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The role of Green Transformational Leadership and Green Product Innovation in Emerging Economies: Green Employee Behaviour and Green Human Resource Management as Intervening Variables

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Abstract

Purpose: This study is to offer a critical re-evaluation of the Green Transformational Leadership (GTL)–Green Product Innovation (GPI) relationship within SMEs in emerging economies, challenging the direct causality assumed in prior research. Theoretically, GTL, as a conceptual construct, lacks the mechanisms to produce a direct impact on GPI, a misconception widely propagated in earlier literature. As such, our study is to redirect such topical issues. In doing so, we also analyzed green employee behavior (GEB) and green human resource management (GHRM) as intervening variables.

Method: We distributed questionnaires into several SMEs operated in East Java, Indonesia.

Result: Our empirical evidence strongly supports the proposed framework, suggesting no significant direct relationship between GTL and GPI and even showing a negative coefficient. However, when mediated by GHRM and GEB, the relationship becomes both positive and significant, indicating that these intervening variables are essential for realizing the innovation potential of GTL. Furthermore, GTL partially fosters GHRM and GEB, while both GHRM and GEB positively influence GPI. These findings carry profound theoretical implications by refining the understanding of leadership's role in sustainability practices and offering actionable insights for managers aiming to enhance green innovation through strategic HR and behavioral interventions.

INTRODUCTION

In emerging economies, the imperative for Green Product Innovation (GPI) is not merely a matter of environmental stewardship but a critical axis upon which long-term economic resilience and competitiveness hinge (Khan et al., 2021). These economies, characterized by rapid industrialization and burgeoning consumer markets, are often plagued by resource inefficiencies, environmental degradation, and regulatory insufficiencies (Ushie et al., 2023; Khan et al., 2021). The urgency to observe GPI in such contexts stems from the intricate balance between economic

growth and ecological sustainability, necessitating a paradigm shift towards the integration of green technologies and sustainable practices in product development (Asni and Agustia, 2022). This shift must transcend the conventional profit-driven model, where the primary objective is market expansion, to a model that aligns with the global demand for sustainability-driven innovation (Khan et al., 2021).

Moreover, the externalities of environmental degradation, such as climate change, loss of biodiversity, and resource depletion, disproportionately affect emerging economies, exacerbating vulnerabilities in agriculture, energy, and manufacturing sectors (Anser et al., 2023). We believe, GPI becomes indispensable, not only as a competitive differentiator but also as a survival strategy, fostering adaptive capacities within these economies to withstand both ecological and market-related disruptions (Akhtar et al., 2021; Ushie et al., 2023). Observing GPI at this juncture is thus critical, as it also enables these economies to build resilience against future environmental risks while simultaneously fostering socio-economic development. The convergence of global green finance, sustainable development goals (SDGs), and international environmental accords provides an impetus for emerging economies to position themselves at the forefront of the green revolution, capitalizing on the potential for GPI to unlock new markets, attract foreign investment, and stimulate job creation in green sectors (Larsen, 2022). Consequently, failure to priorities GPI within these economies not only risks environmental degradation but also forfeits a critical opportunity to redefine their global economic standing in an era increasingly dominated by sustainability-driven innovation (Li, 2022). So, studying GPI within this landscape demands a comprehensive framework to ensure that green initiatives are not merely symbolic but result in measurable environmental impact and sustainable growth trajectories (Kam-Sing Wong, 2012; Khan et al., 2021).

While many studies have positioned GPI as a direct consequence of GTL (e.g. Majali et al., 2022; Begum et al., 2022: Singh et al., 2020), this theoretical approach often oversimplifies the complex relationship between leadership and innovation. GTL is frequently described as an influential factor that inspires a shared environmental vision, fosters a culture of sustainability, and drives the adoption of eco-friendly practices within organizations (Awan et al., 2023). However, this perspective tends to overlook the multifaceted nature of GPI, which requires more than just leadership vision or motivation to innovate. For instance, the link between GTL and GPI is not purely linear or causal; rather, it is contingent on several variables. GTL certainly provides the foundation for fostering an environment conducive to green innovation (Begum et al., 2022), but it alone does not account for the technical expertise, resource allocation, and strategic alignment required to turn visionary leadership into practical, marketable green products. Additionally, this simplified view underestimates the role of external factors like regulatory frameworks, competitive pressures, and consumer demand, which also play critical roles in shaping GPI (Zhang et al., 2020; Zhou et al., 2018). Without addressing these external dynamics, GTL may struggle to translate its environmental vision into tangible product innovations, leading to a potential gap between the organization's aspirations and its actual performance in green markets.

Moreover, we propose that the assumption that GTL naturally leads to GPI fails to account for the complexity of innovation processes within organizations. GPI is not a monolithic outcome that arises solely from leadership direction; it is deeply rooted in an organization's ability to integrate green knowledge, foster cross-functional collaboration, and engage in continuous learning. Green innovation capabilities, such as research and development (R&D) initiatives, green technology adoption, and eco-efficient production processes, play a more substantial role in driving GPI than is often acknowledged in GTL-centric models (see also Zhang et al., 2024; Fernando et al., 2019) . These capabilities often require significant investment and organizational learning, which may not be immediately triggered by GTL alone. Furthermore, employees' innovation behaviors, organizational culture, and resource constraints can either enable or limit the effectiveness of GTL in promoting GPI (Ahmad et al., 2024). Therefore, while GTL is a critical leadership style that aligns with the principles of sustainability and environmental stewardship (Al-Swidi et al., 2021; Begum et al., 2022), its impact on GPI must be examined in conjunction with a broader set of organizational and environmental factors. A more nuanced theoretical approach is needed – one that recognizes the interdependencies between leadership, organizational

capabilities, external pressures, and innovation processes – rather than attributing GPI solely to the influence of GTL. This broader perspective would offer a more comprehensive understanding of how green leadership can effectively drive innovation within the complex and dynamic landscape of sustainable business practices.

Therefore, the aim of the current study is to address the above theoretical problems by examining GEB and GHRM as its intervening variables. While GTL has been widely acknowledged for its ability to inspire an organization-wide commitment to sustainability, it is essential to recognize that leadership alone does not guarantee the successful development and implementation of green innovations. GEB and GHRM serve as critical mechanisms through which the vision set by GTL can be operationalized at various levels of the organization (Chaudhary, 2020; Saeed et al., 2019). GEB, for instance, reflects the day-to-day actions and decision-making processes of employees that align with environmental sustainability goals (Yeşiltaş et al., 2022). GEB is not only driven by leadership but is also shaped by the organization's culture, employee empowerment, and the degree to which employees perceive themselves as agents of green change (Yeşiltaş et al., 2022; Saeed et al., 2019). Similarly, GHRM practices, such as green recruitment, performance management, and training, play a significant role in institutionalizing sustainable behaviors and building the necessary skills to support GPI (Shahzad et al., 2023). As explained by Shahzad et al. (2023), these practices ensure that employees are equipped with the knowledge, motivation, and capabilities to contribute meaningfully to green innovation initiatives.

In this context, GHRM is particularly relevant because it systematically integrates environmental objectives into HR policies and practices, thereby creating a workforce that is not only aligned with but also actively contributes to sustainability goals (Chaudhary, 2020). Green HR practices, such as sustainable performance evaluations, eco-friendly training programs, and green compensation schemes, help to cultivate a work environment where green innovation can thrive (Rana and Arya, 2024). GHRM also enhances employee engagement in green initiatives by embedding sustainability into the organizational fabric, ensuring that green innovation is not a sporadic or top-down effort, but a continuous, integrated process (Mishra, 2017). We agree with Ahmed et al. (2023) that employees who engage in green behaviors – whether through eco-conscious decision-making, resource conservation, or participation in green projects – become critical actors in the innovation process, bridging the gap between leadership's green vision and the tangible development of green products. So, by positioning GEB and GHRM as intervening variables, this study aims to provide a more holistic framework that recognizes the critical role of human capital in green innovation, offering insights into how organizations can more effectively leverage their workforce and HR systems to achieve their green product innovation goals. We believe that this nuanced approach not only fills the gaps left by existing GTL-focused models but also highlights the importance of fostering a green organizational culture that supports sustained innovation efforts.

LITERATURE REVIEW

Underpinning theory

Institutional theory suggests that organizations are deeply embedded within social and cultural frameworks that influence their structures, behaviors, and practices, often beyond rational economic decision-making (Willmott, 2015). Willmott (2015) explains that it emphasizes that legitimacy, rather than purely efficiency, drives organizational conformity to institutional norms, rules, and values. Advanced statements within institutional theory argue that institutional pressures – coercive, normative, and mimetic – lead to isomorphism, where organizations in similar fields increasingly resemble one another (Meyer and Höllerer, 2014). This homogeneity is not merely a result of competitive forces but also the desire to align with the expectations of key stakeholders, regulatory bodies, and society at large. Recent developments in the theory also consider how organizations actively shape and modify their institutional environments, engaging in processes of institutional entrepreneurship to redefine norms and influence sectoral standards, thus demonstrating agency within these macro-level constraints (Risi et al., 2023).

Conformity and isomorphism are central concepts in institutional theory, describing how organizations within a particular field tend to become more similar over time due to various external pressures (Risi et al., 2023: Aksom and Tymchenko, 2020). According to Aksom and Tymchenko, (2020), conformity refers to an organization's alignment with the norms, values, and expectations of its institutional environment, driven by the need to gain legitimacy rather than purely economic efficiency. Then, isomorphism is the process through which this conformity leads to homogeneity among organizations. Conformity and isomorphism in institutional theory represent sophisticated processes through which organizations align with the expectations of their institutional environment, not just to survive but to secure legitimacy within their respective fields (Anlesinya et al., 2023). Others argue that isomorphism extends beyond mere replication of norms and practices, reflecting a complex negotiation between external pressures and internal strategic choices (Burdon and Sorour, 2020). If referring to Sahin and Mert (2023), coercive, normative, and mimetic isomorphisms create a dynamic interplay where organizations do not simply adopt structures due to external pressures but also strategically shape their responses based on resource availability, leadership vision, and stakeholder priorities. Additionally, recent critiques suggest that organizations, especially in highly institutionalized environments, engage in "decoupling," where they symbolically conform to institutional norms while maintaining operational practices that deviate from the norm (Glynn and D'aunno, 2023; Choi and Woo, 2022). This view highlights that isomorphism is not a one-dimensional force but an adaptive, context-specific process, wherein organizations can resist, redefine, or manipulate the institutional logics to gain both legitimacy and competitive advantage.

In the context of the current study?

We perceive that institutional theory offers a robust framework for understanding the forces shaping organizational behavior, especially in the context of environmental practices such as GPI. In the context of GPI, firms often align their environmental strategies with institutional demands to maintain legitimacy and ensure survival in competitive markets (Crossley et al., 2021). For instance, governmental regulations pushing for sustainability and environmental protection can act as coercive pressures, driving firms to adopt green innovations. However, beyond compliance, normative pressures from industry standards, professional bodies, and consumer expectations also play a critical role. Firms in emerging economies are often keenly aware that adhering to international standards of sustainability can enhance their reputation, opening doors to global markets and partnerships. The institutional environment, therefore, shapes the trajectory of GPI by setting boundaries and expectations for firms, encouraging them to innovate in ways that align with broader societal and environmental goals.

Furthermore, institutional theory highlights the role of mimetic isomorphism in driving GPI within SMEs (Huang and Chen, 2022). As these businesses strive to compete on a global scale, they often emulate the practices of successful, leading firms, especially in terms of environmental innovations (Crossley et al., 2021). This is particularly relevant in the context of GPI, where larger multinational corporations, often pioneers of sustainability, set benchmarks for environmental performance. SMEs, constrained by resources and technical know-how, may look to these leaders as a blueprint for adopting green innovations. This mimetic behavior, though driven by competitive survival, aligns with institutional pressures to conform to accepted norms. In emerging economies, where firms may lack the internal capacity for independent innovation, mimetic isomorphism becomes a vital mechanism through which GPI is adopted (Grob and Benn, 2014). Additionally, professional networks, industry associations, and global supply chains can accelerate this process by creating platforms for knowledge transfer and shared best practices. As these SMEs internalize the value of GPI, they not only comply with institutional demands but also enhance their competitive positioning, increasing their ability to attract investment, form strategic alliances, and meet the growing consumer demand for sustainable products (Grob and Benn, 2014; Glover et al., 2014).

Then, while organizations may appear to conform to external pressures for green innovation, they may do so superficially, without fundamentally altering their internal practices or strategies. This phenomenon of decoupling is particularly prevalent in emerging economies,

where institutional pressures to adopt sustainable practices may exceed the firm's capacity to genuinely innovate (Gupta and Gupta, 2021). In these contexts, companies may adopt symbolic measures – such as green certifications, eco-labeling, or sustainability reporting – without integrating substantial green innovation into their product development processes (Gupta and Gupta, 2021). The institutional environment, therefore, not only drives GPI but also shapes the manner in which firms respond to it, often leading to a gap between appearance and reality. For example, SMEs may adopt the language of sustainability to gain legitimacy, satisfy regulatory bodies, or appease environmentally conscious consumers, while actual green innovations remain limited (see also Crossley et al., 2021). This decoupling reflects the complexity of the institutional landscape, where firms must balance competing pressures of legitimacy, resource constraints, and strategic objectives. Thus, while institutional theory explains the broader forces that drive firms toward GPI, it also suggests the potential for superficial adoption, highlighting the need for stronger institutional mechanisms that ensure genuine, impactful environmental innovation. To achieve it, others suggest that GTL, when viewed through the lens of institutional theory, plays a pivotal role in shaping how organizations navigate the pressures for GPI (Zhou et al., 2021; Zhang et al., 2020).

Institutional theory, with its emphasis on the embeddedness of organizations within broader sociopolitical structures, posits that organizations are subject to isomorphic pressures – coercive, mimetic, and normative – that compel them to align with prevailing environmental expectations and sustainability norms. These pressures manifest in a multitude of ways, from governmental mandates and international environmental agreements to market-driven forces such as consumer demands for eco-friendly products and investor scrutiny of sustainability metrics (Abbas, 2024). GTL, by fostering a culture of proactive environmental stewardship, positions organizations to transcend mere compliance with regulatory requirements and embrace a more holistic approach to sustainability, one that reconfigures their strategic orientation towards long-term ecological viability (Ahmad et al., 2024). This leadership paradigm is not confined to the narrow pursuit of efficiency gains or cost reductions but instead seeks to instill a deeper sense of responsibility for planetary well-being, aligning organizational practices with broader ecological imperatives. At its core, GTL is grounded in the recognition that sustainability is not merely an operational concern but an existential imperative that requires a fundamental rethinking of the organization's role within the global ecosystem (Srivastava et al., 2024). It engenders a shift in organizational culture, one that emphasizes continuous learning, innovation, and adaptability in response to the evolving environmental landscape. This is particularly salient in light of the growing importance of sustainability in shaping competitive advantage, as organizations that adopt a forward-looking, green-oriented strategic posture are better positioned to capitalize on emerging opportunities in the green economy, mitigate risks associated with climate change, and secure long-term legitimacy in the eyes of stakeholders.

Moreover, GTL facilitates the alignment of organizational identity with societal expectations, thereby enhancing legitimacy and reducing the likelihood of institutional decoupling, where formal commitments to sustainability are disconnected from actual practices. In doing so, it enables organizations to navigate the complex interplay of institutional logics that govern the environmental domain, balancing the need for economic performance with the imperative for ecological stewardship (Sachdeva and Singh, 2024). This leadership model thus acts as a conduit for organizational resilience, allowing firms to anticipate and adapt to shifts in regulatory landscapes, stakeholder expectations, and market conditions while maintaining a commitment to sustainable development. The capacity of GTL to integrate environmental concerns into the organizational fabric also underscores its role in fostering innovation, as it encourages organizations to explore novel solutions to environmental challenges, from the adoption of clean technologies to the development of circular economy models that reduce waste and resource consumption. In this way, GTL not only drives the internal transformation of organizations but also contributes to the broader societal shift towards sustainability, positioning businesses as agents of positive environmental change within the global institutional framework.

According to Zhou et al. (2018) GTL represents leadership that not only champions environmental values but also fosters a shared vision of sustainability across the organization. In

the context of institutional theory, this form of leadership can be seen as a crucial internal driver that helps organizations respond to external institutional pressures – such as regulatory demands, normative industry expectations, and cultural-cognitive norms for sustainability (Zhang et al., 2020). In this sense, institutional theory helps to explain how GTL mitigates the challenges of mimetic isomorphism in the adoption of GPI. In emerging economies, SMEs often imitate the environmental practices of larger, established firms to gain legitimacy in global markets, but this imitation can sometimes result in superficial adoption rather than deep-rooted innovation. GTL, however, empowers organizations to go beyond mere mimicry by fostering a culture of innovation and environmental stewardship (Ahmad et al., 2024). It is important to note that while GTL plays a significant role in shaping organizational behaviors and aligning firms with external institutional pressures for sustainability (Al-Swidi et al., 2021), GTL as a conceptual construct lacks the mechanisms to produce a direct impact on GPI. Institutional theory helps illuminate why this is the case by underscoring the complex, multi-layered nature of organizational change (Willmott, 2015). GTL primarily influences organizational culture, employee engagement, and strategic vision around environmental sustainability, but these influences are largely indirect when it comes to driving GPI.

The limitations of GTL in directly affecting GPI are rooted in the nature of leadership as a conceptual construct within organizational theory. Leadership, by definition, is an influence process that shapes the motivations, values, and behaviors of organizational members, but it does not directly govern the technical processes, resources, or capabilities (Morgeson et al., 2010) required for GPI. Institutional theory supports this by highlighting that while leaders can encourage firms to respond to external pressures – such as regulatory frameworks, normative expectations, and cultural-cognitive pressures for green innovation – they cannot alone bring about the structural and technical innovations required for GPI. In light of the limitations, we propose its mediators such as organizational structures like GHRM, which institutionalizes environmental values through hiring, training, and reward systems (Shahzad et al., 2023), and by GEB, which translates employee environmental awareness into practical behaviors that support green innovation (Yeşiltaş et al., 2022). By positioning GHRM and GEB as mediators, we argue that GTL's role in GPI is fundamentally indirect, yet highly significant. GTL sets the environmental vision and motivates change, but it is through GHRM and GEB that this vision is realized in the form of innovative green products. Institutional theory helps explain why these mediators are necessary: organizations are subject to complex pressures that require more than leadership inspiration to bring about substantive change. GHRM and GEB provide the structural and behavioral mechanisms that allow firms to respond effectively to these pressures and engage in GPI.

Hypotheses Development

GTL and GPI

Institutional theory, when applied to the nexus between GTL and GPI, elucidates a complex paradigm wherein organizations are not simply mechanistic entities driven by market forces but are also subject to the institutional logics that permeate their operational ecosystems (Zeng et al., 2023). GTL, characterized by a leadership archetype that integrates ecological imperatives with transformational change, functions as an agentic force within the organization, compelling both structural and cognitive shifts that align with emergent institutional exigencies surrounding sustainability (Ahmad et al., 2024). Within the institutional framework, coercive, mimetic, and normative isomorphic pressures coalesce to form an external milieu that necessitates organizational alignment with broader environmental mandates (Stabler et al., 2024). GTL, therefore, does not merely operate within the confines of the firm. It externalizes the organization's green commitments through the prism of institutional legitimacy. Leaders imbued with transformational qualities cultivate an ethos of environmental stewardship that transcends conventional operational paradigms, engendering a paradigmatic shift toward GPI as a requisite response to both exogenous institutional pressures and endogenous organizational values.

We believe that from an institutional perspective, the relational dynamic between GTL and GPI is further complicated by the interpenetration of institutional logics and the diffusion of green

innovation across organizational fields. Institutional logics, as frameworks of cultural meaning and legitimacy, shape the organizational interpretation of green innovation not merely as a strategic advantage but as an institutional imperative (Li, 2022). Under the influence of GTL, organizations become sensitized to the dominant logics within their field, particularly those that valorize ecological responsibility and innovation (Chaihanchanchai and Anantachart, 2023). These logics, disseminated through networks of professional associations, regulatory bodies, and industry leaders, create a mimetic drive for organizations to adopt green innovations as a means of maintaining institutional legitimacy (Huang and Chen, 2022). In this context, GPI is not an isolated phenomenon but a manifestation of an organization's embeddedness within an institutional field that privileges sustainability (Singh et al., 2020). The diffusion of GPI is thus propelled by institutional pressures for conformity to green standards, amplified by GTL's capacity to internalize and disseminate these pressures within the organizational structure. Therefore, the relationship between GTL and GPI, when viewed through the lens of institutional theory (Willmott, 2015; Meyer and Höllerer, 2014), represents a complex interplay between leadership, institutional pressures, and the organizational subsystems that mediate the translation of these pressures into innovative outcomes. From such points, we propose:
H1: There is positive relationship between GTL and GPI

GTL, GEB and GPI

The relationship between GTL and GEB within the framework of institutional theory is deeply embedded in the sociocultural and regulatory paradigms that shape organizational behaviour and operational ethos, underscoring the confluence of normative, coercive, and mimetic pressures that pervade institutional environments (Meyer and Höllerer, 2014). Institutional theory suggests that organizations adapt to external pressures to gain legitimacy. Leaders, through the enactment of green leadership behaviours, become institutional entrepreneurs, forging pathways that not only encourage employees to adopt sustainable practices but also reshape organizational culture in ways that are congruent with green institutional logics. By promoting green values and embedding them within the organizational fabric, GTL facilitates the establishment of a cognitive schema among employees, wherein green behaviour is perceived not merely as a discretionary or prosocial action but as an essential aspect of role performance, thereby elevating GEB to an institutionally sanctioned norm (Awan et al., 2023).

This process is further accentuated by the mimetic isomorphism that occurs as organizations in environmentally regulated sectors, or those subject to normative pressures from green-savvy consumers, emulate the green leadership models exhibited by their more advanced peers, creating a cascading effect of green institutionalization (Wry et al., 2013). The coercive pressures of regulatory bodies, coupled with the normative influence of professional associations and green certifications, reinforce the legitimacy of GTL as a mechanism for fostering GEB, thereby reducing the variance in green employee behaviours across firms operating within similar institutional contexts (Ushie et al., 2023; Esmaeilpour and Bahmiary, 2017). Moreover, GTL fosters a sense of psychological ownership and collective responsibility among employees, amplifying the salience of pro-environmental actions as intrinsic to organizational identity and thereby catalyzing deeper levels of engagement in green behaviours (Dangelico, 2016; Chaihanchanchai and Anantachart, 2023). In sum, GTL serves as a critical institutional catalyst, bridging external environmental imperatives and internal behavioural change, with GEB emerging as a byproduct of the complex interplay between leadership-driven institutionalization processes and broader societal pressures for sustainability. From such points, we propose:
H2: There is positive relationship between GTL and GEB

In the context of GPI, GEB is a central for GTL – GPI relationship. GEB encompasses the day-to-day eco-friendly actions, problem-solving approaches, and creative initiatives that employees undertake in response to the organizational emphasis on sustainability (Zacher et al., 2023; Shahzad et al., 2023). Essentially, GEB becomes the mechanism by which GTL's influence permeates the workforce, fostering a culture of environmental responsibility and a proactive attitude toward green innovation. Without GEB, the aspirational goals set by green leadership

may remain abstract, disconnected from the practical workflows and cognitive engagements necessary for GPI. Institutionalizing GEB through GTL thus ensures that green innovation is not simply a top-down directive but an embedded practice, driven by employees' green consciousness and behaviours, ultimately leading to more robust and continuous cycles of GPI. It can be argued that the institutionalization of GEB, while aligning with external green norms, can create isomorphic pressures that homogenize green behaviours across organizations, potentially stifling the diversity of thought and experimentation crucial for substantive GPI (Huang and Chen, 2023). Furthermore, institutional pressures that shape GEB may lead to symbolic or superficial green practices (greenwashing), where the appearance of innovation is decoupled from genuine environmental impact (Ma and Sambharya, 2024). This dynamic introduces a paradox: while GTL fosters GEB by leveraging institutional logics, the institutional conformity it engenders may paradoxically inhibit the radical innovation that GPI requires. The institutional theory framework, by emphasizing external legitimacy and the diffusion of norms, might not fully account for the entrepreneurial and risk-taking dimensions of green innovation, which require a more flexible and less institutionalized environment for breakthroughs in product innovation (Anlesinya et al., 2023). In this sense, the enactment of GEB is both an individual and institutional phenomenon, driven by leadership influence but reinforced by external environmental expectations and organizational norms (Agyabeng-Mensah et al., 2020). Without the enactment of GEB (Yeşiltaş et al., 2022), GTL's sustainability directives risk remaining aspirational, disconnected from the operational realities of the organization. Therefore, GEB is not only a byproduct of green leadership but the linchpin through which the abstract vision of sustainability becomes a lived reality, shaping both organizational culture and environmental outcomes. From such points, we propose:
H2a: GEB mediates the positive relationship between GTL and GPI.

GTL, GHRM and GPI

Similar to GEB, GTL plays a pivotal role in shaping GHRM practices within organizations, particularly when examined through the lens of institutional theory. Leaders practicing GTL may embody environmental stewardship and inspire their employees to adhere to environmental goals, creating a culture that integrates sustainability into everyday business operations (Awan et al., 2023). Through this lens, GTL becomes a driver of institutional legitimacy, compelling organizations to adopt GHRM as a way to meet the evolving societal and stakeholder expectations around environmental sustainability (Nguyen et al., 2024). This institutional alignment is not merely cosmetic; rather, it fosters deep-seated changes in organizational practices, particularly in human resource management, as leaders seek to demonstrate their commitment to environmental responsibility (Younis and Hussain, 2023). Furthermore, the role of GTL in promoting GHRM can be analyzed as a form of coercive, mimetic, and normative isomorphism, which are key concepts within institutional theory. As previously mentioned, coercive isomorphism refers to pressures exerted by legal regulations or powerful external stakeholders, pushing organizations toward adopting green HR practices. GTL helps firms navigate these regulatory demands by embedding green initiatives in the workforce through recruitment, training, and performance management strategies that prioritize environmental considerations (Agrawal and Pradhan, 2023). For example, GTL influences HR departments to include environmental performance metrics in employee evaluations or encourage green competencies during hiring processes (Aboramadan, 2022).

According to Anlesinya et al. (2023), mimetic isomorphism occurs when organizations model their green HR practices on industry leaders who have already integrated sustainability into their HR frameworks. In such scenarios, GTL serves as a change agent, guiding the organization toward adopting best practices in GHRM (Niazi et al., 2023), not just to keep pace with competitors but also to enhance its institutional legitimacy. Normative isomorphism arises from professional standards and cultural expectations. Here, GTL strengthens the normative pressures by creating a shared value system within the organization that elevates the importance of environmental stewardship, motivating HR departments to reflect these values in their policies, such as offering green training programs and fostering green behaviors among employees. So,

leaders who practice GTL confirm that GHRM is not just a superficial or compliance-driven initiative but a genuine, performance-oriented shift toward sustainability (Anlesinya et al., 2023). By instilling environmental values at every level of the organization, from the recruitment of green-oriented employees to training programs that build environmental competencies, GTL bridges the gap between institutional expectations and actual organizational behavior. This alignment is critical for firms operating in highly institutionalized environments, where failing to substantiate green claims can lead to reputational risks. We think, if conceptualizing GHRM as a tool for operationalizing sustainability (Ababneh, 2021), GTL enables organizations to achieve both legitimacy and performance outcomes, solidifying their position within the institutional framework while promoting long-term environmental impact. Thus, GTL, when coupled with GHRM, not only satisfies institutional pressures but also transforms the organization's green credentials into a competitive advantage. From such points, we propose:
H3a: There is positive relationship between GTL and GHRM.

According to the essence of GHRM, it should operate as a translator of GTL into GPI. At its core, GHRM functions as the organizational interpreter of leadership's environmental ambitions, turning strategic visions into actionable behaviors and competencies across the workforce (Jabbour et al., 2016). The essence of GHRM lies in its ability to embed sustainability into all aspects of HR functions, from recruitment and training to performance management and employee engagement (Al-Swidi et al., 2021). When leadership communicates a clear vision for environmental sustainability through GTL, GHRM operationalizes this vision by fostering a green organizational culture, aligning employee goals with green objectives, and promoting innovative behaviors geared toward sustainability (Chaudhary, 2020). In this way, GHRM plays a vital role in ensuring that the values of GTL do not remain abstract or aspirational but become deeply integrated into daily operations, ultimately driving GPI. One of the primary ways GHRM translates GTL into GPI is through the strategic alignment of employee competencies and behaviors with green innovation goals. GTL, with its emphasis on inspiring change and challenging the status quo, encourages employees to think creatively about environmental challenges (Tian et al., 2020).

However, without the structural support of GHRM, these leadership-driven motivations may lack the necessary pathways for expression. GHRM is related to the framework for employees to channel their green enthusiasm into innovation by implementing green-focused training programs, setting sustainability-related performance metrics, and fostering a culture that rewards environmental creativity (Naz et al., 2023). For instance, GHRM incentivizes green innovation by including eco-friendly initiatives as part of performance appraisals, thereby motivating employees to contribute to GPI. Additionally, GHRM is associated with cross-functional collaboration by fostering an environment where employees feel empowered to share green ideas, which is essential for innovation (Ahmad et al., 2021). By integrating GTL-driven values into HR policies and practices, GHRM ensures that the workforce is not only equipped with the necessary skills for GPI but also encouraged to pursue it as a core organizational objective (Rana and Arya, 2024). Moreover, the process of translating GTL into GPI through GHRM involves creating a feedback loop between leadership, employees, and innovation processes. GTL fosters a culture of open communication, encouraging employees to share their insights and ideas for sustainable solutions (Al-Swidi et al., 2021). GHRM institutionalizes this by establishing channels for idea generation, knowledge sharing, and continuous learning. It ensures that green ideas from employees are captured, nurtured, and developed into innovative products or processes (Farrukh et al., 2022). For example, GHRM can implement green ideation platforms or innovation hubs where employees are invited to contribute to the development of eco-friendly products or services. These platforms act as catalysts for GPI, turning the sustainability vision set by GTL into real-world innovations. This feedback loop is expected to create a synergy between leadership's green aspirations and employees' innovative efforts, as GHRM translates top-down sustainability goals into bottom-up green initiatives. From such points, we propose:
H3b: GHRM mediates the positive relationship between GTL and GPI.

GEB and GPI

In this context, GEB can be viewed as a result of organizations aligning their internal practices with external institutional pressures, such as environmental regulations, societal expectations for sustainability, and industry standards (Mousa and Othman, 2020). Employees within organizations that adopt these green norms are more likely to engage in environmentally friendly behaviors, as these actions become embedded within the organization's culture and values (Ababneh, 2021). This institutional alignment creates a conducive environment for GPI because employees, who are integral to the innovation process, are naturally inclined to seek out and develop products that adhere to the organization's green objectives. We propose that firms with a strong commitment to GEB are particularly well-positioned to align with these regulatory demands. It is because employees actively engage in behaviors that support sustainability goals, such as reducing waste, enhancing resource efficiency, and pursuing environmentally friendly production techniques (Fernando et al., 2019). As a result, these firms are not only compliant with external regulations but are also better equipped to leverage their GEB to drive GPI. Then, employees who are invested in green practices are more likely to contribute innovative ideas and solutions that meet both regulatory requirements and market demands for sustainable products (Aboramadan, 2022). This proactive approach to environmental responsibility enables firms to advance their GPI efforts, turning compliance into a competitive advantage and fostering a culture of continuous innovation in green product development. From such points, we propose:
H4: There is a positive relationship between GEB and GPI.

GHRM and GPI

The strategic alignment of GHRM with organizational sustainability objectives plays a crucial role in facilitating GPI. GHRM policies create an organizational culture that values environmental sustainability, which in turn nurtures an environment conducive to green innovation (Jabbour and de Sousa Jabbour, 2016). GHRM ensures that sustainability becomes a shared value among all employees, from top management to the operational level (Song et al., 2021). This cultural shift leads to increased collaboration between departments, with employees across functions, such as marketing, R&D, and production, working together on eco-innovative projects. The integration of GHRM practices also ensures that sustainability is not siloed but is instead embedded into the company's entire innovation ecosystem (Farrukh et al., 2022). For example, cross-functional teams formed with an awareness of green principles are better positioned to identify synergies between different departments, such as leveraging sustainable sourcing for product innovation or incorporating waste reduction techniques in production design. The influence of GHRM on GPI can also be seen in how companies approach green leadership (Yong et al., 2022). When leaders adopt green HR practices, such as green leadership development programs, they mentor employees to take ownership of sustainability initiatives, creating a strong foundation for green product innovation. For instance, employees who internalize the principles of GHRM are more likely to identify opportunities to reduce a product's environmental footprint, whether through sustainable materials, energy-efficient processes, or recyclability. This proactivity is crucial in GPI, as it encourages employees to go beyond compliance and take an active role in the green innovation process (Agyabeng-Mensah et al., 2020). In this regard, GHRM cultivates a sense of ownership among employees by involving them in the company's sustainability efforts, thereby fostering a mindset of continuous improvement in green product development. As employees become more engaged in the company's sustainability mission, they begin to take greater responsibility for green outcomes, which translates into a more innovative approach to product development (Farrukh et al., 2022). Thus, GHRM serves as a strategic lever to enhance organizational capabilities, making green innovation a natural outcome of the firm's sustainability culture. From such points, we propose:
H5: There is a positive relationship between GHRM and GPI.

METHODOLOGY

Data and Research Procedure

This research is grounded in questionnaire data collected from SMEs operated in East Java, a region known for its vibrant and diverse entrepreneurial landscape. The decision to employ a questionnaire aligned with the study's core objectives, specifically aimed at empirically testing the hypotheses. The use of a questionnaire not only facilitated the collection of large-scale data across different industries and business sizes but also allowed for the standardization of responses, ensuring consistency and comparability across various participants (Couper, 2017). Furthermore, questionnaires were deemed particularly suitable for this research context as they provided a structured means to capture a wide range of information, including demographic characteristics and business performance indicators (Moser and Korstjens, 2018). They also allowed for the collection of more complex data related to decision-making processes, resource allocation, and innovation capabilities within SMEs. In our questionnaires, we used closed-ended questions with Likert-scale responses (Moser and Korstjens, 2018). They facilitated the application of advanced statistical techniques, including regression analysis and structural equation modeling, allowing for the rigorous testing of the hypothesized relationships (Moser and Korstjens, 2018).

On the first page of the questionnaire, we took careful measures to clearly articulate the aims and objectives of our research, ensuring that participants were fully informed about the scope and purpose of the study (Chang et al., 2020). This initial explanation served as a means of transparency and an essential step in fostering trust and encouraging genuine participation, particularly given the sensitivity of the data we sought to collect (Chang et al., 2020; Hulland et al., 2018). We further outlined our approach to handling data, emphasizing that we strictly adhered to ethical standards and data privacy regulations. It was made explicit that the questionnaire did not seek to collect any data that could directly or indirectly identify participants. We ensured their anonymity throughout the process. This assurance was critical in addressing potential concerns around privacy, especially for SMEs that might be wary of sharing information about their business operations, even in aggregated form (Moser and Korstjens, 2018; Chang et al., 2020).

To reinforce our commitment to ethical research practices, we provided detailed information on how the data collected would be used exclusively for the purposes of this study, with all findings presented in a manner that would not compromise the confidentiality of individual responses (Hulland et al., 2018). Additionally, recognizing the importance of voluntary participation, we made it unequivocally clear that participants had the right to withdraw from the survey at any point, without facing any repercussions or penalties (Couper, 2017). As explained by Couper (2017), this included the option to discontinue their involvement even after partially completing the questionnaire. It informed that their engagement was entirely at their discretion. Such meticulous attention to ethical considerations was intended not only to comply with institutional research standards but also to foster a sense of security among participants, which, in turn, would likely result in more candid and accurate responses, thereby enriching the quality of the data collected.

We distributed a total of 150 questionnaires to 25 small and medium enterprises (SMEs) operating in the food and beverage sector. The objective was to gather comprehensive data on key operational aspects. Fortunately, all the questionnaires were returned. However, upon closer inspection, it became evident that a significant portion of the responses could not be processed. Specifically, 43 of the returned questionnaires were incomplete, with missing or unclear answers that rendered them unusable for analysis. This represents a substantial portion of the initial dataset, reducing the total number of valid responses available for further examination. Despite this, we were still able to retain 107 complete and analyzable questionnaires, which constitutes the final sample for our study. The remaining responses provide sufficient data to carry out a meaningful analysis, though the incomplete submissions may point to potential challenges in survey design or respondent engagement that could be addressed in future research endeavors. These factors, while limiting the initial dataset, do not detract from the overall validity of the responses that were fully completed.

Of the 107 data sets that we processed, 53% of the participants were men, while 47% were women, showing a fairly balanced gender representation. The educational backgrounds of the participants were also diverse, with approximately 67% holding diploma degrees, and the remaining 33% being bachelor's degree holders. This distribution reflects a mix of mid-level and higher education among the respondents. In terms of business experience, the participants have established and operated their businesses for an average of around 10 years. This suggests that the SMEs included in the study are relatively well-established, with significant experience in managing their operations in the food and beverage sector, providing a solid foundation for analyzing their responses. The combination of gender diversity, varying educational levels, and substantial business experience among the participants adds depth to the study and enhances the reliability of the insights gathered from the questionnaire data.

Measurements

In our research, we adopted well-established measurement items for the variables to ensure reliability and validity. To measure GTL, we referred to the items used by Singh et al. (2020), which are recognised for their robust assessment of leadership's influence on green initiatives. For GEB, we employed items developed by Tahir et al. (2020), which effectively capture employee engagement in sustainable practices. To measure GHRM, we utilized the items proposed by Munawar et al. (2022), which focus on the integration of green practices in HR policies and procedures. Finally, GPI was assessed using the measurement items from Chen and Liu (2020), known for their precision in evaluating innovation in environmentally friendly products. All of these variables were measured using a 5-point Likert scale, ranging from "strongly disagree" to "strongly agree," to capture the intensity of the participants' perceptions and attitudes accurately. This consistent scaling across all variables ensured comparability and facilitated a nuanced analysis of the relationships between the constructs in our study.

Data Analysis

We employed Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyse the data, a method well-suited for exploring complex relationships between variables (Guenther et al., 2023). However, before proceeding with the PLS-SEM analysis, we undertook a careful process of tidying up and cleaning the data. This step was crucial to ensure that the dataset was free from outliers and that no essential information was missing. By thoroughly examining the data for inconsistencies or abnormalities, we minimized the risk of skewed results, ensuring that the data was both reliable and valid for further analysis. This preparatory work is critical in achieving accurate and meaningful insights when using PLS-SEM, as it enhances the robustness of the model and the integrity of the findings.

The primary reason for using PLS-SEM in our study is that the focus is on prediction testing rather than theory testing (Guenther et al., 2023; Dash and Paul, 2021). Similarly, Usakli and Rasoolimanesh (2023) argue that PLS-SEM is particularly well-suited for studies that aim to examine and validate proposed predictors. It makes it ideal for our research objective of exploring the relationships between variables such as GTL, GEB, GHRM, and GPI. Unlike Covariance-Based SEM (CB-SEM), which is typically used for theory confirmation, PLS-SEM emphasizes maximizing the explained variance in dependent variables and is therefore highly effective in predictive analysis. This approach allows us to assess the strength of the predictors in driving outcomes, which aligns perfectly with the exploratory nature of our study. Therefore, we can derive actionable insights from the data, focusing on the practical significance of the predictors in real-world scenarios, rather than solely confirming theoretical constructs.

RESEARCH RESULTS

Measurement Model Assessment

Table 1 provides critical insights into the reliability and validity of the constructs GEB, GHRM, GPI, and GTL.

Table 1.
Cronbach's Alpha, Composite Reliability (CR), Average Variance Extracted (AVE)

Variables	Cronbach's Alpha	CR	AVE
GEB	0.748	0.838	0.565
GHRM	0.900	0.926	0.714
GPI	0.930	0.948	0.788
GTL	0.932	0.948	0.787

As shown in Table 1, the Cronbach's Alpha values, ranging from 0.748 to 0.932, indicate acceptable to excellent internal consistency across the variables (Sarstedt et al., 2022), with GHRM, GPI, and GTL surpassing the commonly accepted threshold of 0.9, demonstrating robust reliability. The CR scores further affirm the constructs' reliability, all exceeding the 0.7 benchmark, ensuring the measures are free from random error (Hair et al., 2020). The AVE values for all constructs, particularly GPI (0.788) and GTL (0.787), surpass the 0.5 threshold, which confirms that a substantial portion of the variance in the indicators is captured by the constructs, ensuring convergent validity. Overall, these metrics reflect a high level of internal consistency and validity, providing a strong foundation for further structural model analysis.

Table 2.
Outer Loadings

Items of measurement	GEB	GHRM	GPI	GTL
GEB1	0.793			
GEB2	0.759			
GEB3	0.765			
GEB4	0.687			
GHRM1		0.922		
GHRM2		0.813		
GHRM3		0.877		
GHRM4		0.777		
GHRM5		0.829		
GPI1			0.720	
GPI2			0.949	
GPI3			0.920	
GPI4			0.917	
GPI5			0.912	
GTL1				0.881
GTL2				0.922
GTL3				0.884
GTL4				0.953
GTL5				0.785

Table 2 outlines the outer loadings of items measuring GEB, GHRM, GPI, and GTL, which are crucial for assessing the strength of the relationships between observed variables and their respective latent constructs. The loadings of all items for GHRM, GPI, and GTL surpass the 0.7 threshold, reflecting strong indicator reliability and confirming that the items exhibit high levels of shared variance with their constructs (Hair et al., 2020). Notably, GPI2 (0.949), GPI3 (0.920), and GTL4 (0.953) exhibit exceptionally high loadings, suggesting that these items are particularly representative of their respective latent variables. While GEB items display slightly lower loadings, ranging from 0.687 to 0.793, they still meet acceptable standards, implying satisfactory indicator

reliability. The consistent loadings across GHRM, GPI, and GTL constructs not only reinforce the constructs' robustness but also affirm that the measurement model demonstrates solid convergent validity. As such, this provides a strong basis for proceeding to further structural assessments with confidence in the reliability of the indicators.

Table 3.
Fornell-Larcker Criterion

Variables	GEB	GHRM	GPI	GTL
GEB	*0.752*			
GHRM	0.192	*0.845*		
GPI	0.765	0.203	*0.888*	
GTL	0.277	0.712	0.167	*0.887*

Table 3 presents the Fornell-Larcker criterion, a key measure for evaluating discriminant validity, which ensures that the constructs are sufficiently distinct from each other (Hair et al., 2020). Diagonal elements represent the square root of the AVE for each variable, with values exceeding the inter-construct correlations, thereby demonstrating acceptable discriminant validity. GEB, GHRM, GPI, and GTL exhibit square root values of 0.752, 0.845, 0.888, and 0.887, respectively, all higher than the correlations in their corresponding columns and rows, confirming that each construct shares more variance with its own indicators than with others.

Table 4
Cross Loadings

Items of measurement	GEB	GHRM	GPI	GTL
GEB1	0.793	0.354	0.625	0.386
GEB2	0.759	0.107	0.535	0.190
GEB3	0.765	0.122	0.656	0.165
GEB4	0.687	-0.122	0.440	0.003
GHRM1	0.198	0.922	0.192	0.685
GHRM2	0.174	0.813	0.217	0.634
GHRM3	0.187	0.877	0.203	0.639
GHRM4	0.064	0.777	0.046	0.511
GHRM5	0.167	0.829	0.173	0.505
GPI1	0.745	0.088	0.720	0.130
GPI2	0.661	0.194	0.949	0.189
GPI3	0.675	0.223	0.920	0.181
GPI4	0.654	0.197	0.917	0.104
GPI5	0.621	0.203	0.912	0.134
GTL1	0.260	0.588	0.102	0.881
GTL2	0.263	0.541	0.134	0.922
GTL3	0.270	0.557	0.216	0.884
GTL4	0.234	0.586	0.091	0.953
GTL5	0.202	0.800	0.181	0.785

Table 4 illustrates cross-loadings, a key diagnostic for assessing discriminant validity at the item level by comparing an indicator's loading on its assigned construct versus other constructs. The loadings for each item are highest on their respective constructs, confirming the appropriateness of item-to-construct assignment and supporting discriminant validity (Hair et al., 2020)

Table 5 presents the Heterotrait-Monotrait Ratio (HTMT), a stringent criterion for assessing discriminant validity (Hair et al., 2020). Generally, HTMT values below 0.90 indicate adequate discriminant validity, while values above this threshold suggest potential concerns (). In this case, most of the inter-construct ratios fall below the threshold, affirming that the constructs are distinct from each other.

Table 5
Heterotrait-Monotrait Ratio (HTMT)

Variables	GEB	GHRM	GPI	GTL
GEB	-			
GHRM	0.288	-		
GPI	0.890	0.216	-	
GTL	0.312	0.749	0.175	-

Hypothesis Testing

The interpretation of Table 6's direct effects shows the complex interactions between leadership, employee behaviour, HR practices, and innovation within green initiatives. The path from GTL to GPI (H1), with a negative β value of -0.175 (SD = 0.098, p = 0.076, 95% CI [-0.365, 0.007]), suggests an inverse and non-significant relationship, indicating that transformational leadership does not directly facilitate green innovation. However, the positive β of 0.277 from GTL to GEB (H2) (SD = 0.104, p = 0.008, 95% CI [0.078, 0.477]) highlights a significant positive effect, suggesting that leadership plays a pivotal role in enhancing employee eco-friendly behaviour. The strong path from GTL to GHRM (H3), with β = 0.712 (SD = 0.058, p < 0.001, 95% CI [0.605, 0.822]), emphasizes the critical influence of leadership in embedding green HR practices, confirming its vital role in shaping sustainability-oriented organizational processes. GEB's direct influence on GPI (H4), with a β of 0.779 (SD = 0.052, p < 0.001, 95% CI [0.681, 0.888]), shows a substantial positive impact, positioning employee behaviour as a key driver of green innovation. Finally, GHRM showing significant influence on GPI (H5), β = 0.178 (SD = 0.082, p = 0.030, 95% CI [0.022, 0.336]), indicates that while HR practices contribute to innovation, their impact is less direct compared to behavioural or leadership factors. These findings reflect complex, hierarchical interactions in the green organizational landscape.

Table 6
Direct effect

Paths	*β*	SD	P Values	2.5%	97.5%	Notes
H1: GTL -> GPI	-0.175	0.098	0.076	-0.365	0.007	Not supported
H2: GTL -> GEB	0.277	0.104	0.008	0.078	0.477	Supported
H3: GTL -> GHRM	0.712	0.058	0.000	0.605	0.822	Supported
H4: GEB -> GPI	0.779	0.052	0.000	0.681	0.888	Supported
H5: GHRM -> GPI	0.178	0.082	0.030	0.022	0.336	Supported

Table 7 outlines the indirect effects, shedding light on the mediating roles of GEB and GHRM between GTL and GPI. The indirect effect for the path GTL -> GEB -> GPI (H2a) is significant (β = 0.215, SD = 0.082, p = 0.009, 95% CI [0.056, 0.373]), confirming that GEB effectively mediates the relationship between leadership and innovation. This suggests that transformational leadership positively affects employee green behaviours, which in turn drive green innovation. Similarly, the path GTL -> GHRM -> GPI (H3a) exhibits a significant indirect effect (β = 0.127, SD = 0.062, p = 0.041, 95% CI [0.016, 0.256]), supporting the notion that green HRM practices also mediate the leadership-innovation link. These findings indicate that both employee behaviours and HRM practices are vital channels through which leadership exerts influence on green innovation, but with varying levels of impact. Together, these mediating

pathways highlight the layered nature of leadership's influence in fostering sustainable innovation within organizations.

Table 7
Indirect effect

Paths	*β*	SD	P Values	2.5%	97.5%	Notes
H2a: GTL -> GEB -> GPI	0.215	0.082	0.009	0.056	0.373	Supported
H3a: GTL -> GHRM -> GPI	0.127	0.062	0.041	0.016	0.256	Supported

Additional Analysis

Table 8 presents the Variance Inflation Factor (VIF) values, which assess multicollinearity among the constructs in the model.

Table 8
VIF

Variables	GEB	GHRM	GPI	GTL
GEB	-	-	1.083	-
GHRM	-	-	2.028	-
GPI	-	-	-	-
GTL	1.000	1.000	2.114	-

As suggested, a VIF value below 5 generally indicates an acceptable level of multicollinearity, ensuring that each predictor variable provides unique information about the dependent variable (Hair et al., 2020). The VIF for GEB (1.083) and GHRM (2.028) in relation to GPI are well below the critical threshold, suggesting minimal multicollinearity and confirming that these constructs independently contribute to explaining green product innovation. The VIF for GTL is 1.000 when predicting both GEB and GHRM, indicating no multicollinearity issues between GTL and these constructs. However, GTL's VIF value when predicting GPI (2.114), while still acceptable, is slightly higher, reflecting its significant role in influencing GPI, possibly through its indirect effects via GEB and GHRM. Overall, the VIF values demonstrate that the constructs are not highly collinear, supporting the robustness and stability of the model's predictive relationships.

Table 9
***R* Square**

Variables	*R* Square
GEB	0.076
GHRM	0.507
GPI	0.603

Table 9 presents the R Square values, which indicate the amount of variance explained by the independent variables for each dependent variable in the model. The R Square value for GEB is 0.076, indicating that only 7.6% of the variance in GEB is explained by GTL, suggesting a weak explanatory power of the model in predicting GEB. In contrast, the R Square for GHRM is 0.507, showing that 50.7% of the variance is accounted for by GTL, reflecting a strong influence of transformational leadership in shaping green HRM practices. The R Square for GPI is 0.603, meaning that 60.3% of the variance in GPI is explained by the combined effects of GEB, GHRM, and GTL.

Table 10 provides the f Square values, which measure the effect size of the predictor variables on the dependent variables. This helps determine the magnitude of the contribution each independent variable makes to the variance of the dependent variables. The large f Square of 1.411 for GEB on GPI highlights the pivotal role of employee behaviour as a dominant driver of green

innovation, marking it as a critical lever in the sustainability process. In contrast, GHRM shows a small effect size ($f^2 = 0.039$) on GPI, indicating its modest but still valuable contribution to fostering innovation. The large f Square of 1.027 for GTL on GHRM highlights leadership's transformative influence on green HR practices, while the smaller f Square values of 0.083 and 0.037 for GTL's effects on GEB and GPI, respectively, suggest that GTL's direct impact on employee behaviour and innovation is limited, implying that much of its influence operates through its strong effect on GHRM.

Table 10
***f* Square**

Variables	GEB	GHRM	GPI
GEB			1.411
GHRM			0.039
GPI			
GTL	0.083	1.027	0.037

DISCUSSION

Discussion of Findings

In our study, institutional theory provides a lens through which GTL is seen as part of a broader societal or regulatory shift towards sustainability, with GHRM and GEB acting as institutionalized mechanisms that translate leadership into innovation.

At its core, institutional theory posits that organizational behaviour is shaped by broader institutional norms, values, and pressures (Aksom and Tymchenko, 2020; Tolmie et al., 2020). In this context, the absence of a significant direct relationship between GTL and GPI can be understood as a reflection of institutional constraints. Leaders, while committed to green transformation, are often restricted by existing institutional frameworks – regulatory, cultural, or market-based – that inhibit their ability to directly drive product innovation. The negative coefficient observed in the direct relationship may indicate the clash between transformational leadership ideals and institutionalized practices, where green innovation is not prioritised or supported. This institutional inertia reinforces the argument that mere leadership is insufficient in breaking through entrenched norms that govern the company's innovation agenda.

The mediating roles of GHRM and GEB highlight a more complex, indirect pathway for green innovation, where internal organizational structures and individual behaviours act as pivotal mediators. Institutional theory suggests that organizational practices such as GHRM and GEB can act as buffers or bridges between leadership intent and institutionalized constraints (Huang and Chen, 2022). GHRM embeds green practices into organizational routines, aligning employee incentives and recruitment strategies with broader sustainability goals. GEB, shaped by this HR infrastructure (Shibin et al., 2020; Ahmed et al., 2023), reflects a shift in the micro-level behaviours that can drive innovation. Thus, the positive relationship between GTL and GPI, when mediated by GHRM and GEB, signals that institutional change is more likely to emerge when leadership is integrated with organizational practices and individual behaviours. Rather than a top-down, leader-centric approach, the shift to green innovation requires alignment across institutional levels, where leadership intentions are converted into actionable practices through HR and employee engagement.

Furthermore, this framework advances institutional theory by illustrating how leadership can function as a catalyzing force, but only within the bounds of institutional structures and practices. GTL's partial influence on GHRM and GEB supports the idea that leadership serves as an enabler rather than a direct driver of innovation. In institutional terms, leadership fosters the development of normative frameworks that promote green behaviours and practices, but these norms must be diffused and institutionalized within the organization to result in tangible outcomes such as green innovation. By embedding green norms within HR policies and shaping employee behaviour, organizations can achieve institutional legitimacy, aligning with broader environmental and sustainability trends. This dynamic interplay between leadership,

organizational practices, and employee behaviour underscores the critical need for institutional alignment, where GTL sets the vision, but institutional actors – through GHRM and GEB – transform that vision into innovative products.

Theoretical implications

The theoretical implications of our findings significantly contrast with prior studies, particularly those that have traditionally framed GTL as a pivotal driver of GPI (Majali et al., 2022; Ahmad et al., 2024; Begum et al., 2022). In earlier literature, GTL has often been hailed as a direct antecedent to green innovation, with transformational leaders assumed to inspire organizational change, align employee values with environmental goals, and, by extension, foster innovative, sustainable products (Li et al., 2020; Hameed et al., 2022). However, our study challenges this linear perspective, suggesting that the relationship between GTL and GPI is not only insignificant but shows a negative coefficient when examined directly. This counters the widely accepted transformational leadership theory, suggesting that leadership alone, without structural and behavioural mediators, may not generate the innovation outcomes expected by previous research. Theoretical frameworks that emphasize leadership's capacity to unilaterally drive innovation thus fall short of capturing the institutional complexity that mediates the relationship between leadership and organizational outcomes, demanding a more nuanced approach.

One possible explanation for this counterintuitive finding lies in the complexity of organizational processes and the potential for misalignment between leadership intentions and innovation outcomes. Although GTL often articulate a compelling vision of sustainability and inspire commitment to environmental goals, the pathways through which these aspirations are operationalized into actual product innovation are fraught with challenges. For instance, an overly strong focus on transformational leadership ideals may, in some cases, lead to resource allocation decisions that priorities long-term cultural or structural changes over the immediate practicalities of product development. In such scenarios, the aspirational rhetoric of GTL might overshadow the technical and market-oriented dimensions of GPI, leading to a misalignment between high-level strategic goals and the more nuanced demands of the innovation process. Moreover, the negative relationship we observe may stem from potential organizational inertia or resistance. Transformational leadership often entails significant shifts in organizational norms and practices, which, while ultimately intended to be beneficial, can generate short-term disruption. If GTL is perceived by employees or middle management as imposing overly ambitious environmental targets without sufficient infrastructural or resource support, this could result in disengagement or burnout, thereby stifling the creative processes necessary for GPI.

Additionally, leadership-driven sustainability initiatives may, in some instances, generate conflict between departments, particularly when sustainability objectives clash with traditional performance metrics, such as cost-efficiency or speed to market. This tension can create an environment where innovation is constrained by competing priorities, further explaining the negative association we observed. Another potential factor contributing to this negative coefficient could be the external institutional pressures that shape both GTL and GPI. While GTL is often lauded for its ability to respond to coercive, mimetic, and normative isomorphic pressures by aligning the organization with broader environmental expectations, these same institutional forces might also impose rigid frameworks or standards that stifle the flexibility and creativity necessary for breakthrough green innovations. In some cases, organizations may adopt GTL as a symbolic gesture to appease external stakeholders, while the actual processes required to foster green innovation remain underdeveloped or underfunded. This kind of institutional decoupling, where leadership practices are disconnected from substantive innovation outcomes, could partially explain the inverse relationship between GTL and GPI.

Our analysis introduces a critical refinement to institutional theory by emphasizing the mediating roles of GHRM and GEB. Previous studies, especially those in the field of leadership theory, often fail to incorporate the influence of institutional structures, instead focusing predominantly on individual leader characteristics and their influence on follower behavior (Çop et al., 2021; Riva et al., 2021; Rizvi and Garg, 2021). These studies have typically assumed that

leadership styles, particularly transformational leadership, can directly shape organizational outcomes without considering the institutional constraints or internal mechanisms that may moderate or mediate this relationship (see also Moin et al., 2021). By demonstrating the importance of GHRM and GEB as critical pathways through which GTL indirectly influences GPI, our study reframes the debate, moving away from a leader-centric model to one that recognizes the institutional processes and practices that are necessary for translating leadership vision into innovation. This theoretical shift implies that previous studies may have overestimated the autonomous power of leadership in shaping innovation, neglecting the complex interplay between leadership, organizational systems, and employee behaviours within institutional frameworks. Our study underlines that leadership plays a critical role, but it is not sufficient in isolation. Instead, the broader organizational context, which includes structured systems like green HR practices, must work in tandem with leadership to create an environment conducive to innovation. Employees, too, are not passive actors; their active engagement in green behaviors is essential, highlighting the need for an integrated approach that involves multiple layers of the organization. This result comments on the institutional theory's focus on external pressures and conformity by shifting attention toward the systemic, intra-organizational factors that foster sustainable innovation. Moreover, our study acknowledges the complexity of innovation as a holistic, dynamic process that requires active participation and support across all organizational levels, challenging the notion that organizations simply adopt practices due to external institutional pressures.

Then, the contrast between our findings and prior studies calls into question the assumption that leadership itself can directly overcome institutional barriers to innovation. Prior research often treated institutional barriers – such as rigid organizational routines, regulatory constraints, and established market practices – as factors that could be mitigated or bypassed by strong, visionary leadership (Santos and Eisenhardt, 2009; Arici and Uysal, 2022; Farrukh et al., 2022). However, our study's emphasis on the negative direct relationship between GTL and GPI suggests that transformational leadership may not only be insufficient but could even clash with entrenched institutional norms, creating resistance rather than fostering innovation. As previously mentioned, the positive and significant relationship that emerges only when mediated by GHRM and GEB highlights the necessity of embedding leadership initiatives within institutionalized practices and employee behaviours. This contrasts sharply with earlier studies, which did not adequately account for the mediating role of HR practices and behavioural norms, thereby under-theorizing the institutional dynamics at play (Khan et al., 2021). In doing so, our findings push the theoretical conversation forward, suggesting that institutional theory must be more thoroughly integrated into studies of leadership and innovation, recognizing the need for alignment across organizational layers to achieve sustainable outcomes.

Managerial Implications

The managerial implications of our findings suggest a profound reconsideration of how organizations approach green leadership and innovation, particularly within the context of emerging economies. Traditional approaches that place GTL at the core of innovation strategies may be overly simplistic, as our research shows that GTL, by itself, does not directly drive GPI. In fact, the negative coefficient observed in the direct relationship between GTL and GPI underlines the potential pitfalls of over-relying on leadership to bring about innovation without the support of appropriate mediating mechanisms. In this sense, managers need to be aware that transformational leadership, while important in setting a vision, cannot alone overcome the institutional constraints or organizational inertia that hinder green innovation. Instead, leadership must be strategically aligned with organizational systems – particularly GHRM and GEB – to unlock its full potential in fostering innovation. This highlights the importance for managers to view leadership not as a standalone force but as part of a broader organizational ecosystem that includes structured policies, employee engagement, and institutionalized practices.

One of the most critical implications for managers is the need to institutionalize green practices through GHRM. Our study demonstrates that GHRM plays a pivotal mediating role between GTL and GPI, suggesting that green leadership must be translated into actionable HR

policies to have a meaningful impact on innovation. Managers should focus on embedding sustainability goals into recruitment, training, performance evaluation, and reward systems to create an organizational culture that supports green initiatives. By aligning HR policies with environmental objectives, managers can ensure that employees not only understand the importance of green innovation but are also motivated and equipped to contribute to it. This strategic integration of GHRM offers a pathway for managers to bridge the gap between leadership intent and operational execution, ensuring that sustainability goals are embedded within the fabric of the organisation. Moreover, managers should consider GHRM as a tool for enhancing organizational legitimacy, as companies with strong HR practices focused on sustainability are more likely to gain institutional support, both internally and externally, by aligning with broader societal and regulatory expectations.

Equally important for managers is the role of GEB in translating leadership into innovation outcomes. Managers must prioritise the cultivation of green behaviours at all levels of the organization, recognizing that employees are not passive recipients of leadership directives but active agents whose behaviours drive innovation. Practical measures might include employee empowerment initiatives, green training programs, and fostering a culture of environmental stewardship. By encouraging behaviours such as resource conservation, eco-friendly product development, and collaboration on sustainability projects, managers can ensure that green innovation becomes an integral part of everyday organizational life. This has profound implications for leadership development as well. Managers must focus not only on inspiring employees but also on creating an environment in which green behaviours are actively encouraged and rewarded. In doing so, they facilitate the bottom-up diffusion of sustainability practices, which, in combination with top-down leadership, can significantly enhance the organization's capacity for green innovation.

Finally, the implications for managers extend to the broader strategic orientation of the firm. The lack of a direct relationship between GTL and GPI suggests that managers cannot rely solely on leadership-driven innovation strategies. Instead, they must adopt a more holistic approach, integrating leadership with institutional frameworks that support sustainability at multiple levels. Managers should focus on creating an organizational architecture that aligns leadership goals with operational practices, from HR systems to employee behaviour, while ensuring that these practices are institutionally embedded. This means not only investing in leadership development but also ensuring that the entire organizational infrastructure is designed to support green innovation. For instance, managers might need to rethink organizational structures, decision-making processes, and resource allocation to ensure they are conducive to sustainability goals. In addition, strategic alliances with external stakeholders – such as regulatory bodies, suppliers, and customers – can help to further institutionalize green practices, creating a more supportive environment for innovation. Managers, therefore, must move beyond a singular focus on leadership and adopt a systems-thinking approach that recognizes the complex interplay between leadership, organizational practices, and the institutional context in driving sustainable innovation.

CONCLUSION

The empirical evidence derived from our study critically reframes the theoretical discourse on GTL and its impact on GPI through the lens of institutional theory. Traditional perspectives have often posited a direct, linear relationship between GTL and GPI, predicated on the assumption that visionary and inspirational leadership directly translates into tangible innovation outcomes. However, our findings suggest a more complex interaction, where the direct relationship between GTL and GPI is not only insignificant but exhibits a negative coefficient. This divergence from the prevailing theoretical models can be interpreted through institutional theory, which emphasizes the importance of formal and informal structures within organizations. The lack of a direct effect indicates that GTL alone may be insufficient in navigating the institutional constraints and entrenched practices that shape innovation outcomes. Instead, our study highlights that GTL's influence on GPI is significantly mediated by GHRM and GEB, thus suggesting that leadership must be embedded within a supportive institutional framework to drive innovation effectively. This finding refines the theoretical understanding by introducing the

necessity of institutional mechanisms that translate leadership intent into innovative outcomes, thereby challenging the notion that leadership alone is a sufficient precursor for green innovation.

LIMITATIONS AND SUGGESTIONS FOR FURTHER STUDIES

The critical analysis of our findings through the lens of institutional theory shows several important limitations that warrant further investigation. Institutional theory emphasizes that organizational behaviour is influenced by a myriad of external and internal pressures, norms, and values that may not be fully captured within the confines of our research design. The study's reliance on cross-sectional data may limit its ability to account for dynamic changes in institutional contexts over time, which could affect the relationship between GTL, GHRM, GEB, and GPI. Furthermore, our focus on specific industries or regions may restrict the generalizability of the findings, as institutional pressures and practices can vary significantly across different contexts. Future research should therefore consider longitudinal studies that track changes in institutional factors over time, as well as comparative analyses across diverse industries and geographical settings, to provide a more comprehensive understanding of how GTL interacts with institutional frameworks to influence innovation.

Furthermore, while our study highlights the critical roles of GHRM and GEB as mediators, it also reveals a need for a deeper exploration of the institutional dynamics that shape these variables. Institutional theory posits that organizations are influenced by both formal structures, such as policies and procedures, and informal norms, such as organizational culture and employee behaviours. However, our study primarily focused on the formal aspects of GHRM and the behavioural dimensions of GEB, potentially overlooking the subtler, informal institutional factors that might also play a significant role. Future research could benefit from a more nuanced examination of how informal institutional pressures and cultural factors interact with formal HR practices and employee behaviours to affect green innovation. Additionally, the potential moderating effects of external institutional pressures – such as regulatory changes, market dynamics, or stakeholder expectations – on the relationship between GTL, GHRM, GEB, and GPI warrant further investigation. By incorporating these dimensions, future studies can enhance the theoretical framework, providing a richer and more detailed understanding of how leadership and institutional factors coalesce to drive green innovation in varying contexts.

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