sanctions and there should be laws that really*

force companies to use AI in a responsible way (…) it's just too much of a valuable product basically to voluntarily make less money from it or voluntarily make the system more ethical because sometimes when something is more ethical it really requires costly extra steps"(I6). Hereafter, *"CDR is let's say the front runner for legal obligations. But we need these legal obligations. (…). This is one of the major aspects of legal work that has a big advantage against CDR because it's objective and it cannot discuss it, you have to follow it and this is one of the weaknesses of CDR. Without any legal obligations you can discuss more or less everything because there is nobody who decides or nobody who sets the rules"(I8).* Finally, the interviewees affirm that CDR will assume a more relevant role *"the moment CDR becomes a law, that is for instance if I have to open a position like chief privacy officer, therefore is a cost for the company (…) these things, cannot work in another way, or voluntarily. And therefore obviously in terms of organization setup, you need to create an organization that takes care of it" (I7).*

The interview findings suggest that the new AI Act will provide an instrument to ensure ESAI through **AI Risk Assessment**. In this sense, if a firm wants to be sure of using ESAI *"You need to be aware that you are buying AI from a firm that can show that they've done their due diligence and at that moment that you're buying a good product" (I6).* Hence, *"the AI Act is going to do with high-risk AI systems like a European Conformity marking. (..) You do the self-assessment then they do all the checks and once they are successful you get like a Community Europe marking showing that it's a good European product, that deserves to be on the market. And then after that, you're also listed in the database for instance. However, if you don't have a high-risk AI system, that's more difficult and you need to find ways to do an assessment yourself or ask the company that's providing you with the AI system to do an assessment themselves. This is because you're protecting innovation hence regulation will only be for the riskiest AI systems" (I6).*

According to the respondents, there is also to consider aspects connected with the AI Impacts that can support the ESAI: how firms can feel the positive and negative externalities of AI. In particular, from the participants' perspectives, there are the two concepts of **Sustainability By** and **In Digital** which look at the implementation of AI from an upstream and downstream approach. With the *"Sustainability By digital you increasingly have to ensure that your people use technologies responsibly, (…), making people aware of the impacts that technology has (..) so how to use technology in such a way as to generate the maximum of positive externalities and the minimum of negative externalities (I5).* On the other hand, there is the *"Sustainability In digital which is to conceive, think, and design new technologies that the company equips itself with or that the*

company implements, taking ethical considerations into account with an upstream approach (I5). In addition to this, *"Downstream there is the challenge of demonstrating that the use of the technology that has been implemented has been ethical, here the whole regulatory framework of the AI Act and the various frameworks help you (…) So this is an ex-post tool and follows you along the life cycle of an AI which however you need to report and make transparent rather than to decide upstream. So a downstream approach is used to understand how you use that data, how you use that algorithm, what controls you put in place to make sure it works, etc." (I5).*

It is important to note that the interviewees specify also the **AI Negative Effects on Sustainability** and the **AI Benefits on Sustainability**. On the negative side, *"AI technologies, for example, consume lots of energy. So therefore, there's a sustainability concern" (I6)* However, firms seem to be working on it, especially *"big tech released new versions of their large language models which have smaller data sets and therefore it's cheaper, but it also is more sustainable to train them, (…) that's one of the solutions that they're already giving to this problem of sustainability and AI because it's a big, big challenge" (I6).* In addition to this relationship between training and sustainability aspect, the interviews revealed that *"It is also very important to test an AI model not only to understand if it works well but also to understand what potential damage it can cause you in its outputs. If there is no adequate test there is a risk that there will be a waste in the production process, therefore problems from an environmental point of view" (I1).* Furthermore, the participants agree that there are benefits that *"AI models optimize processes and resources in such a way as to have as little waste as possible and, therefore as little impact as possible. Or it can even forecast the firm's sustainable impact in the next years" (I1).*

4.2 Organizational Ecosystem

The first **Organizational Ecosystem** identified through the interviews is the **Top Management and Employees**, in which the participant noted there is a distinction between a **Top-down** and a **Bottom-up** approach to influence ESAI. These approaches respectively look at the relationship between ESAI implementation and the different levels of the organizational hierarchy. The **Top-down approach** is considered the most influential for ESAI. *"It is more top-down in the sense that anyway if you are talking about ethical things, those higher up are more concerned that certain rules are followed rather than the other way around" (I1).* Moreover, the interviewees observed that in most organizations *"there is a CEO who makes decisions and then there are all the c-suites who make other decisions based on those, and then the other ones fall from the top down, good or bad. That's how it works. So what influence does top management have? Total, top-down is decision making." (I7).*

An exclusively **Top-down approach** can create conflict within the organization because of a sense of non-belonging from the bottom, as well as inefficiency in the recognition of opportunities by employees, who in most cases are the ones who interact and use AI the most.

On the other hand, a **Bottom-up approach** is recognized by the interviewees as influential yet to a lesser extent as *"initiatives that start only from the bottom always have the limitation, that they risk, although perhaps well designed, to run up against the fact that from the top you get a different message" (I5).* However, some bottom-up initiatives exist as *"it is a people's business, so it is needed someone within a specific department who says they thought about CDR and others that follow up thinking it's good and they start something the initiative too" (I8).*

Interestingly the participants gave a particular focus to the **Nearest Leadership**, considered a crucial point for the implementation of ESAI due to its innovative role as a foster-intermediary between the bottom and the top of the organizational hierarchy. In fact, *"There are maybe already roles that can take on this corporate digital responsibility role, for example, in agile, a scrum master, (…) assigned with the role of checking on corporate digital responsibility" (I5).* Furthermore, *"middle managers have a higher role because they're even closer to the employees and encourage them to share" (I11),* thus incentivizing bottom-up approaches as *"it's not like at the level of the individual employee they can just shift things around (…) it's more about the most immediate level of hierarchy, and those leaders need to make sure that their teams are thinking about responsibility" (I9).*

A great significance for ESAI is also given to the **Organizational Culture**. This dimension comprehends two positively related concepts, the first one is a **Positive Attitude** which the participant underlined *"helps in considering the ethics and sustainability related to AI"* because *"any organizations that take a stance of "it's too dangerous, there's too much worry, let's not do it" it's a threat to their existence" (I10).* Furthermore, the majority of the interviewees discussed the importance of the culture among the employees, *"the openness to the possibility of using AI in work and projects during development, so people are increasingly using these technologies to help themselves be more efficient" (I2).* The second concept highlighted in the interviews is **Ethical and Organizational Values**. **"***it's clear that this is not something that I need to do alone because of my role, it's a company with a very strong culture of corporate responsibility in general. So in terms of culture, this is going to help us because there's a will to do things the right way" (I4).* Finally, the interviews reveal that it is important to understand that *" CDR is an issue of organizational cultural change, (…) hence you need to align your whole organizational system. This means, for example, both enacting and declaring that CDR is a*

value and then implementing it in one's values charter and vision mission, these documents here, which are the stated values of Schein's culture" (I5).

On the other hand, the participant recognized that there is also an effect of **Bad Influence on Culture** which plays a crucial obstructive role, especially in situations when *"you work for a company and you got on to a pretty bad culture and you realized that even if you raised a concern about the product, every time your manager is just gonna shoot it down. Well, you just gonna stop paying attention to the bad aspects (…) we do that as human beings to protect ourselves" (I9).*

Finally, in the analysis of the ***Organizational Ecosystem***, **Change Management** is indicated as an important factor to consider as it affects how the transformation towards ESAI is perceived and its success consequently. Firstly, the participant underlined that there should be a **Positive Attitude towards Change** because *"if you don't do it, somebody else who has more funds, more money, etc. does it, and at some point, you go extinct. So many companies have gone extinct because they didn't have that courage, right? We all know the classic cases, we would not like to be next" (I5).* A **Positive Attitude** *"is about having clear communication, having a clear path, and how to implement changes. Collaboration of different people who could be responsible or an interlayer between different departments working together on having a CDR task force because if we think about change management that could also create the employees' feeling of commitment towards change, digital responsibility, sustainability, and ethical measures" (I11).* Hence, one of the "*main goals is to try to integrate these algorithms and models into everyday life, to democratize the AI, and to make everyone understand that is something that benefits your tasks" (I3).* Moreover, it is central to "*place a lot of emphasis on business change, only if you say AI will become a strategic priority, you will change" (I5).*

Concerning the **Resistance to Change** it is recognized by the interviewees to be *"a factor that prevents the implementation of corporate digital responsibility inside the firms, it has always been and will be for innovation if people do not understand what's happening, what is important, why ethical considerations, why sustainability is important" (I11).* However *"Reviewing your business model is a very big change (…), it's a transformation that involves investment, risk-taking, abandoning established habits and asking your people to renew themselves and it involves therefore destabilizing certainties"(I5).* Additionally, another important aspect of **Resistance to Change** is the fear that people have of AI, actually, *"a big amount of people are not ready for AI. If you try to bring AI you have to win the hearts of your colleagues and your clients. This is the very first step and this is not easy because we have a lot of concerns against AI because we know all the abuse and all the*

fakes" (I8). Consequently, *"ignorance breeds fear and fear creates resistance to change and resistance creates failure to adopt change accordingly. If you have a base of employees who are knowledgeable about the topic, can see the positives and negatives, and are equipped with critical thinking in building analysis in drawing consequences, then that pattern allows you to use AI in an environment receptive and responsive (...) When that situation doesn't occur, the number one challenge to adoption and change is, for example, trying to get people to understand that they are not all going to lose their jobs" (I7).*

4.3   Organizational Resources and Capabilities

The interview findings highlight the ***Organizational Resources and Capabilities*** required to ensure the implementation of ESAI inside the firm. That refers to the collective skills, processes, resources, and structures that an organization develops to effectively create, manage, and deploy AI systems in ways that align with ethical and sustainability principles. Hence, the **Organizational Capabilities** considered by the interviewees are mainly three: firstly **Cognitive Competencies** *"in people, which means a plurality of viewpoints, and openness to background figures not just from IT. (…) one of the great skills is to have a diversity of viewpoints to deal with the ethical issues of AI, otherwise the risk of missing pieces" (I5).* Secondly, there are the **Strategic Capabilities** that are *"networking capabilities, outside-in capabilities and inside-out spanning capabilities (...) the knowledge exchange with other companies" (I11).* Finally, the interviews revealed also the need for new **Technical Competencies,** specifically *"develop experiences to build up new roles and to build up new expert roles to help people to use AI (...) however that's very difficult" (I8).*

In addition, the analysis reveals the necessity of **Organizational Resources**. In this sense, an important role is the differences between big firms and SMEs due to the differences in being successful in implementing ESAI thanks to the access to resources. Firstly, **Financial Differences between Big Firms and SMEs** are analyzed, and the participant underlined that *"currently, the larger companies have the resources, and they started to move from a while, not so long, on these CDR issues (...) on the other hand, companies that are not as technologically structured, that are smaller and have fewer resources, are not already asking themselves these questions. They are still at a very preliminary pre-adoption stage, still thinking about what they could do with AI, making considerations of regulatory compliance, of privacy policies, of cyber security, which are a step before ethical considerations" (I5).* Instead, the **Structural Differences between Big Firms and SMEs** are more about big companies having *"a great organization, having great processes, they work with their teams well, they're doing a lot. Are they doing the best they can? No, but they're doing a lot"*

(I9). Consequently, the interviews revealed that the adoption of ESAI leverages **Financial Resources** and **Human Capital** as *"The market is challenging organizations that cannot put in place big investments or recruitment around large volumes of people" (I10)*, and *"you need internal resources as the company that wants to run these projects need a multidisciplinary team around such a copilot that helps to enable people to use it in an ethical way (...) if you translate that into money, it's getting expensive, so you need an initial investment and training costs will be the biggest cost" (I8)*. Finally, there should be *"awareness from the managers that in this area it is crucial not to limit yourself to the initial investment, there will be a return on investment, do not to be frightened but be aware that what you are doing is innovation" (I3)*.

4.4   Role of CDR

The conducted interviews reveal the ***Role of CDR*** in the ESAI implementation. CDR refers to a company's commitment and actions to using digital technologies, such as AI, encompassing various aspects of responsibility and ethics. In particular, based on the results of the study, there are two ways ESAI is affected by CDR, the first one is through **Facilitators of CDR**. The first facilitator observed through the interviews is the **Concretization of CDR**, that is creating concrete results and/or measurements to create a practical impact of CDR. This means that *"the enthusiasm* (for CDR) *from the top management, it isn't always followed up by KPIs or concrete measurement of what we're supposed to be achieving" (I4),* or in other words *"the performance management systems of organizations, (...) must be tied to whether people do follow CDR principles. If you don't do that, if you don't dare to align these systems, the risk is that the statements remain on paper. Because if you then reward only based on how much I sell, it wins the reward that I get through the bonus" (I5).*

In addition, the analysis uncovers the role of **Corporate Synergy** by leveraging the collaborative and coordination strengths and processes of different departments and stakeholders within an organization. *"the international coordination, you need to interact with your colleagues on an international level and within your local company, you have to help people understand what the strategy is" (I8).* Furthermore, one more key aspect highlighted by the participant is that *"it's a lot about communication because you need a common understanding, that sounds easy, but it's so hard" (I4).* From an organizational structure synergy setting instead *"it takes processes and tools to use AI ethically. You need vertical and cross-cutting skills mixed that speak on one side and the other side, processes that facilitate and make transparent and trustworthy the evaluation of AI, and make it visible to everybody that although AI is a black box, it's not a black box the way I evaluate it" (I5).*

Moreover, the participant underlined some **Initial Steps toward CDR** that firms should follow and that are positively influential for CDR, firstly *"Peer pressure competition could be an important factor that drives companies to have a first approach to CDR, i.e., if it turns out that the competitors all have CDR Offices that guarantee a level of digital information security and we realize that we are the ones left out, why do we not? Obviously, we don't want to end up there"* (I7). In addition, *"an organizational backdrop helps in the initial phase for people to go and make sure that things don't fall down the gap because too often organizations have somebody responsible for sustainability or somebody responsible for compliance, and they often don't talk, so things get lost"* (I10). Interestingly, different points of view were raised by the participants about the possibility of having a department specialized in CDR inside the firm; however, a common understanding was that it is useful in the initial steps toward CDR as it could be *"a temporary solution centralized in a function, but these competencies must be distributed throughout the organization, hence there must not be a silo that thinks about this. Rather this ability to think about these issues and therefore to make ethical decisions on the use of digital technologies must be distributed at different levels of mastery and owned by the entire organization"* (I5).

Throughout the interviews, it is also clear that the **Availability of Protected Data** supports the positive effects of CDR in the ESAI implementation. For instance, *"The general data protection regulation (GDPR) structure gives something to work with, and I, as Responsible AI, probably need to work with the GDPR responsible people of each team so that there can be points of contact for the AI Act as well. So having some structures for this already is making it easier for me"* (I4).

Lastly, **Educational Initiatives** stand out as an essential facilitator of CDR to train the people inside the firms on ESAI to spread shared knowledge inside the firms to create a collaborative, aware, and innovative environment. The interviewees agreed on the guidance that workshops can provide, in addition to a retraining necessity. *"I'm doing these dilemma training, in which basically I present stories and problems that could actually happen to the leaders to show a bit how things work in sociotechnical context and getting people to reflect on this to approach this kind of awareness building side of also human rights perspectives, therefore how can the firm behave to avoid these consequences and try to force them to discuss a bit among themselves and start the thought processes"* (I4).

From the opposite point of view, the interviews unraveled the **Inhibitors and Problems with CDR**, playing an obstructing role in the implementation of CDR for ESAI. Firstly, there are **Conceptual Problems of CDR since** it is a broad concept that firms could have problems understanding and

knowing. Indeed, *"a lot of firms are implementing CDR, but they're using other terms. CDR is more an expert term" (I8).* Likewise, there is uncertainty about *"whether or not CDR falls under the same laws that apply to CSR. (…) Specifically for the digital realm, we are inventing this completely new thing called CDR, I see why and I see it's necessary to also make digital processes responsible, but oftentimes if you already have a CSR, why not use this infrastructure? Why not use everything that's already set up, like European regulation that takes years to make? So if you want to do that separately for the CDR it will take a long time before it's effective" (I6).* In addition, there are trust-related problems with the concept of the black box of AI, as *"you have to accept the black box concept (…) That's often one of the problems we have with customers, which is they want explained 100% why there is a certain output. But this is a limitation of AI itself, you don't know exactly why and that's one of the reasons why there are all the liability problems to AI, there has to be this awareness that there is up to a degree that you can understand why there are certain outputs" (I1).*

From the interviews, it is possible to observe that there are limitations to the implementation of CDR for ESAI because of the **Financial-Economic Concerns of CDR**, an aspect connected with the fact that CDR as of today has no measurement that can confirm its contribution to the profit of firms, there are assumptions but nothing that can indicate an exact compoundable contribution. *"CDR is not a profit center, it's a cost center, that is, you have to pay someone a salary, is that someone going to make you profits? (…) it's a bit of a long jump from a cost center to a profit center and then the reverse of that isn't it? If the CDR as a concept becomes a dominant concept, a design, and the cost of the technology is lowered as a function of faster and more sustainable and responsible adoption, then obviously this factor of linking cost to a profit, albeit lowering costs, could further drive CDR adoption, but right now it is not" (I7).* There are situations in which *"even a company with a bad Culture could make very good decisions for the environment just because they want to save money for energy and, so we have more rational reasons for CDR. This rational reason is that saving energy for instance saves money. (…) So there should be concrete positive outcomes for a firm to consider the CDR. Otherwise, if there is not this financial connection it is more difficult" (I8).*

Lastly, there are **Organizational Management Problems of CDR** that prevent the instauration of CDR for ESAI. The interviewees observed that *"often with really large AI systems, the programmer only works on specific parts of the AI system, and sometimes it's also difficult to have an overview of the whole product and be able to recognize that certain parts of that AI system can have potential negative consequences" (I6).* Another phenomenon observed from the interviewees is that *"everybody has facade projects, a "save the world project" that shows how you save or rescue the*

world. But this is just one project and it's nothing else (...) We need to be able to say that we are actually using AI in a responsible way and we have to be able to prove it, and it is not only a project but it is our priority. Otherwise as soon as soon as we only build up the facade we continue as we did it before with only a facade project" (I8).

5. DISCUSSION

5.1   Discussion and Theoretical Contribution

As AI systems become increasingly integrated into various aspects of society, addressing ethical considerations and ensuring sustainability in its development and implementation is a priority. In particular, this topic is relevant due to the profound impact AI can have in today's social, economic, and environmental domains, necessitating a framework that promotes fairness, accountability, and long-term viability. The findings of this study revealed a complex system that can be represented with an interconnected Three-level Framework comprehending the External Environment, Organizational, and Individual levels (fig. A). This framework exemplifies the interconnections that exist between the external environment, the organization, and the individual, based on the analysis of the results of this study. It can be seen that there are concentric circles, which means that from the outside to the inside there is an influence. Thus, the external environment influences the organizational level, which in turn influences the individual level. In the end, this complex yet interconnected and dynamic system shapes the implementation of ESAI within companies.

Fig. A: Three-level Framework for ESAI
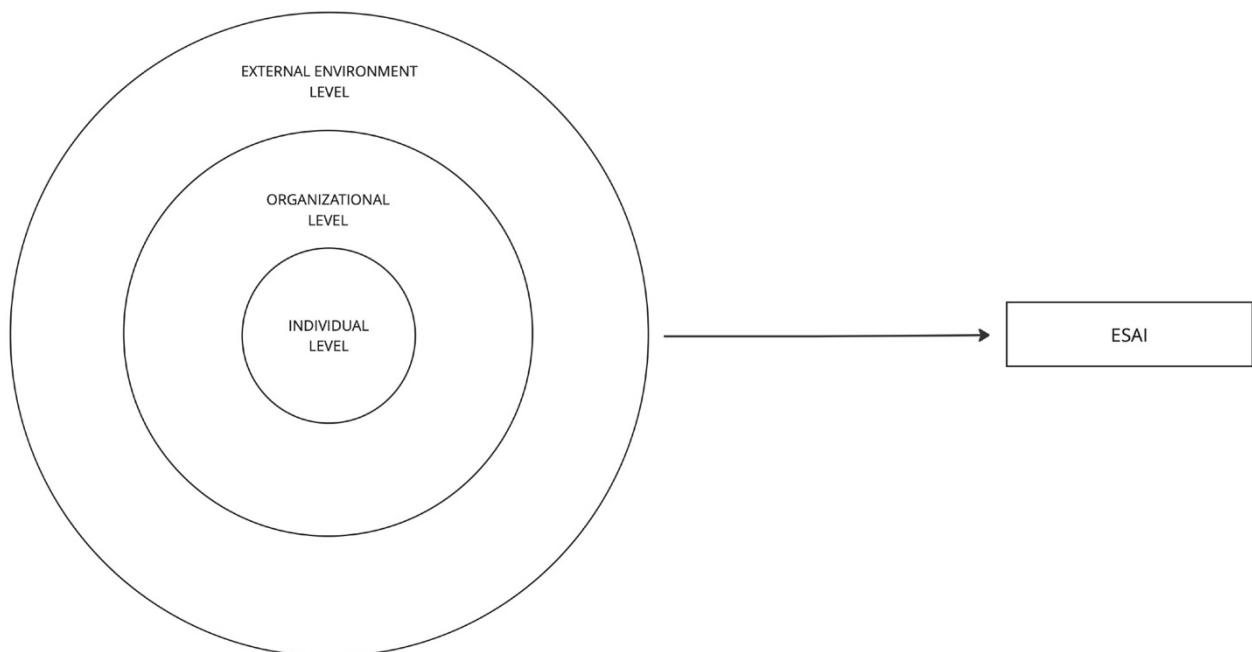
At the highest level, some effects come from the external environment that affects the organizations. Firstly, regulators are moving to create rules that address the need for regulatory guidance, for instance in Europe the AI Act. This regulatory guidance is especially important for those firms that

due to negligence or a lack of capabilities and resources do not consider ethics and sustainability because are more concerned about only the mandatory requirements. Voluntary actions are not enough: if there are no legal requirements, firms are less willing to consider ethical and sustainable concerns related to AI. It is not possible to measure the outcomes or how these voluntary actions affect the outcomes, hence most of the time these considerations are neglected because do not affect positively or negatively the organizations. However, when there are regulatory requirements to satisfy, it is no longer possible to neglect these considerations due to the legal enforcement and power to oblige the companies to adhere to the rules (Wirba, 2023). It is also true that too severe rules do not allow firms to innovate and, in this sense, the AI high-risk level assessment of the AI Act is a right compromise.

> *Proposition 1: Firms are significantly more likely to integrate ethical and sustainable practices into their AI development and deployment when they are subject to legally enforced regulatory requirements, such as the AI Act in Europe, compared to when such practices are encouraged solely through voluntary guidelines.*

Additionally, it is noteworthy that competition is another external driver of ESAI in addition to regulations. Peer competition pressure pushes firms to adequate to the standards of the competition. In this sense, CDR is a great opportunity because if firms start to demonstrate the added value of behaving ethically and sustainably through CDR, the latter becomes a competitive advantage for organizations. This creates a positive chain reaction in which firms want to have it and not fall behind, confirming Dupire et al. (2018) about the adjustment of corporate responsibility due to competition, hence, further supporting Herden et al. (2021) on CDR's possible competitive advantage role. However, it is not easy to evaluate these somehow abstract concepts. Concretization of CDR is needed, firms should be able to see tangible results, confirming and integrating Lobschat et al. (2021) on the financial-economical concerns elucidating the necessity of a measure of evaluation to support CDR practices, which should be seen as complementary for competitive advantage. Furthermore, embedding and formalizing CDR within the company's strategy, core values, and mission, is considered to have positive results only if these initiatives are complemented by concrete and tangible actions within the firm (Li et al., 2023). This means for instance creating performance management systems that reward employees for considering ethical and sustainable considerations in the decision-making; otherwise, the risk is that people make the most-advantage choice instead of the more ethical-sustainable one, pushed by mere profit motivations. Or, from

another perspective, tangible results are also reductions of costs deriving from the better ethical and sustainable use of AI (e.g. energy), supported by price policies for example, which would benefit also managing, conserving, and regenerating resources (Kulkarni et al., 2023; Hao et al., 2023).

Proposition 2: CDR facilitates the approach towards ESAI, especially in the absence of regulatory enforcement, and leads to measurable cost reductions and increased competitive advantage for firms, as evidenced for instance by the development of performance management systems that reward ethical and sustainable decision-making.

Nevertheless, whether due to mandatory policies or because of other external forces, organizations must go through some adjustments, changes, and reconfigurations to benefit from the opportunities provided by ESAI and not be left behind with the consequence of going out of business eventually. Therefore this study goes beyond the relationship between culture, values, and corporate responsibility, and offers a new perspective to Lobschat et al. (2021) by delving into the Change Management dynamics influencing the implementation of ESAI. Hence, firms need to develop new capabilities and access to resources to go through this digitalization, as well as an organizational culture of change. So this study expands the work of Sjödin et al. (2023) on dynamic capabilities and AI-enabled Circular Business Models, in addition to trying to answer the ambiguity surrounding the essential capabilities and resources to exploit AI for the achievement of the SDGs and ESG (Ivanov, 2023; Altenburger 2023). Specifically, the other organizational capabilities proposed in this study are cognitive competencies, strategic capabilities, and technical competencies. The cognitive competencies emphasize the importance of having and confronting diverse perspectives and openness to backgrounds beyond IT (Markauskaite et al., 2022), increasing the overall efficiency of the AI systems and optimizing the processes. The strategic capabilities include networking capabilities, the ability to look outward (outside-in capabilities), and the ability to integrate internal and external knowledge (inside-out spanning capabilities), therefore, confirming collaboration and external interactions as crucial for staying ahead in ESAI implementation (Karami et al., 2019). Finally, there is a need for developing new technical competencies, particularly in creating new roles and expertise to assist in ESAI utilization. On the side of organizational resources, following Lobschat et al. (2021), the differences between big enterprises and SMEs are fundamental in the implementation of ESAI, with Big firms moving toward discussions about CDR thanks to the easy access to funds and resources; while, in contrast, SMEs are less technologically structured and struggle even to have AI

in their business. In addition, structural differences between big enterprises and SMEs are also significant. Large firms possess well-organized structures, effective processes, and collaborative teams, although progress can always be made. In contrast, the challenges faced by SMEs in adopting CDR are mostly due to limited financial resources and human capital (Prasanna et al, 2019).

One key aspect is fostering a positive attitude toward change, recognizing that failure to adapt can lead to obsolescence. Hence, clear communication, a well-defined implementation path, and collaboration across departments foster the success of change management and therefore this new digitalization (Olafsen et al., 2021). If there is not such an environment, there could be resistance to change, which will result in more problems and higher chances of failure of this digitalization, therefore a significant barrier to the implementation of ESAI within firms (Grünbichler, 2023).

For some organizations, regulatory compliance is just a complementary incentive because ESAI is already considered in the organizational culture. That is, there is already an awareness of ESAI and hence there is a culture that has a positive attitude that embraces AI and considers its ethical and sustainable aspects, encouraging proactive behaviors, fostering openness, frequent discussions, and awareness among employees. In addition, it fosters a top-down approach that coexists with bottom-up approaches from the employees, similar to the effect of Ethical Leadership highlighted by Liu et al. (2023). Therefore, in this environment teams already started to consider ethical and sustainability concerns in the implementation and use of AI, prioritizing responsibility and fostering an environment where ethical considerations are integral to decision-making (Saha et al., 2020). When regulations such as the AI Act are published, it is just a leverage helping them to the reinforcement of the processes that they already implemented. Therefore for these firms, the chance of failure in the transition of digitalization and ESAI is lower because they are already committed to ESAI. Most of these firms are big firms with an already established positive organizational culture, easy access to resources for investments in new capabilities and human capital, and a positive attitude toward change besides well-structured change management.

> *Proposition 3: Organizations that proactively develop new organizational capabilities and foster a positive organizational culture towards AI and change management, will experience a higher chance of being successful in the implementation of CDR, in addition to fostering coexistence between a top-down approach and a bottom-up approach for ESAI. However, the success rate is significantly higher in large firms with better access to new resources compared to smaller firms with limited resources.*

Accordingly, CDR is a great opportunity for firms to consider ethical and sustainable concerns and establish an organizational culture for the transition of firms into the implementation of ESAI. In the initial phase of this process, a CDR department can be useful in spreading the knowledge of ESAI inside the firm and incentive people to discuss and consider it in their daily activities and jobs, along with helping cultivate employees' commitment to change. However, it should not become a hierarchical silo phenomenon, these practices need to be established in the organizational culture and throughout the organization. Useful tools for sharing knowledge and raising awareness about CDR are training and workshops (Watts, 2020) that present people with facsimile situations where there are choices to be made and people have to talk about and reflect on the ethical and sustainable consequences of their choices.

The organizational changes require adjustment also from the employee's perspectives, in addition to seeking their involvement and collaboration. Therefore, a crucial point is retraining the employees to educate them on ESAI, so that the workforce can critically assess its pros and cons and is capable of drawing informed conclusions, creating a receptive and responsive environment. This will further prompt discussion within the organization of ethical and sustainable issues that will encourage employee adaptation and renewal, not destabilizing them with the substantial change of abandoning established habits. Furthermore, by educating people on the AI impacts, in particular about the Sustainability By Digital and Sustainability In Digital, the organizations spread consciousness about ESAI, making AI an enabler of sustainability (Ivanov, 2023; Matin et al., 2023). By focusing on Sustainability By digital, companies can enhance their employees' education, awareness, and acceptance of AI, which results in a better organizational environment for ESAI. As a result, this leads to more responsible AI use, reducing negative externalities and enhancing positive ones. Through Sustainability In digital, companies can ensure that new technologies are designed with ethical considerations from the development. This upstream approach will result in intrinsic ESAI optimizing the processes while reducing the environmental impact (Hao et al., 2023). On the side of the downstream challenge, companies demonstrate ethical use of technology through compliance with regulatory frameworks, such as the EU AI Act. This leads to greater transparency and accountability, building stakeholder trust and ensuring technology use is transparent and well-documented, promoting efficiency and responsible governance (Hao et al., 2023).

Proposition 4: In the beginning, implementing a CDR department, that includes regular workshops and training on ESAI for people, can ease the transition by spreading concepts and knowledge about it, hence leading to increased employee engagement, awareness,

and adherence to ethical standards in AI design and usage, as well as fostering a more sustainable organizational culture, reducing resistance to change, and enhances the likelihood of a successful ESAI transformation.

Finally, this study sees top management engagement as vital for considering ESAI, confirming Herden et al. (2021). Whereas the bottom-up approach, though recognized, is less impactful due to a lack of power and potential conflicts with top-management decisions, partially confirming Lobschat et al. (2021). However, this study expands the existing literature by elucidating additional benefits arising from the role of nearest leadership, which is crucial for its closeness to employees, encouraging them to share, engage in ethical practices and guide them through change (Wang et al., 2024). This role serves as a facilitator to install an organizational culture in which the top-down approach and bottom-up coexist and are complementary. Conversely, the influence of a negative culture can undermine positive efforts (Fridan et al., 2023), especially when concerns are dismissed, and a sentiment of disengagement and negligence for ethical implications could arise among the employees. Roles such as the scrum master in agile teams can take on CDR, ensuring that ethical considerations are integrated into digital practices. Hence, there is support for bottom-up approaches, relying on immediate leaders to ensure their teams prioritize responsibility and integrate ethical considerations into their work.

Proposition 5: Effective implementation of ESAI requires engaging and empowering the Nearest leadership roles, such as scrum masters, to support CDR, thereby facilitating a bottom-up approach that engages employees directly, creating a coexistence with the top-down approach.

Fig. B: Conceptual Model for ESAI Implementation
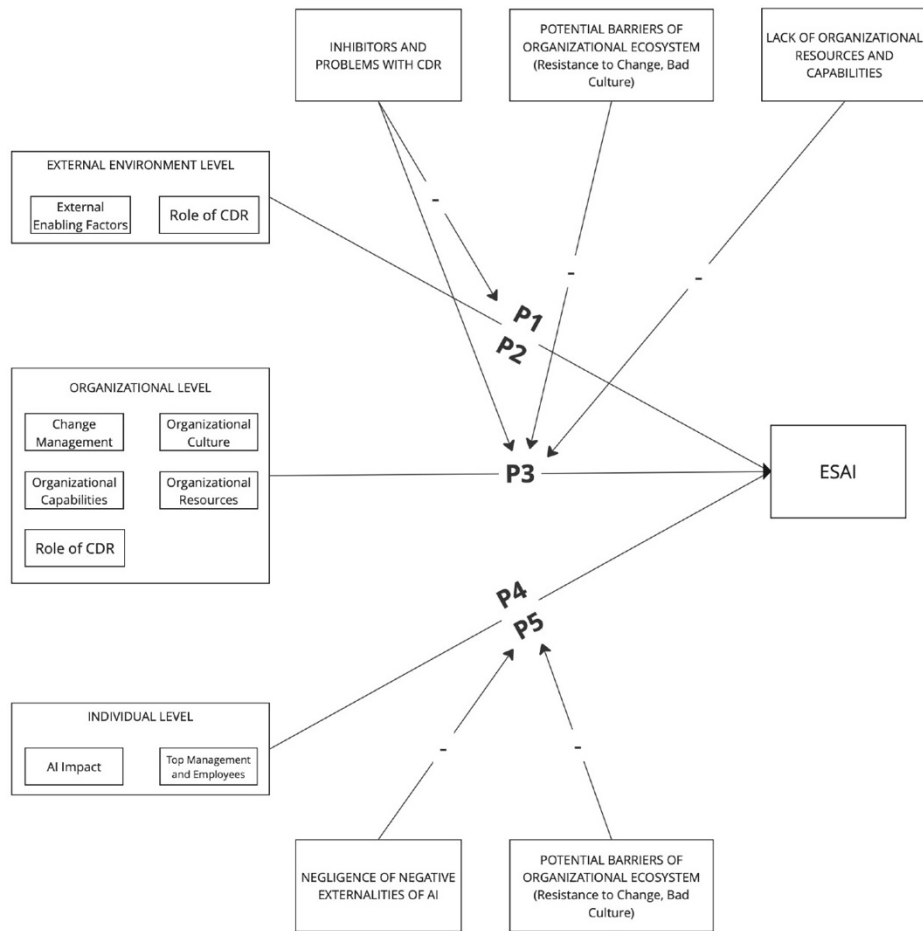
5.2   Practical Contribution

This paper delved into harnessing the benefits of AI-driven decision-making for sustainability through CDR, this study proposes a framework composed of three components, namely External Environment, Organizational, and Employee levels.

In the External Environment, in terms of policy, clear guidelines and standards should be further developed, promoting ESAI use and compliance with sustainability regulations, however without obstructing too much innovation. As for competition, it is critical to understand that there is and will be a competitive advantage that comes from ESAI implementation, further pushed by external stakeholders' preferences shifting, such as customers and final consumers.

Organizationally, managers should foster a culture of digital responsibility, with leadership commitment, ongoing training, and robust governance structures ensuring AI projects align with sustainability goals. This obviously needs investments to be made for new capabilities and resources that must be considered necessary for the long-term survival of the organization. Additionally, it is fundamental to exploit and empower managerial roles close to employees to foster CDR principles

by providing ethical decision-making frameworks. At least in the initial phase, it can be useful and should be considered to create a department, a committee, or an external consultancy, for sharing the knowledge of CDR inside the firm and incentive people to discuss it. Finally, it is important to start considering ethical and sustainable considerations in the performance management systems to further promote and create organizational CDR culture.

To conclude, at the employee level, it must be understood their role in ensuring ESAI implementation when using AI. Openness to change, willingness to be trained, and collaboration with the management are crucial to developing a bottom-up approach.

6. LIMITATIONS AND FUTURE RESEARCH

This study has several limitations that provide opportunities for further research. This qualitative analysis captured the perspectives of the interviews to enhance the knowledge of the relatively new and emerging domain of AI and its influence on ethics and sustainability. Future qualitative and quantitative research could test the results of the proposition of this research.

Furthermore, to better explore the overall topic and the role of CDR, this study did not impose any requirements for what concerns the industry of the firms and balanced the sample between the roles of AI developers, consultants, professors experts in AI and/or CDR, and people working with AI and/or CDR-related tasks. Future research could be interested in using specific requirements to understand better situations inside specific industries or explore the perspectives of specific roles connected with AI, for instance, developers, in addition to expanding the size of the sample to capture different perspectives if needed.

Moreover, this study mainly focuses on the perspective of workers and experts in AI to catch the relevant factors of ESAI inside organizational decision-making. Future research could explore the perspectives of other stakeholders, such as customers, suppliers, or regulators, to understand their perceptions, motivations, and concerns related to ESAI and the social sphere.

The findings of this study specifically detail the importance of CDR, yet further studies could further investigate what other practices can potentially improve the achievement of ESG and SDGs towards AI. For instance, this study underlines the role of a CDR department at the beginning of the transformation toward ESAI, and future research could devote increased attention to understanding better this aspect. In addition, future studies can be developed to test the effectiveness of evaluation through performance management systems to understand the effects on ESAI outcomes.

Finally, future research should focus on empirically testing the developed Three-level Framework to provide confidence regarding the impact of the identified key factors on the ESAI.

7. CONCLUSION

This study explored how managers and employees can utilize AI-driven decision-making to foster ESAI practices, with the aim of identifying the necessary factors for implementing ESAI, in particular through the CDR. Through a comprehensive analysis of qualitative interviews, the analysis has revealed the complexity of the implementation of ESAI inside the firms and it proposes an interconnected Three-level Framework composed of the External Environment, Organizational, and Individual levels.

Specifically, the findings highlight the importance of regulatory requirements and compliance, as well as the role of competition, as external environment level drivers for implementing ESAI. Then this level with these drivers influences changes at the organizational level, affecting which resources, capabilities, and organizational culture are needed for the implementation of ESAI. Lastly, the organizational level also impacts the individual level, necessitating people's retraining and the coexistence of top-down and bottom-up approaches for better ESAI implementation, with near leadership playing a crucial role. In these dynamics, CDR facilitates the adoption of ESAI. However, the study sees it as essential to concretize CDR to achieve tangible results and measures to create a competitive advantage. Moreover, it would be beneficial to establish a dedicated department, committee, or external consultancy to share CDR knowledge at least in the initial phase of this transformation.

In conclusion, this thesis has demonstrated that AI holds enormous potential for optimizing processes and helping solve complex problems related to ESG and SDGs. However, it is crucial to address ethical and sustainability concerns from the outset, with CDR serving as a valuable framework for this purpose. Therefore, advancing the understanding of ESAI will enhance the possibility of maximizing AI's positive externalities while mitigating and controlling its negative impacts.

8. APPENDIX

Appendix 1: Semi-structured Interview Guide

N°	QUESTION
First Part	Introduction
2	How does your firm address the ethical challenges connected with AI?
3	How do you think the implementation of AI could potentially affect the sustainability of your firm?
4	I'd like to ask you some question about Corporate Digital Responsibility, are you familiar with this term? How do you relate with this concept? How could it potentially be implemented in your firm?
5	What factors would facilitate and enable your firm to implement the CDR? Which ones could prevent the implementation of CDR instead?
Second Part	Intermediate
6	How do you think the management affect the whole application of AI?
7	How employees perception of AI affect the ethical and sustainable outcomes of AI?
8	Do you believe a culture embracing AI and a positive attitude towards AI help considering the ethics and sustainability related to AI? If so, how? If not why?
9	What are the necessary capabilities in order to implement AI in a sustainable way? Do you have them? Why don't you have them? What about the resources needed? Do you have them? Why don't you have them?
Third Part	Conclusion
10	How would you improve the Corporate Digital Responsibility inside the firm you work for?

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