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Article

Unveiling Responsible Leadership as a Determinant of Circularity and Net-Zero-Based Performance - Moderating Role of Green Agility

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Abstract

As organizations worldwide strive to mitigate climate change, achieving net-zero-based performance (NZBP) has become a pressing imperative. Drawing on upper echelons theory and dynamic capability theory, this research unveils a distinctive mechanism for achieving NZBP through the responsible leadership (RL) framework. Circular economy (CE) practices play a mediating role, while green agility (GA) acts as a moderator. Using a two-wave, time-lagged design, we collected data from 394 senior managers in large manufacturing firms and analyzed them using Partial Least Squares Structural Equation Modeling (PLS-SEM). The analysis reveals that RL positively influences NZBP through both direct and indirect pathways, with GA strengthening the relationships between RL and NZBP, as well as between RL and CE. By conceptualizing RL as a higher-order construct with six dimensions, we provide a more nuanced understanding of the leadership capabilities needed to drive NZBP, offering support for organizations seeking to enhance their environmental sustainability.

Keywords: responsible leadership; circular economy; net-zero-based performance; green agility; upper echelons theory; dynamic capability

JEL: L25, L26, M14, Q53, Q56

1. Introduction

Today's manufacturing industries are approaching an environmental tipping point, propelling the Earth toward an ecological catastrophe that demands urgent attention due to unrestrained industrial growth (Ghani et al., 2024). The growing environmental consequences of industrial growth include the effluent of metropolitan areas with smog-filled air, CO_2 emissions, and the contamination of water corpses with harmful substances (Memon et al., 2025). For instance, industries such as textiles, chemicals, and cement, while vital to the economy, contribute significantly to environmental hazards that affect human health and natural resources, also directly impacting the long-term sustainability of the industrial sector (Abbas et al., 2020; Abraham, 2024).

Lee et al. (2023) contend that transforming to a net-zero emission society could substantially lessen greenhouse gas (GHG) concentrations, such as CO_2 in the atmosphere, curtailing global warming and climate disorders. The goal is to limit the global average temperature rise to well under 2 °C, ideally 1.5 °C, over pre-industrial levels (Zhang et al., 2024). However, the ongoing rise in CO_2 emissions remains a concern, particularly in countries heavily reliant on traditional linear exploitation models and fossil fuels for economic growth. These nations, often characterized as newly industrialized economies (developing countries) with limited technological advancements and resources, have traditionally prioritized profit generation above environmental concerns, resulting in severe ecological outcomes (Chien et al., 2021; Farrukh et al., 2022).

Accordingly, industries in developing countries are under immense pressure from regulators and stakeholders to adopt sustainable business practices and foster circularity in business processes to mitigate the impending ecological catastrophe (Suchek et al., 2022). Contrary to the linear economy model, which emphasizes "take, make, and dispose", circular economy (CE) models prioritize sustainability, reduce environmental degradation, promote waste reduction, and enhance resource efficiency (Reim et al., 2025). By adopting CE principles, organizations can decrease their reliance on finite resources, enhance product longevity and reusability, and cultivate greater flexibility in response to evolving market dynamics (Korhonen et al., 2018). However, transitioning to a CE requires an elemental shift in business practices. Literature review suggests that the accomplishment of such tactics depends on organizational leaders, whose influence on organizational outcomes is well-established (Memon and Ooi, 2023a). This has led researchers to investigate environmental leadership, with a growing focus on the impact of leadership behaviors (Voegtlin et al., 2020).

Among various leadership models, responsible leadership (RL) is particularly relevant because it enhances net-zero-based performance (NZBP) more effectively than other models. By adopting RL practices, organizations can mitigate the environmental challenges associated with industrial growth, ensuring long-term sustainability and minimizing harm to human health and natural resources (Abraham, 2024; Voegtlin et al., 2020). Responsible leaders strive to align business obligations with civic responsibilities, establishing clear goals and communicating a compelling vision to achieve long-term success (Javed et al., 2024). Research has shown that responsible leaders prioritize ethical decision-making and transparency, fostering trust and collaboration while demonstrating a stronger commitment to sustainability goals (Ur Rehman et al., 2023).

Numerous studies (Kumar et al., 2023; Mehmood et al., 2024; Singh et al., 2023; Tang et al., 2023; Vieira et al., 2021) have investigated the prospective aspects and pathways for achieving net-zero emission profiles, driven by the growing NZBP appreciation. All these studies focus on factors facilitating technological advancements, including policies, legal requirements, and financial inducements. However, despite its substantial potential, very few studies (Ur Rehman et al., 2023; Javed et al., 2020; Liao and Zhang, 2020) have assessed the direct linkage connecting RL and environmental performance or NZBP. Primarily based on stakeholder theory, these studies are insufficient to capture the diverse mechanisms and other theoretical lenses, such as upper echelons theory and dynamic capability theory, through which RL may influence organizational environmental performance. Additionally, these investigations have assessed limited attributes and functions of RL that may not accurately represent a holistic conception of RL's obligations and qualities (Voegtlin et al., 2020). Furthermore, these studies have overlooked RL's potential to facilitate the transition to CE (Abraham, 2024; Javed et al., 2020; Liao and Zhang, 2020), thereby creating a substantial gap and necessitating further research.

This study accentuates a crucial gap in the body of knowledge by examining how RL contributes to NZBP through the mediation of CE practices and the moderation of green agility (GA). Though preceding research has recognized the potential of RL, CE, and GA in improving sustainability, the mechanisms connecting these constructs remain understudied, predominantly in developing country contexts (Mehmood et al., 2024; Ur Rehman et al., 2023). Moreover, the link between RL and CE practices has largely been untested, leaving the mechanism through which RL influences CE transition largely unknown.

To address these gaps, this research proposes and conceptualizes RL as a multidimensional construct grounded in "upper echelons theory" (Hambrick and Mason, 1984) encircling numerous characteristics, principles & responsibilities that RL embodies (Memon et al., 2025). It is contended that RL not only embraces "business and leadership characteristics" but also holds a remarkable position in societal wellbeing, stakeholder engagement, relationship building, fulfilling ethical responsibilities, and proactively striving to achieve NZBP (Ur Rehman et al., 2023). Rather than highlighting dominant leadership behaviors or traits, it would be unfair to emphasize solely stakeholders' profitability and ecological management for improving financial performance, as suggested by stakeholder theory (Maak et al., 2016; Voegtlin et al., 2020). Considering these factors, the authors contend that today's escalating environmental challenges and rapid industrial growth, especially in developing countries, necessitate a more detailed examination of responsible leadership (Memon et al., 2025). Therefore, a multidimensional and holistic view of RL's responsibilities, characteristics, and traits, and an exploration of how they influence sustainable organizational activities, would better address the need rather than studying only limited aspects.

Moreover, this research proposes a distinctive moderator, green agility as the firm's dynamic capability. Green agility is a unique component of this model that catalyzes the relationship between RL and CE and RL and NZBP, resulting in the successful implementation of CE practices and leading RL to enhanced NZBP. The study highlights green agility's role in facilitating organizations to rapidly adapt to environmental and technological changes and proactive pursuit of sustainability efforts. RL can exceed societal expectations for performance and responsibility by utilizing technology to monitor, report, and lessen their environmental impact (Javed et al., 2020). By using CE practices, RL not only enhances NZBP and conforms to international standards, but it also meets community expectations and boosts participation in environmental projects (Liao and Zhang, 2020). This holistic approach emphasizes CE's function as a mediator, explaining RL's influence on NZBP and green agility as a moderator, thereby generating value for both organization and community (Ahsan and Khawaja, 2024).

2. Theoretical Framework and Literature Review

2.1 Theoretical Disposition

This research is grounded in the integration of "upper echelons theory" (UET) and "dynamic capability theory" (DCT), which together formulate a robust lens to explain how leadership influences complex performance outcomes like net-zero. UET posits that the characteristics of a manager significantly affect an organization's performance. Further, UET (Carpenter et al., 2004; Hambrick, 2007) asserts that an organization's strategic decisions and their implementation are largely shaped by these executives. The theory emphasizes a robust linkage amongst a leader's tenure, education level, employment experience, pertinent abilities, and the strategic decisions made by the organization, which sequentially strongly correlate with the organization's future triumphs (Wang et al., 2016). Hence, leaders' "experiences, values and personalities… affect their choices" (Hambrick, 2007, p. 334) and "through these choices, organizational performance" (Hambrick and Mason, 1984, p. 197). While UET explains the origin of strategic choices, DCT (Teece, 2018) explains how organizations effectively implement these choices in varying environments. Dynamic capabilities are operationalized as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al., 1997). This theory is essential for framing the moderating variables in our model. Specifically, GA is conceptualized as a key dynamic capability, the capability to sense and respond to change with speed and flexibility, whereby the external context makes such dynamic capabilities necessary. DCT provides the logic for why and how GA strengthens the organization's ability to execute the RL's CE and NZBP vision. We propose a coherent sequential framework where UET and DCT are not merely adjacent but functionally interlinked. UET establishes RL as the critical antecedent, the source of strategic intent for sustainable practices (i.e., CE) and higher performance (i.e., NZBP). DCT then elucidates the core mechanisms positioning GA as the key dynamic capability that reconfigures operational processes like CE and enhances the firm's overall capacity for sensing and seizing green opportunities, leading to NZBP. Thus, DCT provides the logic for how and why GA strengthens the organization's ability to execute an RL's net-zero performance vision through CE practices. This integration suggests that leadership (UET) must be enacted through specific dynamic capabilities (DCT) to achieve superior performance in the domain of sustainability (Satar et al., 2025; Kam-Sing Wong, 2014; Chen and Chang, 2013).

2.2 Responsible Leadership (RL)

This research has adapted the multidimensional construct of RL from Memon et al. (2025) in line with the preceding logic and characteristics of RL that may affect the NZBP of the firms and contribute to the advancement of sustainable growth. The six (6) dimensions are "social", "ethical", "leadership", "business", "legal", and "environmental". Coherent with the RL responsibilities and characteristics, it is operationalized as "Responsible leadership is the type of leadership that places overwhelming emphasis on social and ethical responsibilities and is accountable to internal and external stakeholders for its leadership, business, legal, and environmental obligations" (Bhatti and Irfan, 2024, p. 19).

Here, the social dimension refers to socially responsible acts of RL that may lead to the common good of society. The ethical dimension pertains to the values, ethics, and respect for diversity. This also includes presenting oneself to all stakeholders for accountability. The leadership dimension refers to the characteristics of leading by example, motivation, self-awareness, relational intelligence, etc. Similarly, the business dimension covers the characteristics of being participative, stakeholder-oriented, and collaborative for doing business. The legal dimension refers to being compliant with legal obligations and transparent. Finally, the environmental dimension pertains to being environmentally friendly; one who involves others in its vision and goal to achieve environmental performance (Memon et al., 2025). Thus, this research unveils the responsibilities and characteristics of RL that influence NZBP via dual pathways; however, all these attributes of RL emphasize the importance of conscious decision-making guided by priorities and vigilant areas. Furthermore, depending on the situation, a leader may combine each trait and duty to varying degrees (Abraham, 2024). As a result, RL is crucial, emphasizing its traits and obligations that are crucial for today's corporate executives, who must deal with increased sustainability issues and social expectations. Studying RL is becoming more important since leaders' duties need to change, especially in light of the increased industrial activity that contributes to sustainability and environmental challenges (Javed et al., 2024).

2.3 Circular Economy

"Circular economy" is a multifaceted concept, characterized by variances in its fundamental principles, goals, and normative perspectives. CE is seen as a flexible concept that may be embraced by various individuals or organizations with differing political and ideological objectives (Kirchherr et al., 2023). CE is characterized by intentional design focused on regenerating and renewing goods, components, and materials to maintain their maximum utility and value throughout their lifecycle (Ooi and Memon, 2025b). CE aims to eliminate waste, improve efficiency, and mitigate the environmental impact of production facilities. Furthermore, CE contrasts with the conventional linear economy model, which prioritizes extraction, production, consumption, and waste disposal (Geissdoerfer et al., 2017). CE promotes innovations in production and consumption systems that enhance material and product efficiency while balancing economic and environmental considerations (Bocken et al., 2025).

2.4 Net-Zero-Based Performance

NZBP aspires to build up the capacity of an organization to diminish GHG emissions, counterbalancing the residual emissions to accomplish an equilibrium between emissions generated in the atmosphere and detached (Tang et al., 2023). This aim is central in the combat versus the overwhelming impacts of environmental alteration on our planet. Instead of focusing only on financial success and shareholder returns, modern businesses are expected to take a more all-encompassing strategy that takes into account the interests and welfare of society, along with their environmental implications (Zacher et al., 2023). In this study, we conceptualize NZBP as an organization's strategic effectiveness in accomplishing a state of net-zero GHG emissions. This involves harmonizing the amount of GHG emitted into the atmosphere with the quantity detached, ultimately resulting in no net addition to global warming (Mehmood et al., 2024). We distinguish NZBP from broader environmental performance measures in two key ways. (1) Specificity: It is exclusively focused on the metrics and milestones related to carbon neutrality, rather than general ecological outcomes like biodiversity. (2) Strategic orientation: It embodies a long-term, transformational goal that requires fundamental changes in strategy, operations, and resource allocation, moving beyond incremental efficiency gains. Thus, NZBP represents a distinct environmental performance outcome that is both a destination (net-zero) and a strategic journey.

2.5 Green Agility

In order to maintain their competitiveness and achieve sustainability performance, organizations must now invest in renewing, realigning, and reconfiguring their resources and capabilities (Rabal-Conesa et al., 2022). As discussed, "dynamic capability" refers to an organization's capacity to adapt to evolving external conditions by strategically managing its resources and reconfiguring them to acquire new skills and competencies (Memon et al., 2024) needed to implement the CE. In this context, green agility functions as a dynamic capability (Felipe et al., 2016) that can be strengthened through pro-environmental interventions and responsible leadership actions, and CE's resource efficiency structure.

"Green agility" describes a company's capacity to innovate environmentally and take a proactive stance in response to environmental opportunities and developments. To accomplish higher environmental performance and sustainability, GA helps businesses become more flexible, robust, and creative (Lu and Ramamurthy, 2011). The ability to swiftly adapt is gaining significance in today's fast-paced environment (Felipe et al., 2016). To spur innovation and get a competitive advantage, agility is considered a key quality. Agile companies are better equipped to adjust their strategies quickly and efficiently (Wamba, 2022). Factors driving the need for agility include market volatility, technological progress, shifting consumer demands, and social factors like environmental, legal, and workforce issues (Harsch and Festing, 2020), involving the creation and execution of activities to generate value in a highly competitive environment (Shams et al., 2021).

3. Hypothesis Building

3.1 Responsible Leadership & Net-Zero-Based Performance

Contemporary research (for instance, Abraham, 2024; Memon et al., 2025) highlights the significance of RL in fostering environmental sustainability within industrial facilities. By promoting environmental sustainability and encouraging trust and cooperation, RL may help organizations reach a shared goal of sustainable development (Wang et al., 2024). While we conceptualize RL as a holistic, higher-order construct where these six dimensions operate synergistically, their theoretical relationships to our outcome variables can be differentiated. The environmental and ethical dimensions provide the foundational moral and ecological imperative for action, making them particularly critical for initiating the pursuit of NZBP (Ur Rehman et al., 2023). The business and leadership dimensions are the primary catalysts for implementation, translating the moral imperative into a viable strategy and mobilizing organizational resources, a mechanism central to building the dynamic capability of GA (Wang et al., 2021). Finally, the legal and social dimensions act as essential guardrails and enablers, ensuring compliance and maintaining stakeholder trust throughout the transition (Bhatti and Irfan, 2024). Therefore, it is not a question of one dimension being more 'important' than another, but rather that each plays a distinct and necessary role in the coherent process of leading an organization toward net-zero. In addition, we posit that RL inspires followers to follow in its footsteps through its leadership and environmental dimension. There is a significant correlation between leaders' environmental behaviors and the actions of their juniors (Robertson and Barling, 2013). Consequently, when it comes to reducing emissions of GHG and employing ecological sustainability strategies, RL sets the example, and followers follow suit (Wang et al., 2024). Leaders' social, ethical, and legal characteristics drive the adoption of sustainable supply chain management practices, reduced energy consumption, increased usage of renewable energy sources, and reduction of greenhouse gas emissions; these are all acts and examples of environmental goals that are being set by RL (Memon and Ooi, 2023b; Ur Rehman et al., 2023; Tuan, 2022). By executing these acts and tactics, RL exploits its "business characteristics", augmenting its organizational ability to achieve greater NZBP as well as creating a positive reputation and image of being an environmentally friendly organization. Thus, we hypothesize:

H1: RL positively leads to NZBP.

3.2 Moderation of Green Agility Between Responsible Leadership and Net-Zero-Based Performance

Today, it's vital for leaders to be adept at responding rapidly to industry changes to meet societal and customer needs. Thus, to seize opportunities and stay ahead of the competition, RL acts proactively and responds swiftly (Memon et al., 2025). RL demonstrates agility in a competitive market, aiming to effectively adapt to shifting market demands and behaviors. Based on UET, RL prioritizes long-term sustainable "triple value", value for the company, the social and natural environment, and shareholders, rather than short-term gains (Tideman, 2016). The authors Nold and Michel (2016) argue that agility empowers leaders to make subtle ongoing adjustments to the organization's core elements in response to constant change.

Literature review suggests that green agility is a vital aspect in the digital age, enabling organizations to sense, seize, and reconfigure resources and skills for a proactive environmental strategy. This leads to eco-innovation adoption and improved performance in today's fast-paced business environment (Salandri et al., 2022). Accordingly, this study posits that with GA's dynamic capability, RL adopts creative, novel techniques to foster NZBP and sustainability; for instance, leveraging digital technologies to monitor, measure, and optimize NZBP (Memon et al., 2025). RL ensures technological equipment & techniques are used ethically to augment sustainable tasks, diminish emissions, and trace NZBP growth (Kane et al., 2015). Digital technologies facilitate RL to supervise and optimize energy utilization, decrease waste, and trace carbon emissions instantly, advancing environmental goals (Yang et al., 2021). In other words, GA is the purposeful ability to adapt rapidly, flexibly, and successfully to environmental variations and client demands (Rabal-Conesa et al., 2022), catalyzing the RL-NZBP relationship. GA strengthens the impact of proactive environmental strategies on NZBP. Firms with higher GA are better outfitted to translate proactive initiatives into innovative outcomes, identify and exploit sustainability opportunities, and scale environmental solutions rapidly (Salandri et al., 2022). Thus, the following is hypothesized:

H2: GA moderates the relationship between RL and NZBP.

3.3 Responsible Leadership, Circular Economy, and Net-Zero-Based Performance

Circular economy provides a useful framework for implementing RL based on UET. RL can enhance its company's image, attract eco-conscious customers, and retain existing ones by demonstrating commitment to the environment and CE (Ur Rehman et al., 2023), aligning strategic intent with ecological principles utilizing RL's environmental dimension. According to Geissdoerfer et al. (2017), businesses can adopt CE approaches to manage resources, supply networks, and production processes in an ecologically responsible manner, utilizing RL's business dimension. The authors Soni et al. (2023) found that CE practices are more effectively implemented when effective leadership is prevalent, which in turn improves NZBP. RL drives this transition by incorporating CE principles into corporate strategy, fostering innovation, and engaging all societal actors in sustainable practices through the exploitation of its leadership and social dimensions (Susur and Engwall, 2023). While minimizing waste and conserving resources, leaders create sustainable economic value, adopt CE practices, and fulfill their legal responsibilities. UET asserts that RL possesses several characteristics like creativity, dedication, and a readiness to re-evaluate traditional business models, develop circular goods and services, and incorporate sustainability into the very structure of their routines through their ethical dimension. These forward-thinking and innovative interventions are crucial forces behind the shift to the CE (Boffa and Maffei, 2023; Regmi et al., 2023), outlining RL's framework for sustained growth (Rodríguez-Espíndola et al., 2022). Thus, the research argues that RL is crucial for implementing a sustainable, mechanized CE paradigm that supports national growth and mitigates GHG emissions (Memon and Ooi, 2023b). Accordingly, the following is hypothesized:

H3: RL positively leads to CE.

Achieving a higher NZBP is crucial for environmentally conscious endeavors, as it demonstrates a company's ability to administer its environmental capital well, decrease its carbon footprint, and maneuver sustainably. In manufacturing supply chains, NZBP can boost profits (Raut RD et al., 2017). Competitiveness and economic value hinge on manufacturing enterprises prioritizing environmental sustainability to attain favorable outcomes. This study assumes that implementing CE practices in manufacturing enterprises enhances NZBP by decreasing waste (Yin et al., 2023). Furthermore, Lee et al. (2023) discovered that NZBP was enhanced by CE practices, including novel product design, recyclable manufacturing, and management innovation. The inevitability and significance of CE practices are conveyed by manufacturers who did not actively consider CE practices during design and supply chain activities, as they adversely influence NZBP (Nkundabanyanga et al., 2021). The authors Chen and Dagestani (2023) and Moktadir et al. (2020) suggest that closed-loop supply chains, remanufacturing, product-service systems, and reverse logistics are further tactics that contribute to the CE. These tactics boost operational efficiency, which sequentially leads to financial benefits and augments organizations' NZBP (Memon and Ooi, 2023b; Yin et al., 2023). Accordingly, we hypothesize:

H4: CE positively influences NZBP.

Responsible leadership, with its inherent characteristics, is a critical determinant of organizational NZBP, particularly in mitigating waste, hazardous materials, and GHG emissions, thus fulfilling their legal responsibilities (Tuan, 2022). Recent research underscores RL's significance in fostering environmental sustainability in manufacturing firms (Ur Rehman et al., 2023). According to Wang et al. (2024), leveraging its social dimension, RL cultivates mutual trust and collaboration through a shared vision amongst stakeholders of the firm, with an emphasis on environmental sustainability. Following their leader, employees adopt RL's practices and green behavior, and set environmental goals like reducing GHG emissions (Memon et al., 2025; Wang et al., 2024). Further, fulfilling its environmental and ethical responsibilities, RL adopts CE practices through promoting reduction in energy utilization (Tuan, 2022), promoting the employment of renewable energy solutions, encouraging sustainable supply chain management practices, ecologically responsible buying, eco-friendly packaging, and warehousing (Memon and Ooi, 2023b). Leveraging its business characteristics, RL manages waste and chemicals sustainably through repair, reuse, upcycling, and recycling (Memon et al., 2025). Thus, the implementation of such CE practices leads organizations to accomplish greater NZBP. Therefore, we posit:

H5: CE mediates the relationship between RL and NZBP.

3.4 Moderation of Green Agility Between Responsible Leadership and Circular Economy

This research integrates upper echelons and dynamic capability theories positing RL as a driver of environmental upgrading, adaptability, responsiveness, and flexibility. For this reason, RL is considered agile and deemed to be "responsive to changing customer demands, flexible in its production capabilities, and able to rapidly adapt to unforeseen circumstances" (Wu and Wang, 2024, p. 2727). Numerous studies have indicated that agility may facilitate the development of incremental and significant advances within organizations (Rabal-Conesa et al., 2022; Ooi et al., 2020; Wamba, 2022; Sánchez et al., 2019). The authors Sánchez et al. (2019) discovered that organizations coupled with agility, innovate and engage with the external environment more frequently than those that are not agile. The authors Sánchez et al. (2019) discovered that organizations coupled with agility, innovate and engage with the external environment more frequently than those that are not agile. The authors Soomro and Soomro (2024) posit that organizational innovation and organizational agility are connected with each other. Those organizations with greater GA may be able to improve their NZBP through the generation of innovative ideas and developing greener products (Memon et al., 2025; Salandri et al., 2022). Accordingly, RL boosts CE practices by promoting energy efficiency, water efficiency, waste-water reduction, GHG emission cuts, and clean product design through the implementation of responsibly innovative techniques and systems. RL encourages sustainable procurement, sustainability criteria in purchasing, and, educates the public on sustainable consumerism (Ooi and Memon, 2025a). Such innovative practices by RL, influenced by GA, boost CE practices. Therefore, we present:

H6: GA moderates the relationship between RL and CE.

4. Research Method

4.1 Procedure and Participants

The study focused on major industrial companies with more than 250 workers in Pakistan, a developing nation. Pakistan's rapidly expanding manufacturing and technology sectors contribute to fiscal development but also cause major environmental issues, such as a severe increase in industrial waste and carbon emissions, making it an appropriate and opportune setting for our study (Abbas et al., 2020; Farrukh et al., 2022). To choose the sample from a range of CO_2-emitting industries, including textiles, chemicals, electrical/electronics, cement, and auto parts production, the research used a "purposive non-probability sampling technique". In order to remove start-ups, the purposive criterion for firms chosen for the study involves having been in business for more than five years and exhibiting an obligation to adopt a strategic vision for the environment (Ghani et al., 2024). Additionally, the companies had to have put in place and obtained certification for an environmental management system (such as ISO 14001). Managers, senior managers, general managers, directors and chief executive officers (CEOs) were among the important members of the management team that responded. The respondents were chosen due to their extensive understanding of the company's performance, strategies, and policies (Memon et al., 2024). Notably, the context of Pakistan is characterized by evolving regulatory pressures for sustainability, but often with weaker institutional enforcement, creating a reliance on corporate self-governance (Abbas et al., 2020; Shahzad et al., 2020). Furthermore, we deliberately focused on large manufacturing firms (over 250 employees) with ISO 14001 certification. This sampling strategy was intentional for two key theoretical reasons: First, large firms typically possess the necessary resources, slack, and complex stakeholder networks where RL is most salient. Second, the ISO 14001 certification indicates a baseline organizational dedication to environmental management systems, which is a logical precursor to the adoption of more advanced CE practices and the pursuit of NZBP. By studying this specific segment, we isolate the dynamics of our proposed model in a context where the phenomena of interest are most likely to be observed and meaningfully measured.

Multiple respondents from these firms provided the data (a maximum of 5 from one organization) in a two-wave, time-lagged design, separated by two months (Kock et al., 2021). Because it reduces common method bias and is brief enough to guarantee respondent retention and lessen the impact of external shocks, two months is thought to be adequate to provide for the temporal precedence necessary to infer directionality in these interactions (Podsakoff et al., 2012). Additionally, this timeframe is suitable for capturing significant changes in how managers view their organization's trajectory toward its net-zero goals because NZBP is measured as a perceptual judgment of strategic progress and effectiveness rather than a precise accounting statistic. This method is in line with accepted procedures in strategic management research that examines the relationship between performance results, leadership, and capabilities (Mehmood et al., 2024; Memon and Ooi, 2023a). Seven hundred survey questionnaires collecting the data for independent and moderating variables as well as demographic information were distributed to the participating organizations during the first wave (time 1). 498 replies (71.14%) were obtained from these. Data for the mediating and dependent variables were gathered during the second phase (time 2) from the respondents of time 1. Following the second phase (time 2), identifying codes were used to match 394 senior management responses, discarding incomplete questionnaires. With a response rate of 79.11%, the final sample size was 394. This rate was attained by using a range of response-increasing techniques, including ensuring secrecy and sending out many reminders, in line with earlier studies (Ghani et al., 2025). Additionally, the minimum sample size required was calculated using the G*Power (3.1, Faul et al., 2007) program, in accordance with the methods used in other social science studies (Ghani et al., 2024; Ooi and Memon, 2025a). Because the usable sample size exceeds the minimum required sample of 119 to obtain 85% statistical power for the study model, the 394 gathered responses were very reliable (Hair et al., 2017). However, the non-response bias rate was calculated through an independent *t*-test for early and late responses. The test result showed that the group effect (early and late responses) is not significant at the 0.05 level, implying that these groups have no significant distinction in items and constructs (King and He, 2005).

The electrical and electronic industry accounted for 28% of the participating enterprises. Additionally, 26% of the businesses were in the textile industry, 22% were in the cement industry, 14% were in the chemical industry, and 10% were in the auto parts manufacturing sector. In terms of workforce size, 46% of the companies had 250–500 workers, 40% had 500–750 workers, and 14% had more than 750 workers. Regarding the age of the enterprises, 25% had been in business for more than 20 years, 29% were between 16 and 20 years old, and 46% were between 10 and 15 years old. Geographically, Lahore (36%), Faisalabad (24%), and Karachi (40%) made up the majority of businesses. The study's respondents included directors (13%), CEOs (9%), senior managers/managers (38%), and general managers (40%). Their experience in leadership positions was varied, with 6–10 years (42%), 11–20 years (28%), and 21–30 years (15%). Additionally, 5% of respondents had <three years and 10% had between 3–5 years of experience.

4.2 Instruments & Tools

Two seasoned management experts thoroughly examined the study tool, a questionnaire, and discovered no significant errors, ensuring content validity. In order to ascertain clarity and comprehension prior to data collection, the questionnaire was also pretested on a smaller scale with six business leaders (Ooi and Memon, 2025a). Prior research with proven validity and reliability served as the foundation for the operationalization of the constructs. Using a scale adopted from Memon et al. (2025), the construct of responsible leadership was thus measured as a "reflective-formative type 2" construct with six (6) dimensions, each with four items (a total of 24 items).

These six (6) dimensions are "social", "ethical", "environmental", "leadership", "business", and "legal". The moderator, green agility, was measured through a scale adopted from Ooi et al. (2020), used in a developing country's context, originally developed by Cegarra-Navarro et al. (2016), having six items. The construct of circular economy practices was adapted from Obeidat et al. (2023), also used in the developing country context by Ooi and Memon (2025a), through a 9-item instrument. The measure for net-zero-based performance was adapted from Mehmood et al. (2024), also used in the developing country context by Memon et al. (2025), having six items. All items were measured via a 7-point Likert scale; Highest = "Strongly agree" and lowest = "Strongly disagree". The detailed items are available in "Appendix A".

4.3 Common Method Bias (CMB)

Even though, a number of procedural steps were taken to prevent CMB such as collecting data from numerous sources and using two waves separated by two months; we statistically examined the data. 38% of the variation was found using the Harman's single-factor test, which is less than the 50% cutoff value (Podsakoff et al., 2012). Moreover, a full collinearity test was carried out in accordance with Kock's (2015) technique to verify that all variance inflation factor (VIF) values were below the limit (<3.3) (Sarstedt et al., 2016). Moreover, a "marker variable" analysis utilizing the social desirability scale (Memon and Ooi, 2023a) disclosed that the endogenous constructs' coefficient of determination (R^2) had not changed significantly. When taken as a whole, these post hoc analyses show that CMB is unlikely to have affected the outcomes.

4.4 Data Analysis

For evaluating complex models containing latent variables, such as moderation and mediation, Partial Least Squares Structural Equation Modeling (PLS-SEM) is the best option (Hair et al., 2019; Sarstedt et al., 2019). For our model, PLS-SEM is more predictive than covariance-based SEM and has higher statistical power and efficiency in parametric inferences (Hair et al., 2017; 2019). Moreover, PLS-SEM is frequently employed in management research since it has been shown to be successful in evaluating non-probability sample data with data normalcy problems (Ghani et al., 2025; Ooi et al., 2020). Mardia's multivariate normality test verified this, showing considerable data abnormality ($\beta = 9.77$, $p < 0.01$) and kurtosis ($\beta = 70.48$, $p < 0.01$).

4.4.1 Lower-Order Constructs Level

In an attempt to decrease the model's complexity and enhance its academic parsimony, "higher-order constructs" (HOC) were employed (Sarstedt et al., 2019).

The analysis employed the "disjoint two-stage" technique as advised by Becker et al. (2012). This technique uses a measuring mode that aligns with the second phase's operationalization of the HOC. This HOC approach can lessen collinearity and increase discriminant validity. Since every item's value was less than 5, the multi-collinearity test we performed, revealed no issues. The measurement model's validity and reliability were also appraised. According to Table 1, every construct has composite reliability ratings more than 0.70, a sign of internal consistency (Hair et al., 2017). The convergent validity was then measured through "outer-loadings" and "average variance extracted" (AVE). All AVEs were >0.50, demonstrating that each construct accounted for a minimum of 50% of its indicator variance. Moreover, as endorsed by Hair et al. (2017; 2019), five items (Environmental responsibility-8 [ER-8] and ethical responsibility [ETR]-11, legal responsibilities [LGR]-18, circular economy practices [CEP-7] and Green agility [GA-6]) that have comparatively lesser outer-loadings as well as cross-loading values were deleted; their deletion also increased the AVE and composite reliability [CR] values; all other outer-loadings were >0.708, demonstrating that all Lower-order construct (LOCs) had adequate convergent validity.

The "heterotrait–monotrait ratio of correlations (HTMT)" was employed to test the "discriminant validity". All of the LOC and HOC of RL had HTMT ratios <0.90, as demonstrated in Table 2, indicating their significant differences. Therefore, the measurement model was utilized to establish discriminant validity. Furthermore, Henseler (2017) recommended that one of the PLS techniques for model estimation and model fit criterion be the "Standardized Root Mean Square Residual" (SRMR). The SRMR of the measurement model utilized in this study was 0.074, which was less than the 0.08 threshold (Hu and Bentler, 1999). The SRMR value suggests that the measuring model used in this study is appropriate.

4.4.2 Higher-Order Constructs Level

The authors conceptualized RL as HOC and it was assessed via the "disjoint-two-stage method" (Becker et al., 2012). It was considered vital to have VIF values (<5) and significant outer-weights ($p < 0.05$) to validate the HOC (Hair et al., 2017; 2019). In addition to this, the authors also evaluated the outer loadings, the significance of the outer loadings, and the confidence intervals of the formative variables. The authors found that the VIFs ranged from 1.394 to 2.353, which meet the VIF required threshold of <5, while one of the formative dimensions was insignificant with regard to its outer weights.

It is noteworthy to mention here that all the HOCs had higher and significant outer loadings, i.e., >0.704, whereas their confidence intervals also fulfilled the threshold criteria and did not include zero values, thus they were retained as per the guidelines of Hair et al. (2017; 2019) due to content validity (Refer Table 3 for HOC validation).

4.4.3 Structural Model

After PLS-SEM verified the measurement model, the structural model was analyzed. Fig. 1 demonstrates a visual depiction of the estimated hypothesized model. Since all exogenous variables were notably smaller than the perimeter of three, the results demonstrated that multicollinearity was not a concern in this study. Additionally, we assessed path correlations using bootstrapping with 10,000 resampling iterations. Table 4 presents two moderating, one indirect (mediation), and three direct possibilities. The findings showed that RL directly improved NZBP ($\beta = 0.297$, $p < 0.001$). In practical terms, this suggests that one standard deviation raise in RL capabilities is linked with a 0.297 standard-deviation increase in the NZBP, representing a moderate-to-strong direct effect according to conventional benchmarks (Cohen et al., 2013). Further, RL positively leads to CE ($\beta = 0.542$, $p < 0.001$), indicating that RLs are instrumental in driving the integration of CE practices within their firms. CE practices further lead to NZBP ($\beta = 0.231$, $p < 0.05$), confirming CE's positive impact on NZBP.

Moreover, RL had a significant indirect impact (mediating relationship) on NZBP ($\beta = 0.164$, $p < 0.05$) through CE practices, underscoring the critical role of CE practices as a strategic enabler in the RL-NZBP link. Moreover, the 95% confidence intervals for this mediation further confirmed the role of CE practices as a mediator in this linkage since they did not include zero values. Finally, the moderator "green agility" between RL and NZBP ($\beta = 0.189$, $p < 0.05$) and RL & CE ($\beta = 0.148$, $p < 0.05$) influenced positively & significantly. The moderation results can be depicted through sloping effects demonstrated in Fig. 2a,b. The analysis reveals that GA functions as a positive enabler and amplifier. As depicted in Fig. 2a, the relationship between RL and NZBP is positive and strong when GA is high (simple slope = 0.225, $p < 0.05$), but it is significantly weaker when GA is low (simple slope = –0.169, $p < 0.05$). This indicates that high levels of GA amplify the positive impact of RL on NZBP. Similarly, Fig. 2b shows that the positive effect of RL on CE is significantly stronger for firms with high GA (simple slope = 0.075, $p < 0.05$) compared to those with low GA (simple slope = –0.050, $p < 0.05$). Thus, GA facilitates RLs to more productively drive the adoption of CE practices.

Afterwards, the R^2 values were assessed. As exhibited in Fig. 1, the R^2 indicated that RL explained 59.8% of the variation in NZBP, while the R^2 from RL to CE was 36.7%, indicating them as grasping substantial explanatory power (Hair et al., 2019). In order to compute the effect sizes (f^2 calculates the comparative effect of an exogenous variable on the endogenous variable), the constructs were assessed. As per our assessment, RL had a substantial effect on NZB, with the f^2 value of 0.425. Further, RL had a moderate to substantial effect on CE ($f^2 = 0.325$), and CE had a moderate effect on NZBP ($f^2 = 0.278$) (Cohen et al., 2013).

4.4.4 Endogeneity and Robustness Tests

Various endogeneity tests were performed to ensure that the core results were without estimation bias. First, the "Durban-Wu-Hausman" (DWH) test was used to check for endogeneity bias to make sure the main results were without sample-selection bias, missing variables, and re-

Table 1. Lower-order constructs.

Variables	Indicators	VIF	Loadings	CR	AVE
Business responsibility	BR-1	2.239	0.766	0.887	0.663
	BR-2	2.282	0.834		
	BR-3	2.252	0.826		
	BR-4	1.921	0.830		
Environmental responsibility	ER-5	2.162	0.920	0.905	0.761
	ER-6	2.250	0.882		
	ER-7	2.432	0.812		
Ethical responsibility	ETR-9	2.499	0.814	0.861	0.674
	ETR-10	2.317	0.825		
	ETR-12	2.229	0.823		
Leadership responsibility	LDR-13	1.982	0.843	0.913	0.725
	LDR-14	2.991	0.841		
	LDR-15	2.526	0.855		
	LDR-16	2.898	0.867		
Legal responsibility	LGR-17	1.963	0.897	0.921	0.796
	LGR-19	1.992	0.880		
	LGR-20	1.886	0.899		
Social responsibility	SR-21	1.942	0.825	0.899	0.689
	SR-22	1.808	0.837		
	SR-23	1.897	0.818		
	SR-24	2.134	0.841		
Green agility	GA-1	2.483	0.788	0.903	0.650
	GA-2	2.549	0.816		
	GA-3	2.695	0.824		
	GA-4	2.863	0.792		
	GA-5	2.965	0.812		
Circular economy	CEP-1	2.911	0.825	0.944	0.677
	CEP-2	2.813	0.813		
	CEP-3	1.923	0.795		
	CEP-4	2.420	0.811		
	CEP-5	2.154	0.815		
	CEP-6	2.245	0.822		
	CEP-8	2.187	0.832		
	CEP-9	2.196	0.867		
Net-zero-based performance	NZBP-1	2.495	0.827	0.928	0.683
	NZBP-2	2.279	0.836		
	NZBP-3	2.188	0.825		
	NZBP-4	2.493	0.826		
	NZBP-5	2.214	0.825		
	NZBP-6	2.131	0.818		

Note: CR, composite reliability; AVE, average variance extracted; VIF, variance inflation factor; BR, business responsibility; ER, Environmental responsibility; ETR, ethical responsibility; LDR, leadership responsibilities; LGR, legal responsibilities; SR, social responsibility; GA, green agility; CEP, circular economy practices; NZBP, net-zero-based performance.

verse causality (Bianco et al., 2023). We used a "two-stage least squares (2SLS) approach" with carefully selected instrumental variables. For RL, we used the leader's tenure (in years), as established leadership tenure enables philosophy implementation (relevance) but doesn't directly cause NZBP outcomes (exclusion restriction). For CE, we used supply chain partner pressure, as external business demands drive CE adoption (relevance) but don't guarantee NZBP success, which depends on internal implementation. Importantly, the DWH test statistics for all key paths, for in-

Table 2. **HTMT criterion**.

	1	2	3	4	5	6	7	8	9
1. BR									
2. GA	0.349								
3. ENR	0.356	0.361							
4. ETR	0.632	0.645	0.676						
5. SR	0.814	0.471	0.622	0.648					
6. CEP	0.611	0.476	0.602	0.535	0.557				
7. LDR	0.823	0.465	0.689	0.732	0.746	0.717			
8. LGR	0.674	0.545	0.749	0.580	0.664	0.748	0.566		
9. NZBP	0.604	0.541	0.762	0.603	0.675	0.680	0.692	0.785	

Notes: ENR, Environmental responsibility; HTMT, heterotrait–monotrait ratio of correlations.

Table 3. **Validation of HOC**.

HOC	LOC	Measure	Weight	*t*-statistics	VIF
Responsible leadership	Business responsibility	Formative	0.361	2.846**	2.109
	Environmental responsibility		0.311	3.455**	1.535
	Ethical responsibility		0.161	2.377*	1.823
	Leadership responsibility		0.447	3.221**	2.353
	Legal responsibility		0.252	1.531	1.623
	Social responsibility		0.213	2.461**	1.394

Notes: HOC, higher-order constructs; LOC, Lower-order construct. ***p* < 0.01; **p* < 0.05 (one-tailed).

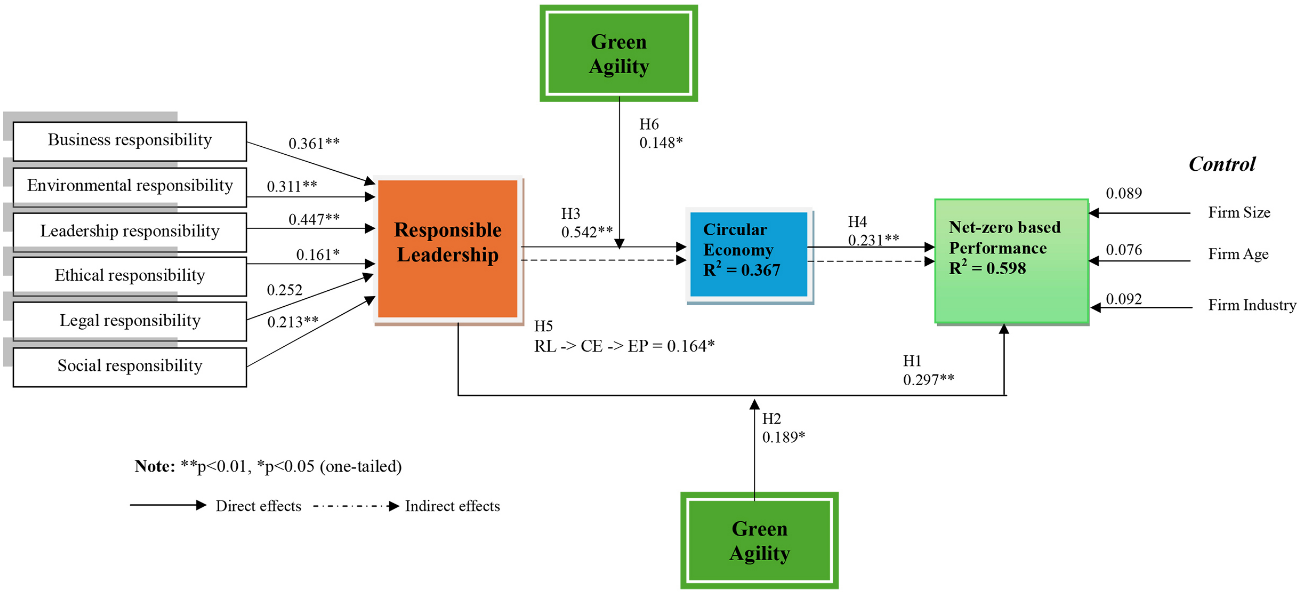

Fig. 1. Hypothesized research model. RL, responsible leadership; CE, circular economy; NZBP, net-zero based performance.

stance, the direct effects of RL and CE, as well as the mediated pathway, are non-significant (all $p > 0.05$). Moreover, the first-stage F-statistics for all instrumental variables are strong and statistically significant (all $F > 10$, $p < 0.001$), confirming that the instruments are relevant. This failure to reject the null hypothesis of exogeneity provides robust statistical evidence that endogeneity bias is not a threat to the interpretation of our PLS-SEM results. The result table for the Durban-Wu-Hausman test is available in Appendix Table 9.

However, the Hausman test is predicated on a number of assumptions: There are no missing variables or functional form misspecifications in the model. Instead of being serially correlated, the error terms are homoscedastic (Park and Gupta, 2012). The regressors are not perfectly multicollinear; therefore, to further strengthen the robust-

Table 4. Structural model.

Relationship	Beta (β)	Std. error	*t*-statistics	LLCI-ULCI	R^2
Direct effects					
H1: RL → NZBP	0.297	0.0778	3.814**	[0.181, 0.569]	0.598
H3: RL → CE	0.542	0.0743	7.285**	[0.418, 0.682]	0.367
H4: CE → NZBP	0.231	0.0781	2.954**	[0.113, 0.546]	
Moderation effect					
H2: RL × GA → NZBP	0.189	0.0715	2.642*	[0.039, 0.286]	
H6: RL × GA → CE	0.148	0.0454	3.256*	[0.028, 0.364]	
Mediation effect					
H5: RL → CE → NZBP	0.164	0.0479	3.422*	[0.040, 0.186]	

Notes: $^{**}p < 0.01$, $^{*}p < 0.05$ (one-tailed). LLCI-ULCI, Lower level confidence interval - Upper level confidence interval.

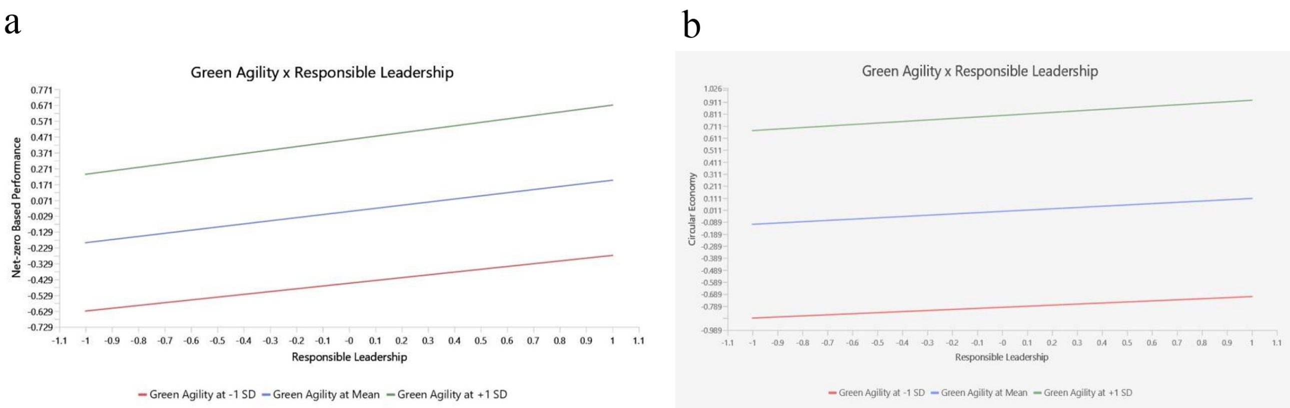

Fig. 2. Moderation of green agility. (a) Between RL and NZBP. (b) Between RL and CE.

ness of our findings and address potential methodological concerns, we conducted two additional analyses: a “lagged independent variable model” and a “Gaussian Copula” test for endogeneity.

For a lagged independent variable model, we used RL from Time 1 to predict both the mediator (CE) and the outcome (NZBP) at Time 2. This specification enforces a stricter temporal sequence. The results, presented in Table 5, show that all hypothesized paths remain statistically significant, although, as expected, some path coefficients are slightly attenuated compared to the main model (e.g., the direct effect of RL on NZBP decreased from β = 0.297 to β = 0.215). This attenuation is typical in lagged models as they account for more variance and provide a more conservative test of causal precedence. The consistent significance across both model specifications strongly reinforces the robustness of our findings.

Table 6 demonstrates the results of the “Gaussian Copula” test to assess potential endogeneity due to unobserved variable bias. This test is suitable for data distributed abnormally (e.g., social sciences and organizational behavior studies) and does not require the availability of instrumental variables (Cheah et al., 2024). The test includes a copula term (a control function) for the potentially endogenous construct. A non-significant copula term indicates that endogeneity is not a critical concern. The Gaussian Copula test results indicate that the copula terms for the key constructs are non-significant (all $p > 0.05$). This suggests that endogeneity due to unobserved variables is not a threat to the interpretation of our main model results.

4.4.5 Predictive Power

A $PLS_{predict}$ analysis was performed to determine the out-of-sample predictive power. Table 7 displays the prediction evaluations for the endogenous construct (NZBP). When compared to the benchmark “linear regression model” (LM), all NZBP indicators in the PLS model showed reduced “root mean squared error” (RMSE) values, suggesting strong prediction accuracy (Hair et al., 2019; Shmueli et al., 2019). This shows how well the model predicts out-of-sample cases. Practically, this suggests that the identified relationships are robust enough to inform predictions about a firm’s future net-zero-based performance based on its current leadership and capability profiles, enhancing the model’s utility for strategic forecasting.

4.4.6 IPMA Analysis

To derive actionable strategic insights beyond the standard path coefficients, an “Importance-Performance Map Analysis” (IPMA) was carried out. This advanced an-

Table 5. Results of lagged independent variable model analysis (Robustness Check).

Hypothesis	Relationship	(β)	*t*-statistics	*p*-value	95% Confidence Interval	Supported?
H3	RL (T1) → CE (T2)	0.418	5.892	0.01	[0.287, 0.536]	Yes
H1	RL (T1) → NZBP (T2)	0.215	3.245	0.01	[0.154, 0.411]	Yes
H4	CE (T2) → NZBP (T2)	0.195	2.845	0.04	[0.158, 0.445]	Yes
H5	RL (T1) → CE (T2) → NZBP (T2)	0.082	2.701	0.04	[0.065, 0.218]	Yes
H2	RL (T1) × GA (T1) → NZBP (T2)	0.141	2.812	0.05	[0.048, 0.211]	Yes
H6	RL (T1) × GA (T1) → CE (T2)	0.121	2.554	0.01	[0.031, 0.189]	Yes

Notes:

• Analysis performed using PLS-SEM with 10,000 bootstrap samples.

• The model controls for firm size, age, and industry sector.

• All significant paths from the original model remain significant in this more conservative specification, confirming the robustness of the proposed relationships. The attenuation of some path coefficients (e.g., the direct effect of RL on NZBP and the indirect effect) is expected and strengthens our confidence in the results.

Table 6. Results of the Gaussian Copula test for endogeneity.

Potentially endogenous construct	Dependent variable	Original (β) main model	Original *p*-value	Gaussian Copula coefficient (β)	Copula *p*-value	Endogeneity
RL	CE	0.542	0.01	0.041	0.421	Not Detected
RL	NZBP	0.297	0.01	0.032	0.512	Not Detected
CE	NZBP	0.231	0.01	0.025	0.587	Not Detected

Notes:

• The Gaussian Copula test was conducted following the procedure outlined by Park and Gupta (2012) for PLS-SEM.

• The null hypothesis is that the construct is exogenous. A non-significant *p*-value ($p > 0.05$) for the copula term fails to reject the null, indicating no significant endogeneity bias.

• The results provide statistical evidence that the path coefficients in the main model are consistent and not substantially biased by unobserved factors.

Table 7. $PLS_{predict}$ results.

NZBP indicators	PLS-SEM		LM-RMSE	(PLS-SEM)–(LM-RMSE)
	RMSE	Q^2		
Item-1	0.76	0.36	0.82	–0.052
Item-2	0.83	0.31	0.85	–0.024
Item-3	0.82	0.41	0.84	–0.018
Item-4	0.81	0.38	0.80	0.013
Item-5	0.80	0.34	0.82	–0.020
Item-6	0.79	0.43	0.82	–0.036

Notes: PLS-SEM, Partial Least Squares Structural Equation Modeling; RMSE, root mean squared error; LM, linear regression model; Q2, Q-squared predict.

alytical technique extends the results of the PLS-SEM by identifying not only which factors are important drivers of NZBP (as indicated by their total effects), but also how well they are currently performing (as indicated by their index values). This dual assessment allows for the identification of critical areas where managerial intervention can yield the highest return on investment (Ooi and Memon, 2025b).

The IPMA results presented in Table 8 and Fig. 3 illustrate these findings. It is worth noting that responsible leadership was given considerably less importance but had relatively good performance in terms of influencing net-zero-based performance. This pattern does not necessarily indicate misspecification but rather suggests that in our sample of leading manufacturing firms, RL may be a hygiene factor, a necessary foundational condition that is already at a high level, thus showing diminished marginal importance. This conveys that these firms have capable RLs in place; the full potential of their influence on NZBP is not being realized. This implies that companies that are interested in enhancing their environmental outcomes should prioritize the development of responsible leadership. Firms may require enhancing their investment in responsible leadership development, fostering an internal environment of ethical and forward-thinking, and more closely aligning their innovation strategies with environmental and social objectives.

Table 8. IPMA results.

Construct/variable	Net-Zero-Based Performance	
	Importance	Performance
Circular economy	0.322	55.653
Responsible leadership	0.451	74.899
Green agility	0.381	62.392

IPMA, Importance-Performance Map Analysis.

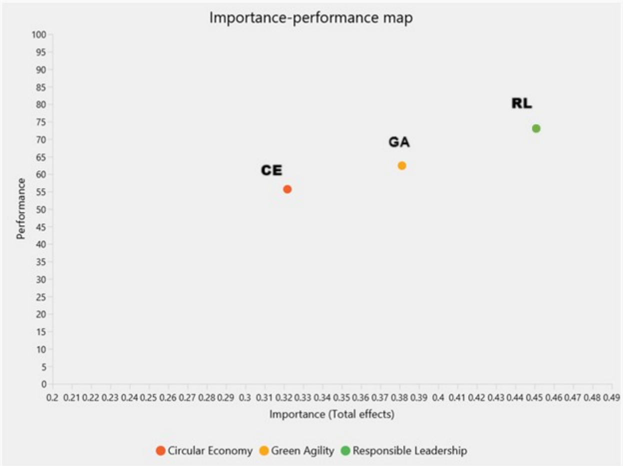

Fig. 3. IPMA analysis for NZBP.

5. Discussion

This study has quantitatively tested the interplay between RL and NZBP using a two-wave time-lagged approach. Accordingly, the research offers significant insights into how businesses may strategically use responsible leadership behaviors for reducing GHG emissions and achieving NZBP in the setting of a developing country (Memon et al., 2025). In particular, the research reveals the specific mechanisms through which RL operates: first, through direct strategic influence on NZBP (β = 0.297), where leaders allocate resources and set sustainability priorities; second, through enabling CE practices (β = 0.542), where leaders create systems and processes for resource efficiency. Further, this study has proposed & investigated distinctive mediating and moderating mechanisms that foster NZBP through RL. For instance, the significant mediation effect (β = 0.164) confirms that CE practices explain approximately 60% of RL's total variance in NZBP, highlighting circularity as the crucial mechanism through which leadership achieves environmental performance. The moderation analysis reveals that green agility acts as an implementation accelerator in highly agile organizations; the relationship between RL and NZBP is 129% stronger, and between RL and CE is 79% stronger. This suggests that while RL provides the strategic direction, GA determines how effectively this direction is executed. However, we acknowledge that alternative pathways and external factors such as regulatory pressures, market demands, or technological capabilities may also influence these relationships. Future research should explore these complementary drivers.

While our findings demonstrate strong relationships between RL, CE, and NZBP, it is crucial to interpret these effects in terms of their practical magnitude and boundary conditions. The substantial effect size of RL on CE (f^2 = 0.325) indicates that leadership commitment can fundamentally transform CE adoption. However, the moderate effect of CE on NZBP (f^2 = 0.278) suggests that circular practices, while important, represent just one pathway to net-zero achievement. The relatively smaller moderation effects of green agility (f^2 = 0.076–0.098) reveal that while GA significantly amplifies leadership effectiveness, it functions as an enhancer rather than a fundamental transformer of these relationships. These effect sizes provide managers with realistic expectations about the relative impact of different strategic interventions.

The findings underline the critical role of RL in augmenting not only the operational efficiency of the firm by implementing technological interventions for fostering circularity but also the environmental performance of the organization by reducing CO_2 and hazardous emissions. Companies are better equipped to meet sustainability exigencies while they instill responsible leadership behaviors into their strategic orientation (Lee et al., 2023; Wang et al., 2021). This study integrates the UET with the DCT, offering a guiding framework for organizations, predominantly in developing countries, aspiring to support pro-environmental strategies with wide-ranging sustainability ambitions and contribute realistically to sustainable growth. In the subsequent discourse, we will elaborate on the potential of our research findings to enhance both theory and practice (Memon et al., 2025; Tuan, 2022; Wang et al., 2024).

5.1 Theoretical Implications

Theoretically, this study augments our comprehension of RL from a developing nation's perspective, i.e., Pakistan. RL is one of the major determinants of CE, opening a new horizon for researchers, since several other pathways, as well as theoretical frameworks, could be investigated that may lead RL to accomplish CE (Abraham, 2024). Additionally, this research emphasizes the need for GA in strengthening the RL-NZBP (H2) and RL-CE (H6) relationships (Memon et al., 2025). Conversely, this study incorporates RL, a relatively recent concept, into the model, recognizing that contemporary leadership styles in the technological age have a significant influence on environmental dynamics. Notwithstanding, considering a gap in how RL transitions from a linear economy to a circular one, this research has developed a mechanism that demonstrates the influence of RL on implementing CE and accomplishing NZBP.

The authors contend that UET provides a foundational lens for understanding how leaders impact organizations and that RLs represent a key managerial characteristic that influences strategic choices, such as the adoption of CE practices. However, UET alone does not explain the processes through which leadership characteristics are translated into capabilities that enable the firm to achieve NZBP. This is where DCT provides the crucial link. DCT explains how firms can create and renew their resource base to adapt to volatile markets by sensing opportunities, seizing them, and reconfiguring assets (Teece et al., 1997). In the context of the highly volatile and unstable economies (e.g., emerging economies), the critical "opportunity" to sense is the imperative for sustainability, and the key task to "seize and reconfigure" around is the CE. This study extends UET by introducing RL as a multi-dimensional construct that captures the specific leadership attributes necessary for steering organizations towards NZBP and CE transitions. Together, these dimensions form a holistic leadership approach that balances multiple responsibilities and is particularly suited to navigating the tensions and trade-offs inherent in the transition to a circular and net-zero future (Bhatti and Irfan, 2024).

The six dimensions of RL uniquely contribute to CE practices by shaping the organization's values, norms, and strategic priorities. For instance, the social and ethical dimensions ensure that the leader's "sense-making" (a UET function) incorporates the needs of a broad set of stakeholders, including communities and future generations, fostering the moral imperative for CE (Memon et al., 2025). The business and leadership dimensions translate this moral imperative into an actionable strategy. They empower the leader to "seize" the CE opportunity by justifying it economically (Business) and by mobilizing and inspiring the organization (Leadership) to embrace new, circular business models. The legal and environmental dimensions provide the guardrails and the ultimate goal (Memon et al., 2025; Voegtlin et al., 2020). They ensure that the "reconfiguration" of assets and processes (a DCT function) complies with regulations (Legal) and is explicitly directed toward reducing environmental impact (Environmental), thus directly contributing to NZBP. Thus, RL, through its multi-faceted dimensions, directly enables the adoption of CE practices, which in turn mediate the relationship between RL and NZBP.

This research argues that RL is uniquely positioned to drive CE transitions and NZBP compared to other leadership styles. While transformational leadership may inspire change, it often lacks the explicit multi-stakeholder orientation and balanced focus on social, ethical, legal, business, and environmental responsibilities that characterize RL (Javed et al., 2024). Similarly, transactional leadership may ensure compliance but does not necessarily foster the voluntary and proactive engagement required for CE and NZBP. The multidimensional construct of RL, as defined in this study, provides a more comprehensive framework for understanding the leadership capabilities needed to address the complex and multi-faceted challenges of sustainability (Scherer and Voegtlin, 2020).

Additionally, the research extends the DCT by establishing GA as a distinctive dynamic capability that moderates the association between RL and NZBP and RL and CE practices. While preceding studies have mostly considered agility as a contextual condition, this study places it as an operational mechanism and specialized dynamic capability that facilitates firms to sense, seize, and reconfigure resources in coherence with environmental & sustainability goals (Salandri et al., 2022; Rabal-Conesa et al., 2022). By demonstrating how businesses create sustainable value through adaptive resource orchestration rather than just resource possession, the study enhances the dynamic capability theory (Ooi et al., 2020).

The findings of this research must be interpreted within the unique institutional and economic context of Pakistan. The significant influence of RL we observed may be amplified in settings with weaker institutional enforcement. In such environments, internal leadership drivers can act as a crucial substitute for external regulatory pressure, making RL a more powerful predictor of sustainable practices than it might be in strictly regulated economies (Javed et al., 2024). Similarly, the mediating role of CE highlights how firms in resource-constrained settings can achieve NZBP not just through high-cost technological solutions but through strategic, process-oriented innovations that optimize resource use. Finally, the moderating role of GA suggests that in volatile emerging markets, the capacity to rapidly adapt may be essential for translating RL intentions into tangible circular and net-zero outcomes. Therefore, our model may be particularly relevant for emerging economies sharing similar institutional characteristics.

However, similar challenges are being faced by developed countries as well, although these are a bit more adverse in developing countries (Memon et al., 2024). The authors contend that this research is generalizable to both developing and developed countries. Overall, the Earth without any distinction of being a developing or developed country, is facing severe environmental and climatic issues including temperature variations, melting glaciers, flooding along with the scarcity of water, financial resources, and physical resources (Ooi and Memon, 2025a; Shahzad et al., 2020) whereby developing countries do not even have a proper system to reuse, recycle or utilize waste resources. In summary, the model puts forward the existing work and offers a foundation for upcoming research in both developing and developed economies. Its theoretical coherence, based in the integration of upper echelons and dynamic capabilities, supports broader generalization and comparative investigation across industries and national settings (Bhatti and Irfan, 2024; Javed et al., 2024; Zacher et al., 2023).

5.2 Practical Implications

Given the unpredictable environment and depleting resources, this study enhances the current corpus of knowledge by offering a unique practical solution and distinctive perspective. Profits are no longer the sole metric that matters; the rules have changed (Memon and Ooi, 2023b). In a journey toward sustainability, leaders must engage in coordinated, reciprocal, and responsible efforts (Scherer and Voegtlin, 2020). Further, in order to establish cognitive legitimacy and social acceptability, organizations should consider society actors as valued stewards. Leaders must prioritize the development of trust and the maintenance of open communication and cooperation, as well as be supportive of their employees, suppliers and other stakeholders. With regard to internal stakeholders, leaders should provide personnel with the requisite resources, especially to meet these sustainability challenges. Similarly, leaders should demonstrate genuine concern for the requirements of external stakeholders by involving them in the sustainability-driven mission and healthy environmental transformation processes.

In practice, the findings of this study suggest a guiding mechanism for organizations, mainly in developing economies. To operationalize RL, organizations can deploy specific tools such as a "sustainability balanced scorecard" to integrate NZBP into strategy, develop RL competency models for hiring and promotion, and institute daily 'green stand-up' meetings to embed circular thinking into routines (Ghani et al., 2025). Furthermore, organizations can create board-level sustainability committees and link executive bonuses to emissions targets, ensuring leadership accountability. These concrete actions translate the strategic vision of RL into tangible daily management practices, enabling firms to effectively align pro-environmental strategies with broader sustainability goals. Furthermore, RLs should focus on building adaptive capabilities that enable the organization to respond promptly to market commotions, policy changes, or resource constraints. This incorporates "proactive trend monitoring, scenario planning, and establishing strong stakeholder partnerships". A practical framework for this is the implementation of "agile sustainability sprints, short, focused projects to test and scale circular innovations, which directly build green agility. An agile organization is better outfitted to maintain steadiness during disaster and ensure enduring viability (Ooi et al., 2020).

Finally, regarding the firms' sustainable utilization of resources and manufacturing programs to accomplish NZBP, the organizations need to devise several adjustments to prevailing practices and actions (Kumar et al., 2023). This study recommends to cope with all waste and chemicals sustainably; leftover lessening through fixing, reprocess upcycling, and reprocessing at the end of the life cycle (Bocken et al., 2025); promoting energy efficiency, water efficiency, waste-water lessening, reduction in GHG emissions, clean product design via the implementation of responsibly innovative techniques and processes; promote sustainable procurement practices like sustainability criterion in purchases and, enlightening people regarding sustainable consumerism (Hao et al., 2023; Memon et al., 2025).

5.3 Limitations & Future Research

Notwithstanding the methodological strengths and considerable implications of the current research, it is not devoid of limitations. Firstly, the data were sourced exclusively from the ISO 14001-certified manufacturing firms in Pakistan, a developing country; therefore, the results of this study are most directly applicable to similar contexts but may not fully represent the dynamics in SMEs. SMEs may lack the formal structures and resources of large firms, potentially making leadership even more pivotal, but they also face different barriers to implementing CE practices. Consequently, future investigations should encompass other industries of developing and developed countries, including SMEs, to establish their boundary conditions and cross-cultural validity. Secondly, while this research assessed the mediating role of CE between RL and NZBP, other potential mediators may still exist. This study has provided the foundational work, whereas future studies may explore other mechanisms connecting RL and NZBP.

Thirdly, the study examined its relationships using upper echelons and dynamic capability theories, which offer a strong framework for evaluating these associations. Future studies can employ other theories, like social identity or trait theory and LMX, to acquire a deeper comprehension of the processes by which workers nurture their competence and embrace responsible behaviors. This will enable a more thorough elucidation of the phenomena and their outcomes. Fourthly, although we employed a time-lagged design, the data remain perceptual and cross-sectional. Future studies could adopt longitudinal case studies or utilize objective, longitudinal performance data to further solidify the causal inferences. Furthermore, exploring other potential moderators, such as the intensity of market competition or the level of stakeholder activism, could offer a more granular discernment of the contingencies affecting the RL-NZBP relationship. Finally, while we employed multiple robust methods to address endogeneity, we acknowledge that no observational study can completely rule it out. Future experimental or quasi-experimental designs could offer even better causal evidence.

Availability of Data and Materials

The participating organizations did not permit the sharing of their data, except with the research team; therefore, supporting data are unavailable.

Author Contributions

KRM conceptualized and wrote the initial draft of this document; BG gathered the data and wrote the discussion of the draft. KRM conducted the analysis, reviewed and finalized the overall draft again. Both authors contributed to editorial changes in the manuscript. Both authors read and approved the final manuscript. Both authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

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Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, AI-assisted technologies were used on the ready content to check the grammatical errors, improve the sentence structure and readability; however, the authors take full responsibility for the content of the publication.

Appendix

Appendix A – Questionnaire items

Responsible leadership (Likert Scale: 1–7; Strongly Disagree – Strongly Agree)

Social

1. Leaders in our organization actively contribute to the common good.

2. Leaders in our organization contribute to social welfare even during recession and low profits.

3. Leaders in our organization believe they have responsibilities to society.

4. Leaders in our organization seek sustainable development and creation of a better life for future generations.

Ethical

5. Leaders in our organization follow the principles of honesty, integrity and fairness.

6. Leaders in our organization consider rights of customers and other stakeholders as top priority.

7. Leaders in our organization have "zero" tolerance for discrimination.

8. Leaders in our organization have diverse representation at all levels.

Leadership

9. Leaders in our organization believe in self-analysis.

10. Leaders in our organization know their biases and inclinations.

11. Leaders in our organization respect the sensitivities of every individual.

12. Leaders in our organization consider emotions while taking any decision.

Business

13. Leaders in our organization frequently interact with relevant stakeholders.

14. Leaders in our organizationbelieve in fulfillment of needs of stakeholders for getting their cooperation.

15. Leaders in our organization get relevant expertise through collaboration with stakeholders.

16. Leaders in our organization involve relevant stakeholders in decision making.

Legal

17. Leaders in our organization do not support any unfair means for benefiting the organization.

18. Leaders in our organization always pay taxes and official dues regularly and completely.

19. Leaders in our organization follow transparent contracting procedures.

20. Leaders in our organization explicitly indicate criteria for decisions.

Environmental

21. Leaders in our organization emphasize minimizing solid waste.

22. Leaders in our organization support environment-friendly initiatives.

23. Leaders in our organization emphasize torecycle water and treat appropriately.

24. Leaders in our organization leaders emphasize conservation of energy.

Circular economy practices (Likert Scale: 1–7; Strongly Disagree – Strongly Agree)

1. Our organization promotes improvement in productivity and efficiency of work processes.

2. Our organization works on reducing raw materials and energy consumption.

3. Our organization promotes energy efficiency and makes use of renewable energy.

4. Our organization redesigns its processes aiming at environmental efficiency.

5. Our organization adopts a lifecycle management approach.

6. Our organization segregates and values waste/residue.

7. Our organization recovers, improves or renews used materials or residues.

8. Our organization cooperates with suppliers to establish closed loops that maximize resource utilization and minimize waste.

9. Our organization cooperates with consumers to establish closed loops that maximize resource utilization and minimize waste.

Green agility (Likert Scale: 1–7; Strongly Disagree – Strongly Agree)

1. We have the ability to rapidly respond to green customer needs.

2. We have the ability to rapidly adapt green production to demand fluctuations.

3. We have the ability to rapidly address green supply chain issues.

4. We rapidly implement decisions to address green market dynamics.

5. We are constantly seeking green practices to reshape our organization.

6. We see green market changes as opportunities for business.

Table 9. OLS and 2SLS regression results for the responsible leadership model.

Variables	Circular economy (CE)			Net-zero performance (NZBP)		
	OLS	2SLS (First Stage)	2SLS (Second Stage)	OLS	2SLS (First Stage)	2SLS (Second Stage)
Endogenous variables						
Responsible leadership (RL)	0.542*** –0.087	-	0.518*** –0.092	0.297*** –0.076	-	0.285*** –0.081
Circular economy (CE)	-	-	-	0.231** –0.089	-	0.219** –0.094
Instruments (first stage only)						
Leader's tenure (Instrument for RL)	-	0.184*** –0.032	-	-	0.179*** –0.031	-
Supply chain pressure (Instrument for CE)	-	-	-	-	0.213*** –0.041	-
Moderators and controls						
Green agility (GA)	0.123** –0.048	0.095* –0.045	0.115** –0.051	0.104* –0.052	0.088 –0.049	0.098* –0.055
RL × GA	0.148** –0.062	0.121* –0.058	0.142** –0.065	0.189** –0.071	0.162** –0.067	0.181** –0.075
Firm size	0.087* –0.042	0.072 –0.039	0.082* –0.045	0.064 –0.047	0.058 –0.044	0.059 –0.05
Firm age	0.045 –0.038	0.038 –0.035	0.041 –0.04	0.052 –0.043	0.046 –0.04	0.048 –0.046
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Model diagnostics						
R-squared	0.367	0.352	0.359	0.598	0.341	0.591
Adjusted R-squared	0.342	0.326	0.333	0.575	0.314	0.568
First-stage F-statistic	-	16.89***	-	-	RL: 16.89*** CE: 19.24***	-
Durbin-Wu-Hausman test (*p*-value)	-	-	0.184	-	-	0.285
Overidentification test (*p*-value)	-	-	0.423	-	-	0.387

Notes: Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Sample: N = 394 senior managers.
Instruments: CEO Tenure (for RL), Supply Chain Partner Pressure (for CE).
First-stage F-statistic interpretation: Values >10 indicate strong instruments (Staiger and Stock, 1997).
DWH test: The null hypothesis is that variables are exogenous ($p > 0.05$ fails to reject null).
Overidentification test: The null hypothesis is that instruments are valid ($p > 0.05$ fails to reject null).
The consistency between OLS and 2SLS coefficients, strong first-stage F-statistics, and non-significant endogeneity tests provide robust evidence for causal interpretation.

Net-zero based performance (Likert Scale: 1–7; Strongly Disagree – Strongly Agree)

Our organization's environmental activities:

1. Drop hazardous air emissions.
2. Drop CO_2 emissions.
3. Drop nitric oxide and methane.
4. Drop solid wastes.
5. Decrease consumption of poisonous materials.
6. Improve ecological conditions.

Appendix B

Endogeneity Tests (DWH) and Model Estimates

The table below present the results of the OLS and 2SLS regressions, along with the critical DWH test. The values clearly show the null hypothesis is not rejected i.e., no endogeneity issue exists.

References

Abbas S, Chiang Hsieh LH, Techato K, Taweekun J. Sustainable production using a resource–energy–water nexus for the Pakistani textile industry. Journal of Cleaner Production. 2020; 271: 122633. https://doi.org/10.1016/j.jclepro.2020.122633

Abraham KT. Responsible leadership and triple bottom line performance: imperatives for corporate sustainability. Journal of Global Responsibility. 2024; 15: 485–500. https://doi.org/10.

1108/jgr-06-2023-0111

Ahsan MJ, Khawaja S. Sustainable leadership impact on environmental performance: exploring employee well-being, innovation, and organizational resilience. Discover Sustainability. 2024; 5: 317. https://doi.org/10.1007/s43621-024-00422-z

Becker JM, Klein K, Wetzels M. Hierarchical Latent Variable Models in PLS-SEM: Guidelines for Using Reflective-Formative Type Models. Long Range Planning. 2012; 45: 359–394. https://doi.org/10.1016/j.lrp.2012.10.001

Bhatti OK, Irfan M. Responsibility-oriented perspective of responsible leadership: development of a measurement instrument. Journal of Leadership Studies. 2024; 18: 7–28.

Bianco D, Bueno A, Godinho Filho M, Latan H, Miller Devós Ganga G, Frank AG, et al. The role of Industry 4.0 in developing resilience for manufacturing companies during COVID-19. International Journal of Production Economics. 2023; 256: 108728. https://doi.org/10.1016/j.ijpe.2022.108728

Bocken N, Pinkse J, Ritala P, Darnall N. Moving Beyond Circular Utopia and Paralysis: Accelerating Business Transformations Towards the Circular Economy. Organization & Environment. 2025; 38: 91–108. https://doi.org/10.1177/10860266251346251

Boffa E, Maffei A. Development and application of an Integrated Business Model framework to describe the digital transformation of manufacturing - a bibliometric analysis. Production & Manufacturing Research. 2023; 11: 2164952. https://doi.org/10.1080/21693277.2023.2164952

Carpenter MA, Geletkanycz MA, Sanders WG. Upper Echelons Research Revisited: Antecedents, Elements, and Consequences of Top Management Team Composition. Journal of Management. 2004; 30: 749–778. https://doi.org/10.1016/j.jm.2004.06.001

Cegarra-Navarro JG, Soto-Acosta P, Wensley AK. Structured knowledge processes and firm performance: The role of organizational agility. Journal of Business Research. 2016; 69: 1544–1549. https://doi.org/10.1016/j.jbusres.2015.10.014

Cheah JH, Magno F, Cassia F. Reviewing the SmartPLS 4 software: the latest features and enhancements. Journal of Marketing Analytics. 2024; 12: 97–107. https://doi.org/10.1057/s41270-023-00266-y

Chen P, Dagestani AA. What lies about circular economy practices and performance? Fresh insights from China. Journal of Cleaner Production. 2023; 416: 137893. https://doi.org/10.1016/j.jclepro.2023.137893

Chen YS, Chang CH. The determinants of green product development performance: Green dynamic capabilities, green transformational leadership, and green creativity. Journal of Business Ethics. 2013; 116: 107–119.

Chien F, Ajaz T, Andlib Z, Chau KY, Ahmad P, Sharif A. The role of technology innovation, renewable energy and globalization in reducing environmental degradation in Pakistan: A step towards sustainable environment. Renewable Energy. 2021; 177: 308–317. https://doi.org/10.1016/j.renene.2021.05.101

Cohen J, Cohen P, West SG, Aiken LS. Applied multiple regression/correlation analysis for the behavioral sciences. Routledge: London. 2013.

Farrukh M, Ansari N, Raza A, Wu Y, Wang H. Fostering employee's pro-environmental behavior through green transformational leadership, green human resource management and environmental knowledge. Technological Forecasting and Social Change. 2022; 179: 121643. https://doi.org/10.1016/j.techfore.2022.121643

Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods. 2007; 39: 175–191. https://doi.org/10.3758/bf03193146

Felipe CM, Roldán JL, Leal-Rodríguez AL. An explanatory and predictive model for organizational agility. Journal of Business Research. 2016; 69: 4624–4631. https://doi.org/10.1016/j.jbusres.2016.04.014

Geissdoerfer M, Savaget P, Bocken NM, Hultink EJ. The Circular Economy – A new sustainability paradigm? Journal of Cleaner Production. 2017; 143: 757–768. https://doi.org/10.1016/j.jclepro.2016.12.048

Ghani B, Mubarik MS, Memon KR. The impact of green HR practices on employee proactive behaviour. The International Journal of Human Resource Management. 2024; 35: 1403–1448. https://doi.org/10.1080/09585192.2023.2294073

Ghani B, Zada M, Lohana MK, Memon KR, Salameh AA, Contreras-Barraza N. Impact of environmental training, awareness, and green values on sustainable food waste management. Scientific Reports. 2025; 15: 37572. https://doi.org/10.1038/s41598-025-05042-9

Hair JF, Hult GTM, Ringle CM, Sarstedt M. A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). 2nd edn. Sage: Thousand Oaks, CA. 2017.

Hair JF, Risher JJ, Sarstedt M, Ringle CM. When to use and how to report the results of PLS-SEM. European Business Review. 2019; 31: 2–24. https://doi.org/10.1108/ebr-11-2018-0203

Hambrick DC, Mason PA. Upper Echelons: The Organization as a Reflection of Its Top Managers. The Academy of Management Review. 1984; 9: 193–206. https://doi.org/10.2307/258434

Hambrick DC. Upper echelons theory: An update. Academy of Management Review. 2007; 32: 334–343. https://doi.org/10.5465/amr.2007.24345254

Hao X, Li Y, Ren S, Wu H, Hao Y. The role of digitalization on green economic growth: Does industrial structure optimization and green innovation matter? Journal of Environmental Management. 2023; 325: 116504. https://doi.org/10.1016/j.jenvman.2022.116504

Harsch K, Festing M. Dynamic talent management capabilities and organizational agility—A qualitative exploration. Human Resource Management. 2020; 59: 43–61. https://doi.org/10.1002/hrm.21972

Henseler J. Partial least squares path modeling. In Leeflang P, Wieringa J, Bijmolt T, Pauwels K (eds.) Advanced methods for modeling markets (pp. 361–381). Springer: Cham. 2017. https://doi.org/10.1007/978-3-319-53469-5_12

Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: a Multidisciplinary Journal. 1999; 6: 1–55. https://doi.org/10.1080/10705519909540118

Javed M, Ali HY, Asrar-ul-Haq M, Ali M, Kirmani SAA. Responsible leadership and triple-bottom-line performance—do corporate reputation and innovation mediate this relationship? Leadership & Organization Development Journal. 2020; 41: 501–517. https://doi.org/10.1108/lodj-07-2019-0329

Javed M, Pless N, Waldman DA, Garavan T, Gull AA, Akhtar MW, et al. What, When, and How of Responsible Leadership: Taking Stock of Eighteen Years of Research and a Future Agenda. Journal of Management Studies. 2024; 62: 3182–3219. https://doi.org/10.1111/joms.13157

Kam-Sing Wong S. Impacts of environmental turbulence on entrepreneurial orientation and new product success. European Journal of Innovation Management. 2014; 17: 229–249.

Kane GC, Palmer D, Phillips AN, Kiron D, Buckley N. Strategy, not technology, drives digital transformation. MIT Sloan Management Review. 2015; 14: 1–25.

King WR, He J. External validity in IS survey research. Communications of the Association for Information Systems. 2005; 16: 45. https://doi.org/10.17705/1CAIS.01645

Kirchherr J, Yang NHN, Schulze-Spüntrup F, Heerink MJ, Hartley K. Conceptualizing the Circular Economy (Revisited): An Analysis of 221 Definitions. Resources, Conservation and Recycling. 2023; 194: 107001. https://doi.org/10.1016/j.resconrec.2023.107001

Kock F, Berbekova A, Assaf AG. Understanding and managing the threat of common method bias: Detection, prevention and control. Tourism Management. 2021; 86: 104330. https://doi.org/10.1016/j.tourman.2021.104330

Kock N. Common method bias in PLS-SEM: A full collinearity assessment approach. International Journal of E-Collaboration. 2015; 11: 1–10. https://doi.org/10.4018/ijec.2015100101

Korhonen J, Nuur C, Feldmann A, Birkie SE. Circular economy as an essentially contested concept. Journal of Cleaner Production. 2018; 175: 544–552. https://doi.org/10.1016/j.jclepro.2017.12.111

Kumar A, Luthra S, Mangla SK, Garza-Reyes JA, Kazancoglu Y. Analysing the adoption barriers of low-carbon operations: A step forward for achieving net-zero emissions. Resources Policy. 2023; 80: 103256. https://doi.org/10.1016/j.resourpol.2022.103256

Lee CC, Wang F, Chang YF. Towards net-zero emissions: Can green bond policy promote green innovation and green space? Energy Economics. 2023; 121: 106675. https://doi.org/10.1016/j.eneco.2023.106675

Liao Z, Zhang M. The influence of responsible leadership on environmental innovation and environmental performance: The moderating role of managerial discretion. Corporate Social Responsibility and Environmental Management. 2020; 27: 2016–2027. https://doi.org/10.1002/csr.1942

Lu Y, Ramamurthy K. Understanding the Link Between Information Technology Capability and Organizational Agility: An Empirical Examination. MIS Quarterly. 2011; 35: 931–954. https://doi.org/10.2307/41409967

Maak T, Pless NM, Voegtlin C. Business statesman or shareholder advocate? CEO responsible leadership styles and the micro-foundations of political CSR. Journal of Management Studies. 2016; 53: 463–493.

Mehmood K, Kautish P, Mangla SK, Ali A, Kazancoglu Y. Navigating a net-zero economy future: Antecedents and consequences of net-zero economy-based green innovation. Business Strategy and the Environment. 2024; 33: 4175–4197. https://doi.org/10.1002/bse.3685

Memon K, Ghani B, Rehman W. Dual Pathways Toward Net-Zero–Based Performance Through Responsible Leadership—Mediation of Green HR Practices, Green Innovation, and Moderation of Digital Capabilities. Business Strategy and the Environment. 2025; 34: 10077–10097. https://doi.org/10.1002/bse.70120

Memon KR, Ooi SK, Han H. Responsible innovation and corporate sustainability performance: A structural equation modeling-neural network approach. Business Strategy and the Environment. 2024; 33: 2712–2730. https://doi.org/10.1002/bse.3627

Memon KR, Ooi SK. Identifying digital leadership's role in fostering competitive advantage through responsible innovation: A SEM-Neural Network approach. Technology in Society. 2023a; 75: 102399. https://doi.org/10.1016/j.techsoc.2023.102399

Memon KR, Ooi SK. Responsible innovation and resource-based theory: advancing an antecedent-outcome model for large manufacturing firms through structured literature review. Asian Journal of Business Ethics. 2023b; 12: 441–467. https://doi.org/10.1007/s13520-023-00181-6

Moktadir MA, Ahmadi HB, Sultana R, Zohra FT, Liou JJ, Rezaei J. Circular economy practices in the leather industry: A practical step towards sustainable development. Journal of Cleaner Production. 2020; 251: 119737. https://doi.org/10.1016/j.jclepro.2019.119737

Nkundabanyanga SK, Muramuzi B, Alinda K. Environmental management accounting, board role performance, company characteristics and environmental performance disclosure. Journal of Accounting & Organizational Change. 2021; 17: 633–659. https://doi.org/10.1108/jaoc-03-2020-0035

Nold H, Michel L. The performance triangle: a model for corporate agility. Leadership & Organization Development Journal. 2016; 37: 341–356. https://doi.org/10.1108/lodj-07-2014-0123

Obeidat SM, Abdalla S, Al Bakri AAK. Integrating green human resource management and circular economy to enhance sustainable performance: an empirical study from the Qatari service sector. Employee Relations: the International Journal. 2023; 45: 535–563. https://doi.org/10.1108/er-01-2022-0041

Ooi S, Memon K. Responsible Innovation, Circular Economy and Organisational Resilience: Investigating Multiple Pathways Towards Sustainability Performance. Business Strategy and the Environment. 2025b; 34: 8966–8982. https://doi.org/10.1002/bse.70057

Ooi SK, Memon KR. Addressing Resource Scarcity: The Role of Responsible Innovation and Resilience in SMEs' Competitive Advantage and Sustainability Performance. Corporate Social Responsibility and Environmental Management. 2025a; 32: 5734–5746. https://doi.org/10.1002/csr.70005

Ooi SK, Ooi CA, Memon KR. The role of CSR oriented organisational culture in eco-innovation practices. World Review of Entrepreneurship, Management and Sustainable Development. 2020; 16: 538–556.

Park S, Gupta S. Handling Endogenous Regressors by Joint Estimation Using Copulas. Marketing Science. 2012; 31: 567–586. https://doi.org/10.1287/mksc.1120.0718

Podsakoff PM, MacKenzie SB, Podsakoff NP. Sources of method bias in social science research and recommendations on how to control it. Annual Review of Psychology. 2012; 63: 539–569. https://doi.org/10.1146/annurev-psych-120710-100452

Rabal-Conesa J, Jiménez-Jiménez D, Martínez-Costa M. Organisational agility, environmental knowledge and green product success. Journal of Knowledge Management. 2022; 26: 2440–2462. https://doi.org/10.1108/jkm-06-2021-0486

Raut RD, Narkhede B, Gardas BB. To identify the critical success factors of sustainable supply chain management practices in the context of oil and gas industries: ISM approach. Renewable and Sustainable Energy Reviews. 2017; 68: 33–47. https://doi.org/10.1016/j.rser.2016.09.067

Regmi R, Zhang Z, Zhang H. Entrepreneurship strategy, natural resources management and sustainable performance: A study of an emerging market. Resources Policy. 2023; 86: 104202. https://doi.org/10.1016/j.resourpol.2023.104202

Reim W, Tabares S, Parida V. Small and Medium-Sized Enterprises and the Circular Economy: Leveraging Ecosystem Strategies for Circular Business Model Implementation. Organization & Environment. 2025; 38: 257–283. https://doi.org/10.1177/10860266251325247

Robertson JL, Barling J. Greening organizations through leaders' influence on employees' pro-environmental behaviors. Journal of Organizational Behavior. 2013; 34: 176–194. https://doi.org/10.1002/job.1820

Rodríguez-Espíndola O, Cuevas-Romo A, Chowdhury S, Díaz-Acevedo N, Albores P, Despoudi S, et al. The role of circular economy principles and sustainable-oriented innovation to enhance social, economic and environmental performance: Evidence from Mexican SMEs. International Journal of Production Economics. 2022; 248: 108495. https://doi.org/10.1016/j.ijpe.2022.108495

Salandri L, Cascio Rizzo GL, Cozzolino A, De Giovanni P. Green practices and operational performance: The moderating role of agility. Journal of Cleaner Production. 2022; 375: 134091. https://doi.org/10.1016/j.jclepro.2022.134091

Sarstedt M, Hair JF, Cheah JH, Becker JM, Ringle CM. How to Specify, Estimate, and Validate Higher-Order Constructs in PLS-SEM. Australasian Marketing Journal. 2019; 27: 197–211. https://doi.org/10.1016/j.ausmj.2019.05.003

Sarstedt M, Hair JF, Ringle CM, Thiele KO, Gudergan SP. Estimation issues with PLS and CBSEM: Where the bias lies! Journal of Business Research. 2016; 69: 3998–4010. https://doi.org/10.1016/j.jbusres.2016.06.007

Satar MS, Alenazy A, Alarifi G, Alharthi S, Omeish F. Digital capabilities and green entrepreneurship in SMEs: the role of strategic agility. Innovation and Development. 2025; 15: 709–738.

Scherer AG, Voegtlin C. Corporate governance for responsible innovation: Approaches to corporate governance and their implications for sustainable development. Academy of Management Perspectives. 2020; 34: 182–208.

Shahzad M, Qu Y, Javed SA, Zafar AU, Rehman SU. Relation of environment sustainability to CSR and green innovation: A case of Pakistani manufacturing industry. Journal of Cleaner Production. 2020; 253: 119938. https://doi.org/10.1016/j.jclepro.2019.119938

Shams R, Vrontis D, Belyaeva Z, Ferraris A, Czinkota MR. Strategic agility in international business: A conceptual framework for "agile" multinationals. Journal of International Management. 2021; 27: 100737. https://doi.org/10.1016/j.intman.2020.100737

Shmueli G, Sarstedt M, Hair JF, Cheah JH, Ting H, Vaithilingam S, et al. Predictive model assessment in PLS-SEM: guidelines for using PLSpredict. European Journal of Marketing. 2019; 53: 2322–2347. https://doi.org/10.1108/ejm-02-2019-0189

Singh J, Pandey KK, Kumar A, Naz F, Luthra S. Drivers, barriers and practices of net zero economy: An exploratory knowledge based supply chain multi-stakeholder perspective framework. Operations Management Research. 2023; 16: 1059–1090. https://doi.org/10.1007/s12063-022-00255-x

Sánchez ÁM, Pérez-Pérez M, Vicente-Oliva S. Agile production, innovation and technological cooperation: Overlapping priorities of manufacturing firms. Baltic Journal of Management. 2019; 14: 597–615. https://doi.org/10.1108/bjm-12-2018-0410

Soni V, Gnekpe C, Roux M, Anand R, Vann Yaroson E, Kumar Banwet D. Adaptive distributed leadership and circular economy adoption by emerging SMEs. Journal of Business Research. 2023; 156: 113488. https://doi.org/10.1016/j.jbusres.2022.113488

Soomro SA, Soomro SA. Green intellectual capital and employee environmental citizenship behavior: the mediating role of organizational agility and green creativity. Journal of Intellectual Capital. 2024; 25: 822–840. https://doi.org/10.1108/jic-03-2024-0067

Staiger D, Stock J. To econometrica. Econometrica. 1997; 65: 557–586.

Suchek N, Ferreira JJ, Fernandes PO. A review of entrepreneurship and circular economy research: State of the art and future directions. Business Strategy and the Environment. 2022; 31:

2256–2283. https://doi.org/10.1002/bse.3020

Susur E, Engwall M. A transitions framework for circular business models. Journal of Industrial Ecology. 2023; 27: 19–32.

Tang W, Mai L, Li M. Green innovation and resource efficiency to meet net-zero emission. Resources Policy. 2023; 86: 104231. https://doi.org/10.1016/j.resourpol.2023.104231

Teece DJ. Business models and dynamic capabilities. Long Range Planning. 2018; 51: 40–49.

Teece DJ, Pisano G, Shuen A. Dynamic capabilities and strategic management. Strategic Management Journal. 1997; 18: 509–533.

Tideman SG. Gross National Happiness: lessons for sustainability leadership. South Asian Journal of Global Business Research. 2016; 5: 190–213.

Tuan LT. Promoting employee green behavior in the Chinese and Vietnamese hospitality contexts: The roles of green human resource management practices and responsible leadership. International Journal of Hospitality Management. 2022; 105: 103253. https://doi.org/10.1016/j.ijhm.2022.103253

Ur Rehman Z, Shafique I, Khawaja KF, Saeed M, Kalyar MN. Linking responsible leadership with financial and environmental performance: determining mediation and moderation. International Journal of Productivity and Performance Management. 2023; 72: 24–46. https://doi.org/10.1108/ijppm-12-2020-0626

Vieira LC, Longo M, Mura M. Are the European manufacturing and energy sectors on track for achieving net-zero emissions in 2050? An empirical analysis. Energy Policy. 2021; 156: 112464. https://doi.org/10.1016/j.enpol.2021.112464

Voegtlin C, Frisch C, Walther A, Schwab P. Theoretical Development and Empirical Examination of a Three-Roles Model of Responsible Leadership. Journal of Business Ethics. 2020; 167: 411–431. https://doi.org/10.1007/s10551-019-04155-2

Wamba SF. Impact of artificial intelligence assimilation on firm performance: The mediating effects of organizational agility and customer agility. International Journal of Information Management. 2022; 67: 102544. https://doi.org/10.1016/j.ijinfomgt.2022.102544

Wang G, Holmes RM, Jr, Oh I, Zhu W. Do CEOs Matter to Firm Strategic Actions and Firm Performance? A Meta-Analytic Investigation Based on Upper Echelons Theory. Personnel Psychology. 2016; 69: 775–862. https://doi.org/10.1111/peps.12140

Wang Y, Shen T, Chen Y, Carmeli A. CEO environmentally responsible leadership and firm environmental innovation: A socio-psychological perspective. Journal of Business Research. 2021; 126: 327–340.

Wang Z, Ye Y, Liu X. How CEO responsible leadership shapes corporate social responsibility and organization performance: the roles of organizational climates and CEO founder status. International Journal of Contemporary Hospitality Management. 2024; 36: 1944–1962. https://doi.org/10.1108/ijchm-11-2022-1498

Wu Y, Wang R. Sustainability-based enterprise supply chain optimization and response under circular economy approach: agile, adaptive and coordinated. Management Decision. 2024; 62: 2737–2762. https://doi.org/10.1108/md-02-2023-0250

Yang M, Fu M, Zhang Z. The adoption of digital technologies in supply chains: Drivers, process and impact. Technological Forecasting and Social Change. 2021; 169: 120795. https://doi.org/10.1016/j.techfore.2021.120795

Yin S, Jia F, Chen L, Wang Q. Circular economy practices and sustainable performance: A meta-analysis. Resources, Conservation and Recycling. 2023; 190: 106838. https://doi.org/10.1016/j.resconrec.2022.106838

Zacher H, Rudolph CW, Katz IM. Employee Green Behavior as the Core of Environmentally Sustainable Organizations. Annual Review of Organizational Psychology and Organizational Behavior. 2023; 10: 465–494. https://doi.org/10.1146/annurev-orgpsych-120920-050421

Zhang L, Wong WK, Liu L, Al Shraah A, Albasher B, Shamansurova Z. Balancing environmental sustainability through fintech, green finance natural resource, and economic growth in Asian economies - A Cup-FM and Cup-BC study. Resources Policy. 2024; 98: 105294. https://doi.org/10.1016/j.resourpol.2024.105294