AI Ethics and Green Leadership: Towards A Responsible Tech-Driven Sustainability Framework — A Systematic Literature Review

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Abstract: - In the era of rapid technological advancement and escalating environmental concerns, the integration of artificial intelligence (AI) with green leadership practices has become increasingly urgent. While AI offers significant potential for operational efficiency and innovation, its deployment raises critical ethical concerns related to transparency, fairness, accountability, and environmental impact. Simultaneously, green leadership defined by its commitment to environmental stewardship, ethical values, and long-term sustainability emerges as a strategic approach to guide responsible innovation. However, existing literature has yet to systematically explore the intersection of AI ethics and leadership within the broader context of sustainable development. This study conducts a systematic literature review (SLR) using the PRISMA 2020 approach, drawing from six academic databases including Scopus, Web of Science, and IEEE Xplore. The review 1600 includes peer-reviewed articles published between 2014 and 2024. Through thematic synthesis and bibliometric mapping, this study identifies key research themes, theoretical frameworks, and empirical findings related to the integration of AI ethics and leadership. The results reveal a fragmented body of literature, highlighting a need for redefining green leadership concept for the AI Era. This study contributes to both theory and practice by offering a conceptual foundation for a responsible tech-driven sustainability framework. Furthermore, it identifies quantitative and qualitative research for proposes future research directions, emphasizing to deepen theoretical understanding while enhancing the practical application of AI in sustainable, ethically robust organizational ecosystems.

1 Introduction

In the era of Industrial Revolution 4.0, the integration of artificial intelligence (AI) into organizational operations creates both opportunities and challenges, especially in balancing ethical values and social responsibility [1][2]. While AI can enhance efficiency, innovation, and data-driven decision-making [3], improper implementation risks algorithmic bias and privacy violations [4][5]. Hence, ethical leadership becomes central in promoting responsible AI use by encouraging transparency and sustainable practices [6], especially given the ambiguities in AI's sustainability contributions [7].

The synergy between AI and green leadership offers a pathway for aligning technological strategies with sustainability objectives [8][9]. However, current practices often favor efficiency and competitive advantage over ethics [10]. Transparency stands out as a key ethical principle supporting accountability and responsibility [11], further highlighting the need for structured ethical AI guidelines [12]. The evolving role of green leadership underscores the necessity to bridge digital innovation with ecological responsibility [13], particularly by embedding ethical frameworks across the AI lifecycle [14][15].

To address this gap, several strategies have been proposed. These include overcoming ethical barriers in AI deployment Morley et al. [16] and ensuring ethical inter-operability across sectors [17]. Institutions are encouraged to integrate business goals with ethical standards, drawing from AI ethics initiatives while fostering a culture of organizational responsibility [18]. Principles like transparency, accountability, and fairness are essential for guiding AI development in trustworthy and unbiased directions [4][19], while green leadership plays a vital role in embedding sustainability in organizational behavior [12][20] [21].

Studies have shown that green leadership not only enhances environmental citizenship within organizations but also creates a 'green climate' that encourages pro-environmental behaviors among employees [22][23]. Despite this, the intersection between AI ethics and green leadership remains underexplored [21][22]. Interdisciplinary collaboration is thus critical to produce integrated guidelines that align AI usage with sustainability goals across sectors. Such collaborations will enable clearer policies that support responsible technological innovation within ethical and environmental bounds.

Therefore, the integration of AI ethics and green leadership within a unified framework is a novel academic contribution. As AI technologies evolve, incorporating stakeholder engagement and ethical governance is crucial for sustainable decision-making [24][25][26][27]. Ethical concerns like justice, fairness, and socio-technical implications must inform AI strategies [28][29]. Responsible AI frameworks should not only be adaptive to technological advancements but also address environmental consequences such as carbon emissions [30][31]. This review aims to propose a comprehensive framework linking AI governance with green leadership, informed by multidisciplinary insights [32][33], in order to foster a more sustainable, ethical future through conscientious leadership.

Furthermore, the researcher developed the following research questions. The research questions are intended to guide the researcher to answer the research objectives. The following are the research questions:

RQ1: How does the integration of Artificial Intelligence enhance organizational decision-making processes in the pursuit of environmental sustainability goals?

RQ2: To what extent does the alignment between ESG principles and green leadership practices influence the effectiveness of AI-driven sustainability strategies in organizations?

RQ3: How do transformational and ethical leadership styles shape organizational readiness and ethical compliance in the implementation of AI technologies?

RQ4: What role do organizational culture and structural characteristics play in moderating the relationship between AI adoption and sustainability outcomes?

RQ5: What are the perceived ethical risks associated with AI deployment, and how can regulatory frameworks be designed to ensure responsible and sustainable AI governance?

RQ6: How is leadership being redefined in the context of increasing AI integration, and what

competencies are required for leaders to effectively navigate ethical and sustainability challenges in the digital era?

2 Literature Review

2.1 AI ethics

AI ethics plays a pivotal role in guiding the responsible development and application of artificial intelligence by incorporating normative principles such as fairness, accountability, transparency, and the prevention of harm. These principles address both ethical challenges and practical implications in real-world contexts. Key components of AI ethics such as transparency, fairness, privacy and data protection, accountability, and non-maleficence are central to ensuring ethical AI use. Transparency, in particular, fosters public trust by making AI systems understandable, thereby reducing opacity through explainable AI practices [34]. Fairness is critical for mitigating algorithmic biases that may result in discriminatory outcomes against specific demo-graphic groups [35], while privacy and data protection frameworks aim to uphold individual rights in the era of data-driven AI [36]. Furthermore, accountability ensures that responsibility can be attributed when AI systems cause harm, a challenge that grows as AI technologies become more autonomous [37]. Importantly, the scope of AI ethics now extends beyond technical considerations to include broader societal and environmental concerns, aligning it with sustainability objectives [38].

2.2 Green Leadership

Green leadership embodies a transformative management paradigm that places sustainability at the heart of organizational strategy, integrating ecological responsibility, ethical values, employee empowerment, and a long-term vision. Central to this leadership model is the commitment to future-oriented strategies that safeguard the well-being of coming generations [39], alongside environmental responsibility through practices aimed at reducing carbon emissions and fostering conservation [40]. Ethical decision-making grounded in integrity further defines green leadership [41], as does the empowerment of employees to participate actively in sustain-ability initiatives [42]. Through role modelling and strategic communication, green leaders significantly influence pro-environmental organizational behavior [43]. Importantly, in the era of rapid technological adoption, especially AI, green leadership ensures that innovation aligns with ecological priorities [44], creating a synergistic model where ethics, sustainability, and technology evolve in harmony.

2.2 Integration AI Ethics and Green Leadership

The incorporation of ethical principles such as transparency, fairness, accountability, and privacy are central to ensuring that AI development fosters responsible innovation and addresses societal and ecological needs. These principles help prevent systemic biases, enhance public trust, and support the creation of AI technologies that reflect societal values and promote sustainability [45]. Responsible AI governance, as advocated by [16], contributes to greater societal acceptance, whereas weak governance can result in privacy violations and data misuse [46]. The absence of globally harmonized privacy safeguards also hinders the regulation of AI's broader impacts [47]. Thus, a strong ethical foundation throughout the AI lifecycle is essential to mitigate risks and uphold public confidence, ensuring a balanced advancement of technology in service of social welfare.

3 Research Methods

This study employs a Systematic Literature Review (SLR) to synthesize interdisciplinary insights at the intersection of AI Ethics, Green Leadership, and Sustainability Frameworks enabling the identification of conceptual gaps and future research directions [48]. Guided by the PRISMA 2020 protocol [49], the review followed four rigorous stages—identification, screening, eligibility, and inclusion—to ensure transparency and replicability. A total of 1,600 records were initially retrieved from six databases—Scopus, Web of Science, ScienceDirect, SpringerLink, IEEE Xplore, and Google Scholar—using Boolean queries combining AI ethics, green leadership, and sustainability terms. Peer-reviewed English-language articles published between 2014 and 2024 were included, while those lacking theoretical or empirical depth or focused solely on technical or unrelated marketing topics were excluded. Following a structured selection process, 420 duplicates were removed, 865 records were excluded after screening titles and abstracts, and 210 full-text articles were excluded based on relevance and quality, resulting in 105 articles for qualitative synthesis, in line with [50]. Data extraction included author information, country, discipline, and key findings, while thematic analysis was conducted using the synthesis framework of [51], enabling the identification of cross-disciplinary themes. This methodological approach strengthens the integration of AI ethics and green leadership toward constructing a responsible, tech-driven

sustainability framework. Each stage of data selection from the identification stage, screening, eligibility, to inclusion can be seen in figure 1.
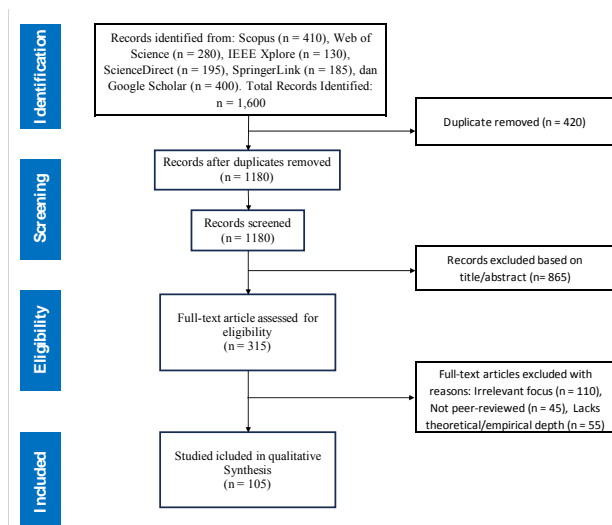

Figure 1. Prisma Framework
Source: Own elaborate (2025)

4 Results of SLR

The results section offers a structured overview of the scholarly landscape on AI Ethics and Green Leadership within a responsible tech-driven sustainability framework. It includes descriptive analyses of 105 selected articles, covering publication years, journal sources, authorship trends, and geographic distribution. This mapping illustrates the evolution of academic interest from 2014 to 2024, highlighting a significant rise in publication volume and interdisciplinary engagement across fields such as Business, Management and Accounting, Social Sciences, Computer Science, and Environmental Science. Additionally, publication outlets are categorized based on indexing platforms (e.g., Scopus, Web of Science), and the research approaches employed in each study are identified to showcase methodological diversity within the field.
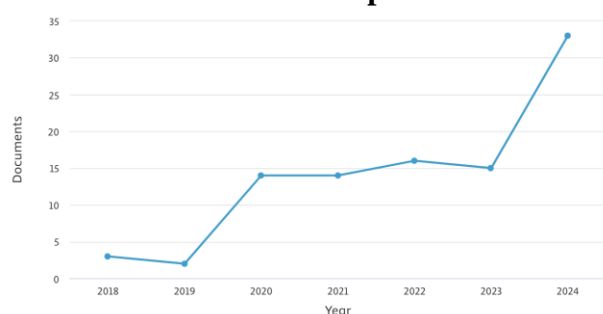
4.1 Characteristics of Sample Articles

Figure 1. Number of Publications on AI Ethics and Green Leadership by year

Source: Own elaborate (2025)

Figure 1 illustrates the upward trend in annual publications on AI Ethics and Green Leadership within the context of a responsible tech-driven sustainability framework. Since its emergence in 2018 (n=3) and 2019 (n=2), scholarly output surged notably in 2020 (n=14) and peaked in 2024 (n=33), marking the field's growing relevance. The year 2020 stands out as a turning point, with approximately 78% of reviewed studies published, signalling a consolidated focus on ethical AI practices and sustainable leadership. This trend reflects increasing recognition of the need for interdisciplinary solutions to the ethical and environmental challenges of emerging technologies.

Citation analysis further reinforces the impact of this research stream, with over 5,920 citations by the end of 2024. This growing citation volume affirms the domain's academic significance in shaping discussions on AI governance, leadership ethics, and sustainability. Tables 1 and 2 present the most cited works, highlighting foundational studies that have influenced the development of this field. Together, these findings underscore AI Ethics and Green Leadership as a critical and expanding area of research with far-reaching implications for responsible innovation and organizational transformation.

Table 1. Most Frequently cited articles of AI Ethics

Article	Citation
[52]. "ChatGPT and a new academic reality: Artificial Intelligence-written research papers and the ethics of the large language models in scholarly publishing."	902
[59]. "Machine learning and artificial intelligence research for patient benefit: 20 critical questions on transparency, replicability, ethics, and effectiveness."	686
[54]. "Artificial intelligence (AI) Ethics: Ethics of AI and ethical AI."	660
[55]. "In AI We Trust: Ethics, Artificial Intelligence, and Reliability."	627
[53]. "The Chinese approach to artificial intelligence: an analysis of policy, ethics, and regulation."	623
[56]. "Ethics in artificial intelligence: introduction to the special issue."	611
[60]. "Artificial intelligence for good health: a scoping review of the ethics literature."	600
[57]. "Connecting the dots in trustworthy Artificial Intelligence: From AI principles, ethics, and key requirements to responsible AI systems and regulation."	460
[58]. Ethics of artificial intelligence in radiology: Summary of the joint European and North American multi-society statement.	375
[61]. "Ethics and governance of trustworthy medical artificial intelligence."	314

Source: Own Processed by Authors (2025)

Based on Table 1, AI ethics encompasses the moral principles, normative guidelines, and philosophical considerations that ensure AI development and deployment remain socially responsible. A key distinction outlined by [54] separates the ethics of

AI—how humans treat AI—from ethical AI—how AI is designed to act ethically. The most cited article (902 citations) [52], critically examines the ethical challenges of large language models like ChatGPT in academic publishing, raising issues of authorship integrity and the need for evolving ethical frameworks.

Recurring themes in the AI ethics literature include transparency, trust, and regulatory frameworks. Vollmer et al [59] presents 20 essential questions highlighting ethical oversight needs, especially in healthcare. Similarly, Ryan [55] emphasizes public trust and calls for embedding ethical reasoning within AI design. National policy contexts also shape ethical AI, as seen in Roberts et al. [53]'s analysis of China's regulatory approach. Concerns specific to AI in medical applications such as privacy, data bias, and regulatory gaps are addressed in [58], [60], and [61]. Additionally, Díaz-Rodríguez et al. [57] links AI principles with actionable policy frame-works, advocating harmonized regulations to support trustworthy AI development. Collectively, these studies reinforce the critical role of ethics in guiding AI toward responsible innovation.

Table 2. Most Frequently Cited Articles of Green Leadership

Article	Citation
[62]. "Green innovation and environmental performance: The role of green transformational leadership and green human resource management."	2.093
[64]. "The joint impact of green human resource management, leadership and organizational culture on employees' green behaviour and organisational environmental performance."	547
[63]. "Unlocking employees' green creativity: The effects of green transformational leadership, green intrinsic, and extrinsic motivation."	525
[67]. "The continuous mediating effects of GHRM on employees' green passion via transformational leadership and green creativity."	390
[65]. "Does green transformational leadership lead to green innovation? The role of green thinking and creative process engagement."	377
[66]. "Green inclusive leadership and green creativity in the tourism and hospitality sector: serial mediation of green psychological climate and work engagement."	366
[68]. "Fostering employee's pro-environmental behavior through green transformational leadership, green human resource management and environmental knowledge."	346
[69]. "Responsible leadership and employee's proenvironmental behavior: The role of organizational commitment, green shared vision, and internal environmental locus of control."	345
[61] "Ethics and governance of trust-worthy medical artificial intelligence."	315
[24]. "Promoting in-role and extra-role green behavior through ethical leadership: mediating role of green HRM and moderating role of individual green values."	266

Source: Own Processed by Authors (2025)

According to Table 2, green leadership is a leadership style that integrates environmental values into strategic, operational, and managerial practices to foster a sustainability-oriented organizational culture. It aims to motivate stakeholders to adopt environ-mentally responsible behaviors while enhancing innovation and performance. Far from being a mere normative concept, green leadership is positioned in the literature as a strategic approach that directly influences green innovation and sustainable development by embedding ecological objectives into corporate decision-making.

Several dominant themes emerge from the most cited works. Green Transformational Leadership is extensively discussed in Singh et al., [62] Li et al., [63] Begum et al. [65], with Singh et al. [62] showing its synergy with Green Human Resource Management (GHRM) in driving environmental performance and innovation. Other studies, such as Li et al. [63] Bhutto et al. [66] emphasize how green leadership fosters employee creativity by nurturing intrinsic motivation and a supportive green psychological climate. The mediating roles of green passion, GHRM, and shared green vision are explored in [67][68][23], while environmental knowledge and personal green values act as key moderators. Furthermore, Bhutto et al. [66] illustrates green leadership's relevance in tourism and hospitality, where green inclusive leadership enhances employee engagement through a pro-environmental workplace climate. These findings highlight green leadership's critical role in aligning organizational behavior with sustainability goals.

4.2 Publication Outlet, Affiliation, Countries, and Disciplinary Field

This review synthesizes peer-reviewed journal articles published between 2014 and 2024 that explore the intersection of AI ethics, green leadership, and sustainability frameworks. It aims to trace current research trends, highlight influential publication venues, and analyze the disciplinary and geographical distribution of scholarly contributions. The growing convergence of ethical AI and sustainable leadership reflects increasing concern over the socio-environmental implications of emerging technologies.

Table 3. Publication Outlet, Affiliation, Countries, and Disciplinary Field

Publication outlet	# of article
Science And Engineering Ethics	32
Technology In Society	10
Journal Of Business Ethics	7
Computer Law and Security Review	4
Organizational Dynamics	3
Technological Forecasting and Social Change	3
European Business Organization Law Review	2
Futures	2
Journal Of Business Research	2
Journal Of Service Management	2
Affiliation	**# of article**

University of Oxford	8
The Alan Turing Institute	8
De Montfort University	6
Oxford Social Sciences Division	6
National University of Singapore	4
Universiteit Maastricht	4
Technische Universität München	4
Turun yliopisto	3
King's College London	3
Universiteit Twente	3
Countries	**# of article**
United Kingdom	29
United States	23
Germany	18
Netherlands	15
Switzerland	9
Australia	8
Sweden	8
Canada	6
China	6
Norway	6
Disciplinary field	**# of article**
Business, Management and Accounting	33,9%
Social Sciences	25,9%
Medicine	11,2%
Nursing	11,2%
Economics, Econometrics and Finance	5,9%
Arts and Humanities	4,2%
Psychology	3,1%
Computer Science	2,8%
Decision Sciences	1,4%
Environmental Science	0,3%

Source: Own Processed by Authors (2025)

Table 3 summarizes the top 10 publication outlets that have significantly shaped this field, providing key metadata such as author affiliations, country of origin, and disciplinary background. This mapping reveals the institutional and regional landscapes where discourse on ethical AI and green leadership is most active, particularly in disciplines like computer science, business ethics, and environmental management. These insights underscore the inter-disciplinary and globally distributed nature of this emerging research domain.

The analysis identifies the top 10 publication outlets contributing to the discourse on AI ethics, green leadership, and sustainability. Science and Engineering Ethics leads with 32 articles, high-lighting its prominence in addressing the ethical implications of emerging technologies. Other key journals include Technology in Society (10 articles) and Journal of Business Ethics (7), reflecting a strong emphasis on social, organizational, and ethical dimensions of AI. Outlets such as Computer Law and Security Review and Technological Forecasting and Social Change demonstrate the field's multi-disciplinary nature, spanning legal, managerial, and foresight perspectives.

Institutionally, leading contributors include the University of Oxford and The Alan Turing Institute (each with 8 articles), alongside De Montfort University, National University of Singapore, and Technische Universität München, indicating a

globally distributed scholarly effort. The UK, US, Germany, and the Netherlands dominate authorship, supported by contributions from Switzerland, Sweden, Australia, China, and Norway, underscoring global awareness of the need for responsible AI governance linked to sustainability.

Disciplinary analysis reveals a strong concentration in Business, Management and Accounting (33.9%) and Social Sciences (25.9%), emphasizing the role of governance and behavioral insights in shaping ethical AI. Health-related disciplines such as Medicine and Nursing (each 11.2%) also contribute significantly, particularly in relation to ethical concerns in clinical AI applications. Interestingly, Computer Science comprises only 2.8%, indicating that much of the ethical discourse is rooted in socio-economic and policy contexts rather than technical domains.

4.3 Finding and Future of Research on AI Ethics, Green Leadership, and Sustainability

Studies on the intersection of AI ethics and green leadership show an increasing interest in balancing technological advancement with environmental sustainability. AI ethics focuses on the development and application of technology that is in line with human values and social goals, while green leader-ship emphasizes leadership that drives environment-ally oriented organizational practices. The integration of these two domains creates a synergy that strengthens organizational performance while supporting responsible innovation. Recent literature confirms that this approach not only strengthens the social legitimacy of AI adoption but also drives organizational transformation towards sustainable practices. Thus, the relationship between technology ethics and green leadership becomes an important foundation in forming sustainability framework.

Table 4. Finding and Future Research

Authors	Finding of Research	Future of Research
[70]	The paper emphasizes that AI can significantly contribute to addressing complex social and environmental challenges, but it also highlights the potential risks associated with AI, such as conflicts with human ethics.	Examine the implications of AI on corporate social responsibility goals, particularly how AI can enhance decision-making processes by analyzing vast amounts of data in real-time,
[71]	The framework enhances the transparency and structure of analyses regarding AI-related ESG impacts, allowing companies to better incorporate research in AI ethics into their evaluations.	Developing more comprehensive frameworks that effectively capture the sustainability-related impacts of AI are analyzed at micro, meso, and macro levels.
[72]	The empirical results indicate that the use of artificial intelligence (AI) positively impacts the environmental performance	Future study focus on green culture of organizations moderates the relationship between AI use and green product innovation, and the

Ref	Finding	Future Research
	of organizations through the facilitation of green innovation in both product and process development.	mediating effect of green product innovation on the connection between AI use and environmental performance.
[73]	The research highlights the necessity of integrating artificial intelligence (AI) with environmental, social, and governance (ESG) factors to effectively digitize the board-room, which is essential for modern enterprises to address critical issues such as climate change and corporate governance.	Future research could explore the intricate ethical quandaries and hazards associated with the implementation of artificial intelligence in relation to environmental, social, and governance (ESG) performance, focusing on how these challenges can be effectively managed within corporate strategies.
[74]	Ethical leadership was identified as a significant moderator in the relationship between AI-induced job insecurity and PCB, suggesting that ethical leader-ship can help mitigate the negative impact of job insecurity on the psycho-logical contract, thereby supporting the maintenance of pro-environmental behaviors among employees.	Investigating the role of different leadership styles, beyond ethical leadership, in moderating the relation-ship between AI-induced job insecurity and psychological contract breach could provide deeper insights into effective management strategies in the context of technological advancements.
[75]	The paper discusses the ethical considerations surrounding AI applications in leadership. It also addresses the implications for the workforce, emphasizing the need for ethical guidelines and strategies to manage the transition towards AI-driven leadership	The finding highlights the transformative impact of AI on leadership practices, emphasizing how AI fosters a data-driven culture and reshapes organizational dynamics, leading to enhanced decision-making capabilities.
[76]	The study found a positive association between AI adoption and both green investment and environmental performance within SMEs, indicating that integrating AI can enhance environmental initiatives and outcomes in small and medium enterprises.	Exploring the long-term effects of AI adoption and green leadership on environmental performance in SMEs across different industries and regions, assessing how varying contexts influence the synergy between technology and sustainability practices.
[77]	Leaders in AI must ensure that technological advancements promote sustainability and do not harm the environment, thereby fostering a holistic approach to ethical leadership that encompasses both AI ethics and green initiatives for human well-being.	For future research could investigate the broader impact of AI on human well-being, examining how ethical leadership can foster environments where AI enhances societal values rather than undermines them.
[21]	It outlines the strategies employed by ethical leaders to establish ethical standards, cultivate responsible AI cultures, and promote transparency, ultimately influencing employee wellbeing and decision-making in AI environments.	Investigating the impact of ethical leadership on employee wellbeing and decision-making within AI environments can provide insights into how ethical standards and responsible AI cultures can be cultivated to enhance organizational effectiveness.
[78]	The paper emphasizes the importance of integrating ethical principles into AI development and deployment processes, highlighting that fairness, transparency, accountability,	Future research could focus on developing more comprehensive ethical decision-making models and methodologies that can effectively balance competing ethical
	privacy, societal impact, and human values are essential for aligning AI applications with human values and societal goals.	considerations in AI applications, ensuring that they align with human values and societal goals.
[79]	The paper emphasizes the importance of ethical leadership in navigating the challenges and opportunities presented by AI technologies, highlighting that ethical leaders can foster a culture of fairness, transparency, and accountability, which is essential for responsible AI use and organizational success.	Future research could focus on developing comprehensive ethical guidelines for AI use, which would outline organizations' commitments to ethical practices. This includes exploring how these guidelines can be effectively communicated and integrated into all aspects of AI.
[80]	AI technologies enhance leadership by enabling leaders to simulate various scenarios and model potential outcomes, which aids in exploring different strategies and assessing their impacts. This capability allows for more agile and adaptable leadership, enabling organizations to respond quickly to changing market conditions and emerging trends.	Future research could focus on developing frameworks and guidelines for the ethical development and deployment of AI technologies in leadership, specifically addressing how to mitigate biases in AI algorithms that can lead to unfair outcomes in recruitment and performance assessments.
[81]	The study found that AI enhances the recruitment process by effectively identifying and attracting environmentally conscious applicants, thereby aligning the workforce with the organization's green initiatives.	Future research could explore the long-term impacts of AI-driven Green HRM practices on employee engagement and organizational culture.
[82]	The research highlights that AI plays a critical role in fostering innovation by enhancing operational efficiency, driving product development, optimizing processes, and transforming business models.	For future research could investigate the evolving leadership styles required in the AI era, particularly how leaders can effectively foster collaboration, and adapt to the rapid technological changes
[83]	Transformational leadership and artificial intelligence were also confirmed to have a significant impact on employees' innovative work behavior, with the added finding that they moderate the relationship between green hard TM and employees' innovative work behavior.	Future research could focus on exploring the long-term effects of green talent management on employees' innovative work behavior in various industries beyond higher educational institutions.
[84]	The article outlines responsible AI development principles that emphasize fairness, human-centered values, and safety, aiming to address ethical issues such as bias, privacy, responsibility, and openness in AI technologies.	Future directions for AI ethics include the development of regulatory frameworks that can effectively govern the use of AI technologies, ensuring they are aligned with ethical standards and societal values.
[85]	The study finds that both AI experience and sustainable leadership independently enhance work engagement. However, the interaction between AI experience and sustainable leadership negatively affects work engagement, suggesting that there is a need for strategic alignment between AI	Future research could explore the specific mechanisms through which the interaction between AI experience and sustainable leadership negatively affects work engagement, aiming to identify strategies that can mitigate this adverse effect and enhance overall

	initiatives and sustainable leadership principles to optimize employee engagement.	employee engagement in organizations.
[86]	The review identifies a paradigm shift in leadership practices, emphasizing the rise of agile and collaborative approaches. Leaders are now required to adopt orchestration roles, engage in strategic thinking, and cultivate partnerships with AI, reflecting a significant transformation in how leadership is executed in organizations.	Future research should focus on developing adaptive organizational frameworks that effectively integrate AI technologies, emphasizing the need for interdisciplinary collaboration to address the challenges posed by AI in leadership and organizational structures.

Source: Own Processed by Authors (2025)

Based on Table 4, findings from 18 articles reveal that the integration of artificial intelligence (AI), green leadership, and organizational sustainability forms a critical synergy for advancing responsible decision-making. AI supports real-time data analysis to enhance corporate social responsibility and operational efficiency [70][71]. Studies underscore the value of aligning AI with ESG principles and highlight green leadership as instrumental in improving environmental performance, particularly in SMEs [73]. Organizational green culture also significantly moderates the impact of AI on green innovation [83] [74].

Ethical leadership emerges as essential in managing AI-driven transitions, mitigating job insecurity, and preserving pro-environmental workplace behavior [74][77] [21]. In South Korea, ethical leadership has been shown to moderate the link between AI-related job insecurity and psychological contract breach [70] [74]. AI also contributes to green HRM and fosters transformational leadership that encourages innovation [81][83], while future leadership models are becoming more data-driven, responsive, and collaborative [75][82] [86].

Nonetheless, ethical challenges such as algorithmic bias, privacy, and transparency demand comprehensive regulatory frameworks and ethical decision-making models [78]. A study by Herlina et al. [85] found that although AI and sustainable leadership individually enhanced work engagement, their interaction had a negative effect—highlighting the need for strategic alignment between technological initiatives and sustainability principles.

4.4 Thematic Clusters

The qualitative synthesis of peer-reviewed studies identified six key thematic clusters that clarify the intersection between artificial intelligence (AI), leadership, and sustainability. The first theme, AI as an Enabler of Sustainability and Decision-Making, highlights how AI enhances strategic decision-making, ESG reporting, and predictive environmental analytics. Zhao & Gómez Fariñas [70] emphasize AI's potential in fostering transparent and responsive sustainability practices.

The second theme, ESG Integration and Green Leadership Synergy, explores the strategic alignment of Environmental, Social, and Governance (ESG) principles with green leadership. Zechiel et al. [87] demonstrate that such synergy enhances the effectiveness of AI-enabled sustainability initiatives.

The third theme, Transformational and Ethical Leadership in AI Contexts, underlines the role of leadership styles in promoting innovation, ethical compliance, and organizational accountability. [88] argues that transformational and ethical leadership strengthen responsible AI governance.

The fourth theme, Cultural and Organizational Moderators, addresses how organizational culture, norms, and structural flexibility influence AI's impact on sustainability outcomes [70][71].

The fifth theme, Ethical Risks and Regulatory Needs, points to ongoing concerns around algorithmic bias, data privacy, and transparency. Scholars such as Almansour [72] Bolte et al. [89] advocate for ethical regulatory frameworks grounded in stakeholder inclusion and universal principles.

Finally, Redefining Leadership for the AI Era identifies emerging competencies—digital fluency, ethical literacy, and orchestration skills—as essential for navigating the complexities of AI-driven sustainability [87] [88]. Together, these six themes offer an integrated foundation for future research and practical leadership frameworks.

Table 5. Thematic Clusters

Thematic Clusters	Authors
AI as an Enabler of Sustainability and Decision-Making	[71] [88] [91] [92] [93] [94] [95] [96] [97] [98] [99] [78] [100] [101] [102] [103] [104] [105] [106] [107]
ESG Integration and Green Leadership Synergy	[88] [108] [109] [56] [110] [111] [112] [113] [114] [103] [78] [115] [74]
Transformational and Ethical Leadership in AI Contexts	[90] [89] [116] [108] [117] [56] [118] [119] [120] [121] [78] [122]
Cultural and Organisational Moderators	[71] [72] [123] [124] [96] [125] [126] [113] [102] [121] [127] [105] [128]
Ethical Risks and Regulatory Needs	[72] [90] [116] [91] [117] [56] [98] [97] [112] [120] [114] [12] [129] [157] [131] [115] [106]
Redefining Leadership for the AI Era	[88] [89] [91] [94] [130] [97] [121] [78]

Source: Own Processed by Authors (2025)

5 Discussion and Future Research

5.1 Discussion

The integration of Artificial Intelligence (AI) into organizational contexts is reshaping the landscape of sustainable leadership and ethical governance. The

findings from this review underscore a complex yet promising intersection between AI technologies, ethical leadership, and environmental sustainability. Multiple studies consistently indicate that AI can support organizational efforts to address pressing global challenges, such as climate change, resource efficiency, and ethical decision-making. However, this potential is not without risk. Therefore, understanding the conditions under which AI enhances or undermines sustainability and ethical values becomes crucial for both researchers and practitioners.
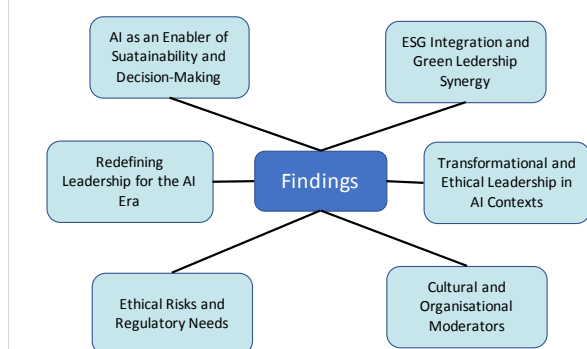

Figure 3. Ai Ethics and Green Leadership Model

5.1.1 AI as an Enabler of Sustainability and Decision-Making

The integration of Artificial Intelligence (AI) substantially enhances organizational decision-making by enabling real-time monitoring, predictive analytics, and optimization aligned with environmental sustainability goals. Studies such as Zhao & Gómez Fariñas [70] Zechiel et al. [87] show that AI supports ESG disclosures and contributes to SDGs 12 and 13 through predictive environmental analytics. Green AI, as explored by Verdecchia et al. Khalid et al. [92], promotes energy efficiency and strategic planning, particularly in risk management and sustainable operations.

Ethical dimensions of AI are also central. [98] introduce Socially Responsible AI (SRAI), while Alberto (2024) highlights Explainable AI (XAI) for transparency. Swiatek [102] demonstrates that embedding AI within bounded ethicality frameworks enhances alignment with ecological targets. Innovations like Green AI Alloghani [98] and federated AI integrated with circular economy principles Kumar [77] support decentralized, sustainable decisions.

AI's forecasting capabilities are also prominent. Srivastava et al. [99] emphasize algorithmic prioritization of sustainability, Nasir et al. [100] show integration with Environmental Management Systems for strategic responsiveness, and Jelonek & Rzemieniak [101] highlight AI's role in

environmental operations. Energy optimization and real-time monitoring are further supported by [94]. The ethical and sustainable use of AI is reinforced by frameworks such as SUM Values [57][104], while Balcıoğlu et al. [105] demonstrate that AI simulations and text mining techniques provide timely, evidence-based strategies for environmental challenges.

5.1.2 ESG Integration and Green Leadership Synergy

The integration of ESG (Environmental, Social, and Governance) principles with green leadership is widely acknowledged as a critical enabler for ethically grounded and sustainable AI deployment. Zechiel et al. [87] Biggi et al. [107] argue that ESG-committed leadership fosters inclusive environments where green leaders translate ESG values into AI-driven sustainability strategies. Ruban [110] further highlight ESG-informed leadership as a strategic anchor for aligning AI adoption with long-term sustainability goals.

Studies by Suljic [108] Jahan et al. [109] underscore that embedding ESG principles in AI governance supports responsible innovation and minimizes ethical risks, even when leadership is not the primary focus. Popescu et al. [111] introduces AI-eco-ethics, showing how ESG-oriented leadership enhances AI legitimacy. Similarly, Ryan [55] Swiatek [102] emphasize ESG's role in building stakeholder trust, accountability, and transparent governance.

Kumar [77] positions leaders as stewards of responsible AI, embedding ESG into both the design and execution of AI initiatives. Matsunaga [114] references the UNESCO Recommendation on the Ethics of AI, reinforcing ESG's importance in upholding environmental justice and human rights. Finally, Sklavos et al. [73] conclude that ESG-based AI, when championed by green leadership, supports holistic, ethically robust, and forward-looking sustainability innovation.

5.1.3 Transformational and Ethical Leadership in AI Contexts

Transformational and ethical leadership styles are critical in guiding organizations toward the ethical and effective adoption of Artificial Intelligence (AI). Verdecchia et al. [90] Bolte et al. [89] highlight how transformational leadership encourages innovation and AI readiness, while ethical leadership ensures accountability through data governance and stakeholder trust. Biggi et al. [107] reinforce that leaders who promote ethical visions and employee engagement foster cultures of transparency, compliance, and trust.

Şengüllendi et al. [116] introduces "elemental ethics", advocating for moral responsibility across the AI value chain, aligning with visionary leadership. Rohit et al. [117] Mäntymäki et al. [30] show that these leadership styles underpin governance systems that promote fairness, inclusion, and green innovation, while also encouraging long-term strategic thinking.

Supporting this, Kordsachia et al. [120] propose the Hourglass Model, illustrating how ethically grounded leadership strengthens internal capabilities, stakeholder alignment, and AI governance preparedness. Manda et al. [78] adds that such leaders cultivate foresight and inclusivity, ensuring AI initiatives align with organizational values. The chapter Ethical Leadership in the Age of AI (2024) further affirms that reflective, principle-based leadership is central to shaping value-driven AI strategies.

5.1.4 Cultural and Organizational Moderators
Organizational culture and structure significantly moderate the relationship between AI adoption and sustainability outcomes. Zhao & Gómez Fariñas [70] Sætra [71] argue that decentralized, innovation-driven, and collaborative cultures foster ethical and environmentally beneficial AI use, while hierarchical or profit-centric structures may hinder responsible implementation. Díaz-Rodríguez et al. [57] emphasize that agile cultures prioritizing ethical foresight and stakeholder collaboration enhance responsiveness and reduce risk.

Structural enablers such as decentralized governance, transparent communication, and cross-functional teams are essential for aligning AI with sustainability objectives. [124] proposed participatory governance and continuous learning frameworks, while [120] highlight institutional mechanisms like ethical review boards in supporting sustainability performance. [126] confirm that adaptive, ethics-oriented cultures promote interdisciplinary dialogue and reduce AI-related risks.

Popescu et al. (2024) link learning-oriented cultures and ESG-integrated workflows with strategic AI alignment [111]. Similarly, [13] stress inclusive stakeholder engagement and feedback mechanisms for keeping AI responsive to ethical and ecological concerns. [127] conclude that CSR-rooted, environmentally conscious cultures—supported by decentralized structures and interdisciplinary teams—are critical for achieving ethical and measurable sustainability outcomes through AI.

5.1.5 Ethical Risks and Regulatory Needs

Recent literature consistently identifies a range of ethical risks associated with AI deployment, including algorithmic bias, lack of transparency, privacy breaches, and surveillance concerns [71] [89]. Other issues such as environmental inefficiency and socio-economic exclusion are also highlighted [111] [97]. [55] stress the implications of algorithmic opacity, automation bias, and stakeholder exclusion, which undermine public trust, sustainability, and democratic accountability.

To mitigate these risks, scholars advocate for harmonised ethical governance frameworks centred on fairness, inclusivity, human-centric design, and environmental justice [114] [90]. [12] call for multi-stakeholder oversight aligned with global ethical standards, while [102] emphasizes the need for accountability, representation, and context-sensitive governance.

Various frameworks have been proposed to institutionalize ethical AI. [112] introduces AI-eco-ethics, and Correia & Água (2024) recommend embedding explainability and ethical audits throughout the AI lifecycle. [117] stresses that governance must move beyond technical fixes to embrace systemic environmental and social values. The UNESCO Recommendation on the Ethics of AI [115] and models aligned with the UN Internet Governance Forum (IGF) provide practical, anticipatory, and sustainability-oriented regulatory pathways.

5.1.6 Redefining Leadership for the AI Era
Leadership in the AI era is being redefined by the integration of digital fluency, ethical literacy, and strategic foresight. Zechiel et al. [87] Biggi et al. [107] emphasize that modern leaders must act as ethical integrators aligning technology with human values, sustainability goals, and institutional integrity. Gazi et al. [93] Brock & Von Wangenheim [131] further advocate for interdisciplinary leadership that blends data literacy, collaboration, and long-term societal orientation.

This evolving leadership paradigm promotes inclusivity, systems thinking, and anticipatory governance. Kordsachia et al. [120] Kumar [77] describe leaders as agents of alignment, connecting AI capabilities with organizational values and external ethical frameworks. The Ethical Leadership in the Age of AI (2024) chapter reinforces the expectation that leaders balance innovation with inclusive and moral stewardship.

Suhag [112] highlight the importance of interpreting AI insights through an ESG lens, ensuring stakeholder inclusion and sustainability governance. Collectively, these studies depict a shift toward eco-

centric, ethically grounded, and digitally competent leadership.

In essence, the redefinition of leadership in the AI era calls for green leaders who integrate environmental stewardship, AI governance, and digital ethics [88] [88] [77]. This model fosters innovation that is not only technologically advanced but also socially equitable and ecologically responsible, guiding organisations toward sustainable transformation.

5.2 Future Research

Based on the Future of Research themes across the 18 studies in Table 4, here's a structured promotion of future research directions, categorized into quantitative and qualitative approaches. These suggestions aim to deepen understanding of AI, ethical leadership, ESG, and organizational sustainability. Quantitative research can empirically test the relationships and causal mechanisms suggested by previous findings. Here are several proposed directions:

 a. Impact of AI on CSR Performance
   "Investigate the statistical impact of AI adoption on corporate social responsibility (CSR) indicators using regression or SEM techniques."
 b. Mediating and Moderating Effects
   "Investigate green innovation as a mediator and green organizational culture as a moderator between AI adoption and corporate social responsibility (CSR) performance using multi-group SEM or moderated mediation analysis."
 c. Measurement of ESG-Aligned AI Adoption
   "Develop and validate a scale to measure the extent to which AI adoption are aligned with ESG frameworks in SMEs and large enterprises."
 d. Employee-Level Analysis on Job Insecurity and Leadership
   "Use structural equation modelling (SEM-PLS) to assess how different leadership styles moderate the effects of AI-induced job insecurity on AI adoption and corporate social responsibility (CSR)."

Qualitative studies are well-suited to uncover the underlying mechanisms, perceptions, and values that guide organizational decisions. Suggested directions include:

 a. Narrative Inquiry on Leadership Transformation
   "Explore how leaders interpret their evolving roles in the AI era through interviews or longitudinal case studies."
 b. Exploring the Ethics of AI at the Board Level
   "Conduct semi-structured interviews with board members to understand how they reconcile ESG expectations with AI deployment strategies."

 c. Cultural Alignment and AI Implementation
   "Use ethnographic methods to examine how green organizational cultures influence day-to-day decision-making in AI-powered workplaces."
 d. Focus Group on AI-Induced Job Insecurity
   "Conduct focus groups with employees in tech-integrated organizations to explore emotional responses and coping strategies related to AI-driven change."

5 Conclusion

This study synthesizes how Artificial Intelligence (AI) intersects with sustainability through six key themes: AI as an enabler of sustainability, ESG–green leadership integration, transformational and ethical leadership, organizational and cultural moderators, ethical risks and governance, and the redefinition of leadership in the AI era. Findings confirm that AI enhances decision-making via real-time analytics, predictive modelling, and risk management aligned with environmental goals [70] [90]. Concepts such as Green AI, Socially Responsible AI, and Explainable AI Alloghani [98] provide ethical frameworks for sustainable adoption. Theoretically, this review positions AI as a catalyst for environmental and governance transformation when embedded in ESG-oriented green leadership [107] [70]. Practically, it highlights the need for ethical readiness, stakeholder inclusion, and trust in institutional AI governance. Regulatory recommendations include ethical audits, participatory oversight, and sustainability-by-design approaches [111] [114].

Importantly, the study redefines green leadership to integrate digital ethics, environmental stewardship, and AI governance, requiring future leaders to possess systems thinking and ethical foresight [120] [77]. This marks a shift from control-based to adaptive, values-based leadership.

Future research should explore the mediating role of green innovation and the moderating effect of organizational culture, develop ESG-aligned AI tools, and examine leadership in AI-induced change through both quantitative (e.g., SEM) and qualitative (e.g., ethnography, narrative) methodologies to advance both theory and application.

References:

[1] Dwivedi, Y. K., Hughes, L., Ismagilova, E., Aarts, G., Coombs, C., Crick, T., ... & Williams, M. D. (2021). Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda

for research, practice and policy. *International journal of information management*, 57, 101994.

[2] Rai, A. K., Sharma, I., & Silcox, C. (2020). Accountability, secrecy, and innovation in AI-enabled clinical decision software. *Journal of Law and the Biosciences,* 7(1), lsaa077.

[3] Samuels, A. (2025). Examining the integration of artificial intelligence in supply chain management from Industry 4.0 to 6.0: a systematic literature review. *Frontiers in Artificial Intelligence,* 7, 1477044.

[4] Jobin, A., Ienca, M., & Vayena, E. (2019). The global landscape of AI ethics guidelines. *Nature machine intelligence*, 1(9), 389-399.

[5] Mittelstadt, B. (2019). Principles alone cannot guarantee ethical AI. *Nature machine intelligence,* 1(11), 501-507.

[6] König, P. D., Wurster, S., & Siewert, M. B. (2022). Consumers are willing to pay a price for explainable, but not for green AI. Evidence from a choice-based conjoint analysis. *Big Data & Society,* 9(1), 20539517211069632.

[7] Ioku, T., Song, J., & Watamura, E. (2024). Trade-offs in AI assistant choice: Do consumers prioritize transparency and sustainability over AI assistant performance? *Big Data & Society*, 11(4), 20539517241290-217.

[8] Adelakun, B. O., Antwi, B. O., Ntiakoh, A., & Eziefule, A. O. (2024). Leveraging AI for sustainable accounting: Developing models for environmental impact assessment and reporting. *Finance & Accounting Research Journal,* 6(6), 1017-1048.

[9] Arinze, C. A., & Jacks, B. S. (2024). A COMPREHENSIVE REVIEW ON AIDRIVEN OPTIMIZATION TECHNIQUES ENHANCING SUSTAINABILITY IN OIL AND GAS PRODUCTION PROCESSES. *Engineering Science & Technology Journal,* 5(3), 962-973.

[10] Floridi, L., & Cowls, J. (2022). A unified framework of five principles for AI in society. *Machine learning and the city: Applications in architecture and urban design*, 535-545.

[11] de Cerqueira, J. A. S., & Canedo, E. D. (2022, May). Exploring ethical requirements elicitation for applications in the context of ai. *In Simpósio Brasileiro de Sistemas de Informação (SBSI)* (pp. 150-163). SBC.

[12] Khan, A. A., Badshah, S., Liang, P., Waseem, M., Khan, B., Ahmad, A., ... & Akbar, M. A. (2022, June). Ethics of AI: A systematic literature review of principles and challenges. *In Proceedings of the 26th international conference on evaluation and assessment in software engineering* (pp. 383-392).

[13] Ma, L., Zhang, X., & Dong, L. (2023). Enhancing sustainable performance: the innovative strategy of digital transformation leading green collaborative management. *Sustainability*, 15(17), 13085.

[14] Ashok, M., Madan, R., Joha, A., & Sivarajah, U. (2022). Ethical framework for artificial intelligence and digital technologies. *International Journal of Information Management*, 62, 102433.

[15] Zhou, J., Chen, F., Berry, A., Reed, M., Zhang, S., & Savage, S. (2020, December). A survey on ethical principles of AI and implementations. *In 2020 IEEE Symposium Series on Computational Intelligence (SSCI)* (pp. 3010-3017). IEEE.

[16] Morley, J., Elhalal, A., Garcia, F., Kinsey, L., Mökander, J., & Floridi, L. (2021). Ethics as a service: a pragmatic operationalisation of AI ethics. *Minds and Machines*, 31(2), 239-256.

[17] Danks, D., & Trusilo, D. (2022). The challenge of ethical interoperability. *Digital Society*, 1(2), 11.

[18] Schiff, D. S., Logevall, E., Borenstein, J., Newstetter, W., Potts, C., & Zegura, E. (2021). Linking personal and professional social responsibility development to microethics and macroethics: Observations from early undergraduate education. *Journal of Engineering Education,* 110(1), 70-91.

[19] Borenstein, J., & Howard, A. (2021). Emerging challenges in AI and the need for AI ethics education. *AI and Ethics*, 1(1), 61-65.

[20] Ahmad, S., Islam, T., Sadiq, M., & Kaleem, A. (2021). Promoting green behavior through ethical leadership: a model of green human resource management and environmental knowledge. *Leadership & Organization Development Journal,* 42(4), 531-547.

[21] Uddin, A. A. (2023). The era of AI: Upholding ethical leadership. *Open Journal of Leadership*, 12(4), 400-417.

[22] Li, M., Gong, Z., Gilal, F. G., Van Swol, L. M., Xu, J., & Li, F. (2021). The moderating role of ethical leadership on nurses' green behavior intentions and real green behavior. *BioMed Research International*, 2021(1), 6628016.

[23] Islam, T., Khan, M. M., Ahmed, I., & Mahmood, K. (2021). Promoting in-role and extra-role green behavior through ethical leadership: mediating role of green HRM and moderating role of individual green values.

International Journal of Manpower, 42(6), 1102-1123.

[24] Sidorova, A., & Saeed, K. (2022). Incorporating Stakeholder enfranchisement, Risks, Gains, and AI decisions in AI Governance Framework. *Proceedings of the 55th Hawaii International Conference on System Sciences, 2022.* (pp 5943-5952).

[25] Adeniyi, A. C., & Okusi, O. (2024). Ethical AI governance, financing, and human well-being in the 21st century. *African Journal of Humanities and Contemporary Education Research*, 17(1), 193-205.

[26] Vinuesa, R., Azizpour, H., Leite, I., Balaam, M., Dignum, V., Domisch, S., ... & Fuso Nerini, F. (2020). The role of artificial intelligence in achieving the Sustainable Development Goals. *Nature communications*, 11(1), 233.

[27] Zhang, J., & Zhang, Z. M. (2023). Ethics and governance of trustworthy medical artificial intelligence. *BMC medical informatics and decision making*, 23(1), 7.

[28] van Berkel, N., Papachristos, E., Giachanou, A., Hosio, S., & Skov, M. B. (2020, October). A systematic assessment of national artificial intelligence policies: Perspectives from the Nordics and beyond. *In Proceedings of the 11th nordic conference on human-computer interaction: shaping experiences, Shaping Society* (pp. 1-12).

[29] Ghani, M. M., Mustafa, W. A. W., Hashim, M. E. A., Hanafi, H. F., & Bakhtiar, D. L. S. (2022). Impact of generative AI on communication patterns in social media. *Journal of Advanced Research in Computing and Applications*, 26(1), 22-34.

[30] Mäntymäki, M., Minkkinen, M., Birkstedt, T., & Viljanen, M. (2022). Defining organizational AI governance. *AI and Ethics*, 2(4), 603-609.

[31] Wang, H., Fu, T., Du, Y., Gao, W., Huang, K., Liu, Z., ... & Zitnik, M. (2023). Scientific discovery in the age of artificial intelligence. *Nature,* 620(7972), 47-60.

[32] Agbese, M., Alanen, H. K., Antikainen, J., Halme, E., Isomäki, H., Jantunen, M., ... & Vakkuri, V. (2021, September). Governance of ethical and trustworthy al systems: research gaps in the ECCOLA method. *In 2021 IEEE 29th International Requirements Engineering Conference Workshops (REW)* (pp. 224-229).

[33] Miyamoto, H., Mejia, C., & Kajikawa, Y. (2023, July). Venture Capital Investment in Artificial Intelligence and Its Performance under the Growing Social Recognition of Artificial Intelligence: Do more AI-experienced Trend Leaders Overperform their Peers? *In 2023 Portland International Conference on Management of Engineering and Technology* (PICMET) (pp. 1-10). IEEE.

[34] Yu, L., & Yu, Z. (2023). Qualitative and quantitative analyses of artificial intelligence ethics in education using VOSviewer and CitNetExplorer. *Frontiers in Psychology*, 14, 1061778.

[35] Ueda, D., Kakinuma, T., Fujita, S., Kamagata, K., Fushimi, Y., Ito, R., ... & Naganawa, S. (2024). Fairness of artificial intelligence in healthcare: review and recommendations. *Japanese Journal of Radiology*, 42(1), 3-15.

[36] Prathomwong, P., & Singsuriya, P. (2022). Ethical framework of digital technology, artificial intelligence, and health equity. *Asia Social Issues,* 15(5), 252136-252136.

[37] Petersson, L., Vincent, K., Svedberg, P., Nygren, J. M., & Larsson, I. (2023). Ethical considerations in implementing AI for mortality prediction in the emergency department: Linking theory and practice. *Digital health*, 9, 20552076231206588.

[38] Farooq, M. S., Tahseen, R., & Omer, U. (2021). Ethical Guidelines for Artificial Intelligence: A Systematic Literature Review. *VFAST Transactions on Software Engineering*, 9(3), 33-47.

[39] Robertson, J. L., & Barling, J. (2013). Greening organizations through leaders' influence on employees' pro- environmental behaviors. *Journal of organizational behavior*, 34(2), 176-194.

[40] Kura, K. M. (2016). Linking environmentally specific transformational leadership and environmental concern to green behaviour at work. *Global Business Review*, 17(3_suppl), 1S-14S.

[41] Murad, M., & Li, C. (2025). Impact of green inclusive leadership on employee green creativity: mediating roles of green passion and green absorptive capacity. *Leadership & Organization Development Journal*, 46(1), 118-138.

[42] Albrecht, S. L., Donnelly, T., Frenkiel, M., Rajic, S. K., Kavadas, V., & Leiter, M. P. (2023). Pro-environmental employee engagement: the influence of pro-environmental psychological capital, pro-environmental job resources, and perceived corporate environmental responsibility. *Frontiers in Sustainability,* 4, 1117892.

[43] Aulia, K. Z., & Nawangsari, L. C. (2023). Effects of Green Human Resource

Management and Green Transformational Leadership towards Employee Sustainable Performance through Employee Green Behavior at Mercu Buana University. *European Journal of Business and Management Research*, 8(5), 181-186.

[44] Esen, E., & Caliskan, A. O. (2019). Green human resource management (GHRM) and environmental sustainability. *PressAcademia Procedia*, 9(1), 58-60.

[45] Hermansyah, M., Najib, A., Farida, A., Sacipto, R., & Rintyarna, B. S. (2023). Artificial intelligence and ethics: Building an artificial intelligence system that ensures privacy and social justice. *International Journal of Science and Society,* 5(1), 154-168.

[46] Talukder, K. A., & Shompa, T. F. ARTIFICIAL INTELLIGENCE IN CRIMINAL JUSTICE MANAGEMENT: A SYSTEMATIC LITERATURE REVIEW. *Non-human journal,* 1(01).

[47] Huda, A. N., Winarno, A., & Yahya, K. (2024). Transhumanism Ethics: A Critical Analysis of AI Technology Development and Its Implications for Humanity. *Journal of Islamic Thought and Philosophy*, 3(2), 273-292.

[48] Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of business research*, 104, 333-339.

[49] Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *bmj*, 372.

[50] Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence- informed management knowledge by means of systematic review. *British journal of management,* 14(3), 207-222.

[51] Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC medical research methodology*, 8, 1-10.

[52] Lund, B. D., Wang, T., Mannuru, N. R., Nie, B., Shimray, S., & Wang, Z. (2023). ChatGPT and a new academic reality: Artificial Intelligence- written research papers and the ethics of the large language models in scholarly publishing. *Journal of the Association for Information Science and Technology*, 74(5), 570-581.

[53] Roberts, H., Cowls, J., Morley, J., Taddeo, M., Wang, V., & Floridi, L. (2021). *The Chinese approach to artificial intelligence: an analysis of policy, ethics, and regulation* (pp. 47-79). Springer International Publishing.

[54] Siau, K., & Wang, W. (2020). Artificial intelligence (AI) ethics: ethics of AI and ethical AI. *Journal of Database Management (JDM),* 31(2), 74-87.

[55] Ryan, M. (2020). In AI we trust: ethics, artificial intelligence, and reliability. *Science and Engineering Ethics,* 26(5), 2749-2767.

[56] Dignum, V. (2018). Ethics in artificial intelligence: introduction to the special issue. Ethics and Information Technology, 20(1), 1-3.

[57] Díaz-Rodríguez, N., Del Ser, J., Coeckelbergh, M., de Prado, M. L., Herrera-Viedma, E., & Herrera, F. (2023). Connecting the dots in trustworthy Artificial Intelligence: From AI principles, ethics, and key requirements to responsible AI systems and regulation. Information Fusion, 99, 101896.

[58] Geis, J. R., Brady, A. P., Wu, C. C., Spencer, J., Ranschaert, E., Jaremko, J. L., ... & Kohli, M. (2019). Ethics of artificial intelligence in radiology: summary of the joint European and North American multisociety statement. *Radiology,* 293(2), 436-440.

[59] Vollmer, S., Mateen, B. A., Bohner, G., Király, F. J., Ghani, R., Jonsson, P., ... & Hemingway, H. (2020). Machine learning and artificial intelligence research for patient benefit: 20 critical questions on transparency, replicability, ethics, and effectiveness. *bmj,* 368.

[60] Murphy, K., Di Ruggiero, E., Upshur, R., Willison, D. J., Malhotra, N., Cai, J. C., ... & Gibson, J. (2021). Artificial intelligence for good health: a scoping review of the ethics literature. *BMC medical ethics*, 22, 1-17.

[61] Zhang, J., & Zhang, Z. M. (2023). Ethics and governance of trustworthy medical artificial intelligence. *BMC medical informatics and decision making*, 23(1), 7.

[62] Singh, S. K., Del Giudice, M., Chierici, R., & Graziano, D. (2020). Green innovation and environmental performance: The role of green transformational leadership and green human resource management. *Technological forecasting and social change,* 150, 119762

[63] Li, W., Bhutto, T. A., Xuhui, W., Maitlo, Q., Zafar, A. U., & Bhutto, N. A. (2020). Unlocking employees' green creativity: The effects of green transformational leadership, green intrinsic, and extrinsic motivation. *Journal of cleaner production*, 255, 120229.

[64] Al-Swidi, A. K., Gelaidan, H. M., & Saleh, R. M. (2021). The joint impact of green human resource management, leadership and

organizational culture on employees' green behaviour and organisational environmental performance. *Journal of cleaner production,* 316, 128112.

[65] Begum, S., Ashfaq, M., Xia, E., & Awan, U. (2022). Does green transformational leadership lead to green innovation? The role of green thinking and creative process engagement. *Business Strategy and the Environment*, 31(1), 580-597.

[66] Bhutto, T. A., Farooq, R., Talwar, S., Awan, U., & Dhir, A. (2021). Green inclusive leadership and green creativity in the tourism and hospitality sector: serial mediation of green psychological climate and work engagement. *Journal of Sustainable Tourism*, 29(10), 1716-1737.

[67] Jia, J., Liu, H., Chin, T., & Hu, D. (2018). The continuous mediating effects of GHRM on employees' green passion via transformational leadership and green creativity. *Sustainability*, 10(9), 3237.

[68] Farrukh, M., Ansari, N., Raza, A., Wu, Y., & Wang, H. (2022). Fostering employee's pro-environmental behavior through green transformational leadership, green human resource management and environmental knowledge. *Technological Forecasting and Social Change,* 179, 121643.

[69] Afsar, B., Maqsoom, A., Shahjehan, A., Afridi, S. A., Nawaz, A., & Fazliani, H. (2020). Responsible leadership and employee's proenvironmental behavior: The role of organizational commitment, green shared vision, and internal environmental locus of control. *Corporate Social Responsibility and Environmental Management*, 27(1), 297-312.

[70] Zhao, J., & Gómez Fariñas, B. (2023). Artificial intelligence and sustainable decisions. *European Business Organization Law Review*, 24(1), 1-39.

[71] Sætra, H. S. (2021). A Framework for Evaluating and Disclosing the ESG Related Impacts of AI with the SDGs. *Sustainability*, 13(15), 8503.

[72] Almansour, M. (2025). How do green intellectual and co-creational capitals drive artificial intelligence innovation and green innovation in start-ups? *European Journal of Innovation Management,* 28(4), 1649-1666

[73] Sklavos, G., Theodossiou, G., Papanikolaou, Z., Karelakis, C., & Ragazou, K. (2024)

[74] Kim, B. J., Kim, M. J., & Lee, J. (2024). Code green: ethical leadership's role in reconciling AI-induced job insecurity with pro-environmental behavior in the digital workplace. *Humanities and Social Sciences Communications*, 11(1), 1-16

[75] Subrahmanyam, S. (2025). AI-Driven Leadership in the Modern Era for Revolutionizing Next-Generation Strategies: Organizational Impacts and Future Development. *In Leadership Paradigms and the Impact of Technology* (pp. 61-86). IGI Global Scientific Publishing.

[76] Aftab, J., Stan, M. R., Srivastava, M., Wei, F., & Abid, N. (2025). The Impact of Digital Leadership on Performance: Examining the Roles of Big Data Analytical Capabilities, Green Innovation, and AI Change Readiness in Italian SMEs. *Business Strategy and the Environment*, 10.1002/bse.70031.

[77] Kumar, S. (2025). Ethical leadership in the age of AI. *In Responsible Implementations of Generative AI for Multidisciplinary Use* (pp. 265-290). IGI Global.

[78] Manda, V. K., Christy, V., & Jitta, M. R. (2025). Ethical AI and Decision-Making in Management Leadership. *In Ethical Dimensions of AI Development* (pp. 197-226). IGI Global.

[79] Kandasamy, U. C. (2024). Ethical Leadership in the Age of AI Challenges, Opportunities and Framework for Ethical Leadership. *arXiv preprint arXiv*:2410.18095.

[80] Aziz, M. F., Rajesh, J. I., Jahan, F., McMurrray, A., Ahmed, N., Narendran, R., & Harrison, C. (2024). AI-powered leadership: a systematic literature review. *Journal of Managerial Psychology*, Vol. ahead-of-print No. ahead-of-print.

[81] Sanwal, T., Rajput, J., Tyagi, M., Yadav, S., Avasthi, S., & Sareen, P. (2025).

[82] Farid, O. (2024). The Role of Artificial Intelligence in Innovation and Leadership. Cambridge Open Engage. This content is a preprint and has not been peer-reviewed.

[83] Odugbesan, J. A., Aghazadeh, S., Al Qaralleh, R. E., & Sogeke, O. S. (2023)

[84] Aldhafeeri, F.M. (2024). Navigating the ethical landscape of artificial intelligence in radiography: a cross-sectional study of radiographers' perspectives. *BMC Med Ethics* 25(52).

[85] Herlina, M. G., Iskandar, K., & Triana, I. (2024), September). AI and Leadership Moderator: Enhancing Work Engagement through Intelligent Experience and Sustainable Practices among Indonesian Employees. *In 2024 7th International Conference of*

Computer and Informatics Engineering (IC2IE) (pp. 1-7). IEEE.

[86] Budianto, S., Rahadian, D., & Yunita, I. (2025). The Emerging Landscape of AI-Powered Leadership: Transforming Roles and Organizations. *Journal of Lifestyle and SDGs Review,* 5(2), e04139-e04139.

[87] Zechiel, F., Blaurock, M., Weber, E., Büttgen, M., & Coussement, K. (2024). How tech companies advance sustainability through artificial intelligence: Developing and evaluating an AI x Sustainability strategy framework. Industrial Marketing Management, 119, 75-89.

[88] Mantini, A. (2022). Technological sustainability and artificial intelligence algor-ethics. *Sustainability*, 14(6), 3215.

[89] Bolte, L., Vandemeulebroucke, T., & van Wynsberghe, A. (2022). From an ethics of carefulness to an ethics of desirability: going beyond current ethics approaches to sustainable AI. *Sustainability,* 14(8), 4472.

[90] Verdecchia, R., Sallou, J., & Cruz, L. (2023). A systematic review of Green AI. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 13(4), e1507.

[91] Mercier-Laurent, E. (2023, August). The future of artificial intelligence: Empowering humanity and help protecting planet. *In Computer Sciences & Mathematics Forum* (Vol. 8, No. 1, p. 38). MDPI.

[92] Khalid, J., Chuanmin, M., Altaf, F., Shafqat, M. M., Khan, S. K., & Ashraf, M. U. (2024). AI-Driven Risk Management and Sustainable Decision-Making: Role of Perceived Environmental Responsibility. *Sustainability,* 16(16), 6799.

[93] Gazi, M. A. I., Hossain, M. M., Islam, S., Masud, A. A., Amin, M. B., Senathirajah, A. R. B. S., & Abdullah, M. (2024). CSR and sustainable environmental performance: an exploration of mediating and moderating factors. *Sustainability,* 16(19), 8499.

[94] Kuang, M., Kuang, D., Rasool, Z., Saleem, H. M. N., & Ullah, M. I. (2024). From bytes to sustainability: Asymmetric nexus between industrial artificial intelligence and green finance in advanced industrial AI nations. *Borsa Istanbul Review,* 24(5), 886-897.

[95] Goel, A., Raut, G., Sharma, A., & Taneja, U. (2024). Artificial Intelligence and Sustainable Business: A Review. *South Asian Journal of Business and Management Cases, 13*(3), 340-365.

[96] McDermid, J. A., Jia, Y., Porter, Z., & Habli, I. (2021). Artificial intelligence explainability: the technical and ethical dimensions. *Philosophical Transactions of the Royal Society A*, 379(2207), 20200363.

[97] Alberto, N. (2024). XAI and Sustainability: Unifying Regulatory Standards and Solutions for the Future of Environmental Management. Earth ArXiv, 1-23.

[98] Alloghani, M. A. (2023). Architecting green artificial intelligence products: Recommendations for sustainable ai software development and evaluation. *In Artificial Intelligence and Sustainability* (pp. 65-86). Cham: Springer Nature Switzerland.;

[99] Srivastava, A., Kumari, G., & Pathania, A. (2024). Technological innovation and accounting in Industry 6.0: Application, implication, and future. In *Sustainable Innovation for Industry 6.0* (pp. 286-309). IGI Global.

[100] Nasir, S., Khan, R. A., & Bai, S. (2024). Ethical framework for harnessing the power of AI in healthcare and beyond. *IEEE Access,* 12, 31014-31035.

[101] Jelonek, D., & Rzemieniak, M. (2023, September). The Use of Artificial Intelligence in Activities Aimed at Sustainable Development-Good Practices. In *European Conference on Artificial Intelligence* (pp. 277-284). Cham: Springer Nature Switzerland.

[102] Swiatek, L. (2024). Strengthening the sustainability of artificial intelligence: Fostering green intelligence for a more ethical future. In *Artificial intelligence for sustainability: Innovations in business and financial services* (pp. 83-103). Cham: Springer Nature Switzerland.

[103] Rastogi, S., & Pandita, D. (2025). From code to collaboration: influence of artificial intelligence on workforce dynamics. *International Journal of Organization Theory & Behavior*. Vol. ahead-of-print No. ahead-of-print.

[104] Correia, A., Água, P., & Lobo, V. (2024). Adaptive Learning Design: Integrating AI to Personalize Critical Thinking Education. *EDULEARN24 Proceedings*, 7733-7741.

[105] Balcıoğlu, Y. S., Çelik, A. A., & Altındağ, E. (2024). Artificial intelligence integration in Sustainable Business Practices: A text mining analysis of USA firms. *Sustainability*, 16(15), 6334.

[106] Ofek, N., & Maimon, O. (2023). Beyond Metrics: Navigating AI through Sustainable Paradigms. *Sustainability, 15*(24), 16789.

[107] Biggi, G., Iori, M., Mazzei, J., & Mina, A. (2025). Green Intelligence: The AI content of green technologies. *Eurasian Business Review*, 1-38.

[108] Suljic, V. (2025). Strategic Leadership in AI-Driven Digital Transformation: Ethical Governance, Innovation Management, and Sustainable Practices for Global Enterprises and SMEs. *SBS Journal of Applied Business Research, 13*(1), 17-35.

[109] Jahan, N., Gade, N., Zhen-Duan, J., Fukuda, M., Estrada, R., & Alegría, M. (2024). Investigating the role of interpersonal relationships on low-income SUD patients' recovery: a qualitative analysis of various stakeholders in New York state. *Addiction Research & Theory, 32*(4), 291-298.

[110] Ruban, D. A. (2022). Analytical review of conjugation of the ethical bases of artificial intelligence implementation and ecologization in corporate governance. *Journal of Applied Economic Research, 21*(2), 390-418.

[111] Popescu, S. M., Mansoor, S., Wani, O. A., Kumar, S. S., Sharma, V., Sharma, A., ... & Chung, Y. S. (2024). Artificial intelligence and IoT driven technologies for environmental pollution monitoring and management. *Frontiers in Environmental Science*, 12, 1336088.

[112] Suhag, D. (2024). Regulatory and Ethical Considerations. In *Handbook of Biomaterials for Medical Applications, Volume 2: Applications* (pp. 355-372). Singapore: Springer Nature Singapore.

[113] Morandín-Ahuerma, F. (2023, September 28). *Ten UNESCO Recommendations on the Ethics of Artificial Intelligence*.

[114] Matsunaga, M. (2022). Uncertainty management, transformational leadership, and job performance in an AI-powered organizational context. *Communication monographs,* 89(1), 118-139.

[115] Lehuedé, S. (2024). An elemental ethics for artificial intelligence: water as resistance within AI's value chain. *AI & SOCIETY*, 1-14.

[116] Şengüllendi, M. F., Bilgetürk, M., & Afacan Fındıklı, M. (2024). Ethical leadership and green innovation: the mediating role of green organizational culture. *Journal of Environmental Planning and Management,* 67(8), 1702-1723.

[117] Rohit, A. K., Saini, M., & Pawar, M. (2024). Integration of Artificial Intelligence In Human Resource Information System. International *Journal of Innovative Research in Technology and Science*, 12(2), 177-183.

[118] Pramanik, S. (2024). Structural Systems Powered by AI and Machine Learning Technologies. In *The Ethical Frontier of AI and Data Analysis* (pp. 272-294). IGI Global Scientific Publishing.

[119] Boudreaux, M. J. A. (2024). *Transformational Leadership in AI-Driven Industry 4.0: Cultivating Adaptive, Ethical, and Resilient Leaders* (Doctoral dissertation, South College).

[120] Kordsachia, O., Focke, M., & Velte, P. (2022). Do sustainable institutional investors contribute to firms' environmental performance? Empirical evidence from Europe. *Review of Managerial Science*, 16(5), 1409-1436.

[121] Lin, X. F., Wang, Z., Zhou, W., Luo, G., Hwang, G. J., Zhou, Y., ... & Liang, Z. M. (2023). Technological support to foster students' artificial intelligence ethics: An augmented reality-based contextualized dilemma discussion approach. *Computers & Education*, *201*, 104813.

[122] Olorunfemi, O. A., Falayi, K. O., Oriolowo, T. A., John, S. A., Falayi, A., & Obi, C. O. (2024). Assessment of the adoption of cloud computing system in the Nigeria healthcare sector. *World Journal of Advanced Research and Reviews*, 21(1), 929-941.

[123] Shuaib, K. M., & He, Z. (2023). Mediating effect of organisational learning and moderating role of organisational culture on the relationship between total quality management and innovation among manufacturing companies in Nigeria. *Total Quality Management & Business Excellence*, *34*(7-8), 894-929.

[124] Sarkar, P. (2024). *Requirements for Developing an Ethical AI Policy Framework in Healthcare Research: A Case Study*. University of California, Davis.

[125] Yankovskaya, V., Gerasimova, E. B., Osipov, V. S., & Lobova, S. V. (2022). Environmental CSR from the standpoint of stakeholder theory: Rethinking in the era of artificial intelligence. *Frontiers in Environmental Science,* 10, 953996.

[126] Kiden, S., Stahl, B., Townsend, B., Maple, C., Vincent, C., Sampson, F., ... & Yazdanpanah, V. (2024). Responsible AI

governance: a response to UN interim report on governing AI for humanity. *arXiv preprint arXiv:2412.12108*.

[127] Woodgate, J., & Ajmeri, N. (2024). Macro ethics principles for responsible AI systems: Taxonomy and directions. *ACM Computing Surveys*, *56*(11), 1-37.

[128] Gorian, E., & Osman, N. D. (2024). DIGITAL ETHICS OF ARTIFICIAL INTELLIGENCE (AI) IN SAUDI ARABIA AND UNITED ARAB EMIRATES. *Malaysian Journal of Syariah and Law*, *12*(3), 583-597.

[129] Rui, Z., & Lu, Y. (2021). Stakeholder pressure, corporate environmental ethics and green innovation. *Asian Journal of Technology Innovation*, *29*(1), 70-86.

[130] Neumann, M., Kuchel, T., Diebold, P., & Schön, E. M. (2024). Agile culture clash: Unveiling challenges in cultivating an agile mindset in organizations. *arXiv preprint arXiv*:2405.15066.

[131] Brock, J. K. U., & Von Wangenheim, F. (2019). Demystifying AI: What digital transformation leaders can teach you about realistic artificial intelligence. *California management review*, 61(4), 110-134.

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