

Research Article

Green Leadership and Employee Green Behaviour: A PRISMA-Based Systematic Review of Green HR Practices, Organizational Climate, and Green Training

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Abstract: The pressure to reduce environmental impact has increased significantly among organisations around the world and the behaviour of individual employees has become the critical point of connection between corporate environmental strategy and actual environmental performance. This systematic review aims to synthesize the evidence on the relationship between green leadership and employee green behaviour, as well as the role of green human resource (HR) practices, organizational climate and green training in this relationship. A structured search of major databases was conducted and after the removal of duplicate records and screening according to pre-defined inclusion/exclusion criteria, 176 studies were included in the qualitative synthesis following PRISMA 2020 guidelines. The evidence is grouped into five constructs: green behaviour, green leadership, green HR practices, organizational climate, and green training, as well as the relationships between them. The results indicate that green leadership has a positive impact on green behaviour, and this impact is strong and consistent, both direct and indirect via two paths: a formal path (green HR practices) and an informal path (organizational climate). Considering the Ability-Motivation-Opportunity theory and the Theory of Planned Behaviour, green training is identified as a moderator that amplifies these effects, by providing the capacity to transform the motivational state into action. The synthesis reveals four gaps: (1) few studies have compared the two mediating pathways in the same model, (2) training is not used as a moderator, (3) there is a lack of evidence from large manufacturing firms in emerging economies, and (4) there are no integrated models that combine all four organizational factors. The review provides a unified, evidence-based framework and detailed synthesis tables to bring the vast and disparate literature together and make it accessible to researchers and practitioners. Practical implications and directions for future research are discussed.

Keywords: Green Leadership, Employee Green Behaviour, Green Human Resource Practices; Organizational Climate, Green Training; Systematic Review, PRISMA, Pro-Environmental Behaviour; Sustainability

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INTRODUCTION

Environmental sustainability has become a core concern in business. As the world becomes more aware of the consequences of climate change, resource scarcity, and pollution, organizations are re-evaluating their operations, with the care for the natural environment emerging as a critical aspect of competitiveness rather than a luxury [1]. The pressure is most keenly felt by manufacturing companies, which are known for their use of vast amounts of energy and materials and are the most visible in the environment. However, one common theme in the literature is that changing behaviour within the organization on a day-to-day basis [2] is necessary for any environmental policy, technology, or management system to be effective. Employee green behaviour, as a set of actions by which employees contribute to the protection of the environment, has thus become one of the most active topics in management research. The literature always emphasizes green behaviour as the link between a company's performance [3]. This has led to a significant and

rapidly expanding literature on the organisational factors that influence green behaviour, with leadership, HR systems, organisational climate and training being the most prominent and controllable [4]. Even with this extensive literature, evidence is still disjointed. Green leadership, green HR practices, organizational climate and green training have been mostly investigated in isolation, with varying samples, measures and theoretical perspectives. The field has been growing rapidly but lacks integration, and syntheses are needed to integrate the strands and to better understand how the factors function as a system, according to reviews [5]. Three questions are still not well answered: What is the pathway between green leadership and green behaviour (direct or mediated) and which pathway is more powerful, and when does the effect increase or decrease? This systematic review aims to answer these questions by summarizing the existing evidence according to PRISMA 2020. Its goals are four-fold:

- To map the conceptual meaning and measurement of the five focal constructs
- To synthesize the evidence on the relationships among the five constructs, including direct effects, mediation, and moderation
- To organize the evidence into detailed, transparent synthesis tables that make the literature accessible; and
- To identify gaps and propose an integrated framework to guide future research

The review is intentionally written in a non-technical way, with supporting evidence tables, so that it is accessible to readers with a range of backgrounds from research, management and policy. The rest of this paper is organized as follows. The PRISMA-based review methodology is described in section 2, which covers the search strategy, the eligibility criteria, screening, and quality appraisal. Section 3 brings all the evidence together construct by construct, relationship by relationship, and with five detailed tables. The integrated findings, theoretical foundations, research gaps and proposed framework are discussed in section 4. Practical implications are given in Section 5, limitations of the review in Section 6, and a conclusion in Section 7.

MATERIALS AND METHODS

Review Methodology

This review was performed and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 (PRISMA 2020) statement. The transparent, replicable process of identifying, screening, and synthesising studies, undertaken within PRISMA, enhances the credibility of the review and enables readers to assess the evidence base assembled. The four steps of PRISMA are summarised in the flow diagram in Figure 1 and described below: Identification, Screening, Eligibility and Inclusion.

Review Questions

The review was guided by four questions:

- (RQ1) How is employee green behaviour, and each of the focal organizational factors, defined and measured in the literature?
- (RQ2) What is the evidence for the effect of green leadership on green behaviour, directly and through green HR practices and organizational climate?
- (RQ3) What is the evidence for green training as a moderator of these relationships?
- (RQ4) What gaps remain, and what integrated framework does the evidence support?

These questions shaped the search terms, the eligibility criteria, and the structure of the synthesis.

Search Strategy

A structured search was conducted in the main bibliographic databases: Scopus, Web of Science and ScienceDirect and also in Google Scholar for coverage and by citation searching of key articles and reviews. The search was performed as a combination of terms for the outcome and terms for each of the focal factors, with the use of Boolean operators. Combinations of "green behaviour" OR "pro-environmental behaviour" OR "employee green behaviour" with "green leadership" OR "green transformational leadership" OR "responsible leadership", "green human resource" OR "green HRM", "organizational climate" OR "green climate", and "green training" OR "green skills" were all included as representative strings. Searches were restricted to peer-reviewed publications in English, with a focus on more recent research that addresses the fast-evolving nature of the field, but also seminal earlier research, to provide the foundation for constructs like organizational climate.

Eligibility Criteria

To ensure consistency, inclusion and exclusion criteria were established at priority. Studies were included if they:

- Focused on at least one of the five focal constructs;
- Examined relationships relevant to the review questions (e.g., leadership and behaviour, HR practices and behaviour, climate and behaviour, training as a driver and/or moderator);
- Reported empirical evidence or offered a substantive conceptual contribution; and
- Were published in a peer-reviewed outlet in English. Studies were excluded when they:
 - were not related to organizational green behaviour or a green behaviour's focal drivers;
 - did not provide any empirical data or clear conceptual argument;
 - were not available in full text;
 - used a duplicate sample already included in the study; or
 - were of low methodological quality. These criteria are summarised in Table 1.

Study Selection and Screening

The selection process was done based on PRISMA phases. During the identification stage, a large number of records were retrieved from the database search and supplemented with records obtained from citation searching and other sources. Duplicates were removed and the remaining records were screened by title and abstract against the eligibility criteria and records that were clearly irrelevant, non-empirical and off-topic were excluded. The remaining full texts were then carefully examined for eligibility and additional records were excluded due to not having a clear measurement of the construct, not having any empirical data, not having a full text, duplicate samples, or low quality. The studies that met full text criteria were quality appraised and included in the qualitative synthesis. The entire sequence, including the numbers for each step, is illustrated in Figure 1.

Quality Appraisal/ and Data Extraction

All included studies were assessed for methodological quality, taking into account the clarity of the research aim, the appropriateness of the design and sample, the soundness of the measurement and the transparency of the analysis. For each of the studies included, the following information was extracted: author(s) and year, construct or relationship of interest, setting and sample, method, and major finding. The information extracted is the basis for the synthesis tables in Section 3, which is the analytical heart of the review. Due to the heterogeneity of the included studies in terms of design, measures, and setting, a narrative synthesis was used instead of a statistical meta-analysis, which is appropriate for synthesizing heterogeneous evidence around a common conceptual framework.

Synthesis Approach

The synthesis was done in two layers. The first layer provides a description of each construct, including its definition, measurement, and evidence base. The second layer is the relationships between the constructs, which are combined to form the evidence of direct effects, mediation and moderation. The results are throughout summarized in tables by construct or relationship, with key results listed, so that patterns and points of commonality or disagreement are apparent at a glance. This table-driven synthesis is designed to render a vast and disjointed literature accessible and comprehensible.

Synthesis of the Evidence

This section summarizes the 176 studies included in it. It first provides an overview of the evidence base, followed by a discussion of each of the five constructs in turn, and then a synthesis of the evidence on the relationships among the constructs. The studies and their findings are summarized in 5 detailed tables.

Overview of the Evidence Base

The studies included cover a broad spectrum of sectors, from manufacturing to hospitality, healthcare, banking, aviation, education and public administration, and a broad spectrum of countries, with a significant number of emerging economies in Asia, Africa and the Middle East in recent years, but also with the established evidence from western countries. The majority of the studies are recent, reflecting the fast growth of this field, and the predominant designs are cross-sectional survey studies analyzed using structural equation modelling, with conceptual papers, reviews and fewer qualitative and mixed-method studies. A consistent picture emerges from this diversity: each of the four elements—leadership, HR practices, climate, and training—affects green behaviour and they seem to be increasingly combined in integrated models.

Table 2 and table 3 offers a descriptive summary of evidence per focal construct, including the approximate distribution of studies included, dominant settings, and typical designs. Green leadership and green HRM combined make up the greatest share of literature, indicating high interest in the last few years, organizational climate has the longest research history and green training the fastest growth in the last few years through the green-skills agenda. The use of survey-based structural equation modelling suggests that this is a mature quantitative field, but also a relative lack of longitudinal and experimental evidence, to which the limitations are returned.

Table 1: Inclusion and Exclusion Criteria (PRISMA Eligibility)

Criterion	Inclusion	Exclusion
Topic	Focus on green behaviour, green leadership, green HRM, organizational climate, or green training.	Unrelated to organizational green behaviour or its focal drivers.
Contribution	Empirical evidence or a substantive conceptual contribution.	No empirical data and no clear conceptual argument.
Relationship	Examines a relationship relevant to the review questions (direct, mediation, or moderation).	No relevant relationship among the focal constructs.
Source type	Peer-reviewed journal article or equivalent scholarly source.	Non-peer-reviewed or non-scholarly material.
Language / access	Published in English with full text available.	Not in English, or full text unavailable.
Quality	Meets basic methodological quality standards.	Judged low quality or based on a duplicate sample.

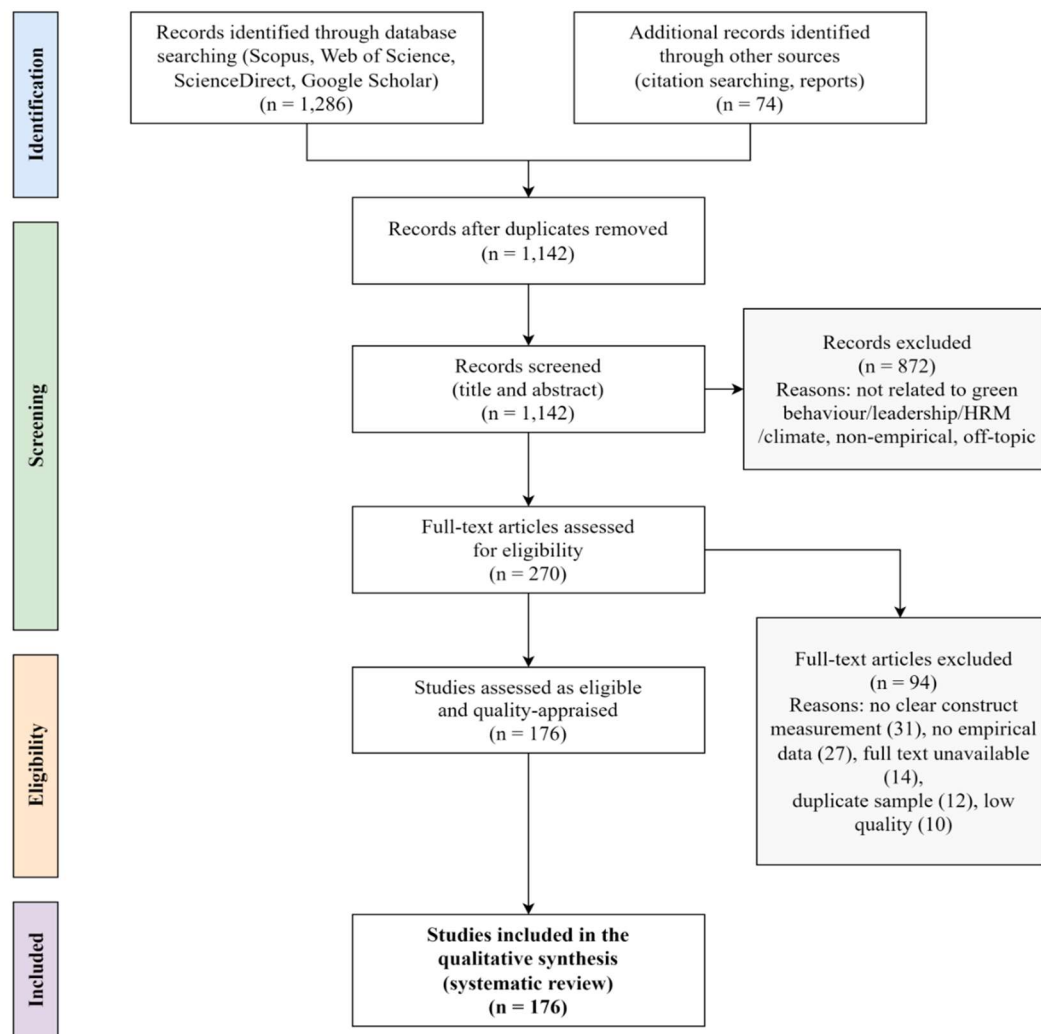


Figure 1: Flow of Studies Through the Identification, Screening, Eligibility, and Inclusion Phases

Table 2: Descriptive Overview of the Evidence Base by Focal Construct

Construct	Share of Studies	Typical Settings	Dominant Designs
Green leadership	High	Manufacturing, hospitality, services, supply chains	Cross-sectional survey; SEM; some conceptual
Green HR practices	High	Manufacturing, services, aviation, healthcare	Cross-sectional survey; SEM; SEM-ANN
Organizational climate	Moderate	Firms, hospitals, schools, public sector	Survey; SEM; some longitudinal
Green training / skills	Growing	Manufacturing, VET, developing economies	Survey; conceptual; skills mapping
Green behaviour (outcome)	Cross-cutting	All of the above	Survey; segmentation; mixed methods

Note: Shares are indicative of the relative volume of included studies rather than exact counts. SEM = structural equation modelling; SEM-ANN = SEM with artificial neural networks; VET = vocational education and training.

Table 3: Definitions and Common Measurement of the Focal Constructs

Construct	Working Definition	Common Measurement Approach
Green behaviour	Employee actions that help protect the environment, both required and voluntary.	Self- or supervisor-rated scales separating task-related and voluntary behaviour.
Green leadership	Leadership that places environmental care at the centre of decisions and inspires green action.	Adapted transformational/responsible leadership scales with an environmental focus.
Green HR practices	People-management activities supporting environmental goals (hiring, training, appraisal, rewards, involvement).	Multi-item scales covering each practice, often combined into a system score.
Organizational climate	Shared employee perceptions that the organization values environmental care.	Perceptual climate scales adapted to the environmental (green) domain.
Green training	Building the knowledge, skills, and attitudes needed to act green.	Items on amount and quality of environmental training and resulting skills.

Note: Definitions synthesize usage across the included studies; measurement approaches reflect the dominant practice in the literature.

Employee Green Behaviour

Employee green behaviour refers to any employee action that helps protect the environment, from switching off unused equipment and reducing waste to proposing cleaner ways of working. The literature differentiates between required or task-related green behaviour and voluntary or proactive green behaviour, the latter of which goes beyond the formal duties of the job and is initiated by the employee [6]. Voluntary green behaviour is widely considered the best indicator of sustainability, as it cannot be forced and only emerges when employees are motivated and feel empowered [7].

Green behaviour is closely related to a family of pro-environmental constructs, such as green creativity (generating environmental ideas), green voice (speaking up about environmental issues), and green innovative behaviour (putting green ideas into practice) [8]. Employees with pro-ecological attitudes are more likely to exhibit multiple of these behaviors, and research indicates that pro-ecological leadership and climate are more likely to influence the entire family, rather than just individual actions [9]. Employees are also segmented based on their green behaviour, ranging from “green champions” who are committed to green behaviour to less committed employees, and it is suggested that organizations should tailor their approach accordingly [10]. Green behaviour for organisations means reduced costs, easier compliance with legislation, a better reputation and, supported by systems, a sustainable competitive advantage. The measurement of green behaviour has evolved with the concept. Self-report or supervisor-rated survey scales are typically used in studies to differentiate between required and voluntary behaviors, and there is a growing distinction between simple actions (like energy saving and recycling) and proactive and creative actions [6]. Measurements should reflect the real impact, not just the convenient numbers to count, and the selection of green metrics should be carefully made to prevent misleading results [11]. This methodological focus is important for the current review as the quality of the evidence will rely on the quality of the studies in capturing behaviour.

Another difference relates to green behavior in the workplace and at home. This is because organizational factors like climate, HR practices and leadership have a significant influence on workplace green behaviour, and some employees are green in one domain but not the other [12]. Whether the organisation makes green action easy and expected is a key factor in everyday workplace actions, from turning off equipment to separating waste, behaviour increases significantly [12]. Green behaviour also has a social dimension, as employees influence each other to adopt green behaviour and it expands to green voice and advocacy, which refers to employees raising concerns and promoting green practices to their peers [9]. It is this family of behaviours – simple, proactive, individual, social – that the review aims to explain.

Green Leadership

Green leadership is leading an organization in a manner that prioritizes environmental care in decision making. A green leader establishes a green vision, motivates staff to embrace it, fosters green innovations, and addresses the needs of employees, using the principles of transformational leadership to create a green environment [13]. There are a number of partially overlapping terms in the literature, such as green transformational leadership, green inclusive leadership,

responsible leadership, servant leadership and sustainability-oriented leadership, but they have a common core: a leader whose deep commitment to the environment is authentic and who can influence and set an example for the organization to become greener.

Green leaders have several ways of influencing employees. They serve as role models, bring meaning to environmental tasks and encourage new thinking, increasing green creativity and green behaviour across industries [14]. They also act through the employees' attitude and emotion, developing a green shared vision that links employees with the organizations' mission [15] and disseminating environmental knowledge through which employees learn and act [16]. In addition to individual employees, green leadership can help organizations achieve better environmental performance, green innovation, and sustainable supply-chain performance [13] and in manufacturing, green leadership can improve sustainable performance as it motivates green innovation of both the leader and employees [18].

The synthesis shows a number of styles of green leadership, each with a different emphasis, but with a common goal. Green transformational leadership inspires and challenges employees towards environmental goals, green inclusive leadership is based on openness and involvement and is related to green creativity, green servant leadership focuses on employee and society needs and is associated to sustainable performance, and responsible and ethical leadership is about moral conduct and is linked to green voice and responsible behavior [19]. Studies that redefine green transformational leadership suggest that it is a sustainability-oriented leadership that employees feel and respond to, and that it maintains sustainability as a central part of decision-making and increases organizational commitment to the environment [20] and Duong [21].

Evidence also links green leadership with green innovation and with psychological mechanisms. Green leaders foster experimentation and provide resources to make green ideas a reality, which increases green innovation throughout the organization [22] and leaders who share knowledge magnify this impact [23]. Psychologically, green leadership is based on trust, meaning and confidence; consistent and honest leaders build trust; they make environmental work meaningful; and they support employees, which increases the belief that environmental work makes a difference [18]. These mechanisms are consistent with the Theory of Planned Behaviour, as leadership influences attitudes, social norms, and perceived control at the same time. The work also shows that green leadership is a changing phenomenon that is following the evolution of technology, with green digital leadership enhancing the sustainability of complex operations. Some of the selected studies on green leadership are summarized in Table 4.

Green Human Resource Practices

Green HR practices (green HRM) are the people-management practices employed to facilitate green objectives such as green recruitment, green training, green performance appraisal, green rewards and green involvement [5]. Their argument is that employees will behave green if they are encouraged and enabled to do so, and that green HRM can help to bridge the gap between green talk and green walk by integrating green objectives into the systems that drive behaviour [24]. There is robust evidence that green HRM is positively associated with pro-environmental behaviour and commitment [25] and also the benefits of green HRM are extended to employee well-being and engagement. Green HRM has been found to influence low-carbon and energy-saving behaviour, significantly predict energy-transition behaviour in advanced modelling [26] and to have a positive impact on green innovative behaviour and mental well-being. Green HRM enhances sustainable and responsible performance in sectors and facilitates the adoption of the circular-economy at the organizational level. Importantly for the current review, a few studies suggest that green HRM acts as a linkage that translates leadership's vision into tangible actions that drive behaviors, thereby serving as a natural mediator.

The synthesis reveals that green HRM is not a standalone practice, but rather a system of mutually reinforcing practices. Green recruitment attracts green employees, green training develops green ability, green appraisal indicates that environmental performance is valued, green rewards motivate, and green involvement gives employees a voice in environmental decision-making, leading to ownership. Research has shown that these practices are best when used in combination such that the entire system is aligned. This systemic character is one of the reasons why green HRM is a strong mediator as the bundle, rather than any one practice, has an influence on leadership that extends to behaviour.

Green HRM also has been linked to corporate responsibility and environmental performance as well as to new areas like artificial intelligence and circular economy. It aids in converting intentions into actions [27], enhances environmental performance in various sectors [28] and assists in responding to customer pressures for greener products. Its effects are enhanced when combined with big data analytics and green digital leadership [29] and it can help in adopting green AI in small companies. Importantly, studies mapping the path to sustainability identify green HRM as one of the mediators and explicitly call for research comparing these mediators, which this review does [30]. With regard to performance, green HRM benefits employees themselves, increasing their well-being, engagement, and sense of purpose and thus partly accounts for its impact on behaviour. Selected studies on green HRM are summarised in Table 5.

Organizational Climate

Organizational climate is the collective perception of employees about what is valued, rewarded and expected in the organization. In the context of the environment, a green or pro-environmental climate refers to the employees' shared perception that the organization is truly committed to protecting the environment. Climate is different from formal policy – it is the “how things are done here” and is not written down.

There is a long tradition in which climate is related to job satisfaction, commitment, engagement and performance in banks, hospitals, schools and universities [42]. Recent research has extended the concept to the environment, demonstrating that a green climate fosters green purchasing, green voice and green behaviour and in hospitals, a green climate promotes greener practices among medical staff. Climate is often regarded as a mediator that conveys the impact of leadership, HR practices and support to employee behaviour [43] and in the environmental arena, a green climate translates the leadership and culture into green behaviour. Climate is a natural pathway from leadership to behaviour as leaders strongly shape climate through their words, actions and priorities. The synthesis identifies a number of climates that shed light on the influence of climate on behaviour. Research on safety climate demonstrates that common beliefs about safety have a strong influence on careful behaviour; research on ethical climate shows that shared perspectives of right and wrong are highly influential on moral and environmental behaviour; and research on innovation climate indicates that a supportive and open atmosphere can facilitate the employees' willingness to try new things.

Table 4: Synthesis of Selected Studies on Green Leadership

Ref.	Author (Year)	Setting / Sample	Focus	Key Finding
[13]	Abourobah <i>et al.</i> [13]	Firms; survey	Green transformational leadership	Raises employee green creativity under supportive conditions.
[31]	Ak <i>et al.</i> [31]	Hospitality	Responsible leadership	Improves environmental performance via green culture.
[18]	Shiferaw <i>et al.</i> [18]	Manufacturing (Ethiopia)	Green leadership	Boosts sustainable performance through innovation.
[17]	Hoque <i>et al.</i> [17]	Supply chains	Green leadership	Strengthens sustainable supply-chain performance.
[15]	Younas <i>et al.</i> [15]	Firms; survey	Responsible leadership	Green shared vision links leadership to behaviour.
[32]	Alabdali <i>et al.</i> [32]	Supply chains; digital	Green digital leadership	Improves sustainability of complex supply chains.
[33]	Meng <i>et al.</i> [33]	SMEs	Leaders' sustainability commitment	Commitment cascades to raise SME sustainability.
[20]	Hussain <i>et al.</i> [20]	Conceptual/empirical	Green transformational leadership	Genuine environmental commitment drives behaviour.
[14]	Dinibutun [14]	Firms; survey	Green inclusive leadership	Raises green creativity via inclusion.
[19]	Xiao <i>et al.</i> [19]	Firms; survey	Responsible leadership	Builds ethical bonds supporting green voice.

Table 5: Synthesis of Selected Studies on Green HR Practices

Ref.	Author (Year)	Setting / Sample	Focus	Key Finding
[25]	Bangwal <i>et al.</i> [25]	Firms; survey	Green HRM and behaviour	Raises green behaviour and environmental commitment.
[34]	Din <i>et al.</i> [34]	Healthcare	Green HRM outcomes	Improves behaviour, well-being, and engagement.
[26]	Abu Bakkar <i>et al.</i> [26]	Energy sector; SEM-ANN	Green HRM and energy behaviour	Strongly predicts energy-transition behaviour.
[35]	Sampene <i>et al.</i> [35]	Firms; survey	Green HRM and low carbon	Stimulates low-carbon, energy-saving actions.
[36]	Faeni <i>et al.</i> [36]	Aviation	Green HRM performance	Supports sustainable, responsible operations.
[37]	Ly <i>et al.</i> [37]	Circular economy	Green HRM and circularity	Helps firms adopt waste-reducing practices.
[38]	Noor <i>et al.</i> [38]	Firms; survey	Green HRM and leadership	Green HRM links leadership to green behaviour.
[39]	M <i>et al.</i> [39]	Structural analysis	Green HRM system	Practices act together as a system for sustainability.
[40]	Vadithe <i>et al.</i> [40]	Manufacturing	Green HRM implementation	Improves organizational sustainability.
[41]	Anshima <i>et al.</i> [41]	Firms; survey	Green HRM and commitment	Carries management commitment to sustainability.

Table 6: Synthesis of Selected Studies on Organizational Climate

Ref.	Author (Year)	Setting / Sample	Focus	Key Finding
[44]	Etse <i>et al.</i> [44]	Firms; survey	Green climate	Encourages green purchasing and behaviour.
[45]	Piubello Orsini <i>et al.</i> [45]	Hospitals	Green climate	Leads to greener practices among staff.
[46]	Mu <i>et al.</i> [46]	Firms; survey	Climate and eco-behaviour	Improves employees' environmental behaviour.
[47]	Vedadi <i>et al.</i> [47]	Firms; survey	Climate and attitudes	Improves environmental attitudes and participation.
[48]	Wu <i>et al.</i> [48]	Firms; survey	Leadership and climate	Leadership shapes climate, which shapes outcomes.
[49]	Shetty <i>et al.</i> [49]	Firms; survey	Culture, climate, behaviour	Green climate carries culture through to behaviour.
[12]	Ali <i>et al.</i> [12]	Banks (China)	Climate as mediator	Mediates the HRM-performance link.
[32]	Chaudhary <i>et al.</i> [32]	Firms; survey	Climate strength	Stronger shared climate has larger effect on behaviour.
[50]	Hossny <i>et al.</i> [50]	Nursing	Climate and care quality	Climate affects quality of care and commitment.
[45]	Elci and Alpan [45]	Firms; survey	Ethical climate	Ethical climate promotes responsible behaviour.

A common theme of lessons is that staff act in accordance with what the climate communicates about what is valued. Green climate applied to the environment, stimulates green purchasing, green voice, green creativity and general green behaviour [44]. Climate is also related to motivation, commitment and change. A positive climate increases motivation and organizational commitment, which leads to employees' willingness to make discretionary effort and work engagement even in challenging circumstances. Climate influences how employees experience change, and a supportive green climate makes it easier to make the change to greener ways of working, which, in turn, is a form of change in the organization. Two features augment climate's impact: climate strength (the extent to which the climate is shared and pervasive) and alignment with leadership signals. Strong and consistent climate has a greater impact on behaviour than weak and inconsistent [32] and this strength is achieved through consistent communication and priorities by leaders. Selected studies on organizational climate are summarized in Table 6.

Green Training

Green training involves providing employees with the knowledge, skills, and attitudes necessary to engage in environmentally responsible actions, ranging from the importance of the environment to specific practices like energy conservation and waste management. Training is important enough to study in its own right, although it is often considered as part of green HRM, employees might want to be green but not be able to do it properly. This is evidenced by the increase in green skills and green jobs, where green tasks and skills are more integrated into many jobs and the demand for them is rapidly growing and studies in India have shown the importance of training institutes in developing these skills [11].

Training is one of the elements that turns intentions into action by providing the ability, and trained employees are more confident and capable, which means they are more likely to act green. An important theme is that the value of training is dependent on surrounding conditions, as set out in the Ability-Motivation-Opportunity logic. This conditional role gives the justification that green training is not a simple direct cause but a moderator which enhances the impact of leadership, HR practices and climate on behaviour [38].

The synthesis indicates that green training is provided both in classroom and on-the-job learning, in workshops, as e-learning, and in practice; and that the best training is a combination of knowledge and practice, and is frequent rather than one-off. Training is most effective when it is connected to actual work activities, backed by leadership, and part of a broader green HR system that incentivizes the desired behavior. The conditional and moderating role of training is also cautioned by studies which indicate that training cannot induce green behaviour in the absence of motivation or opportunity. The relevance of training is even more accentuated in the context of the increase of green skills and green jobs. Green tasks and skills are increasingly present in many jobs, and the demand for them is growing, as industries are increasingly implementing green technologies and standards. The literature from developing economies emphasizes the importance of expanding green training to enable the entire workforce to engage in the green transition [38] and in India, studies have underscored the significance of training institutes and vocational education in developing these skills [11]. This future-oriented evidence further highlights that training is not just a response to the needs of the moment but a commitment to sustaining the green actions of employees in the future. Selected studies on green training and green skills are summarised in Table 7.

Synthesis of Relationships among the Constructs

Beyond the individual constructs, the review synthesizes the evidence on the relationships among them, which is where the field is converging toward integrated models. Five relationships recur across the literature.

Table 7: Synthesis of Selected Studies on Green Training and Green Skills

Ref.	Author (Year)	Setting / Sample	Focus	Key Finding
[51]	Hossain <i>et al.</i> [51]	Manufacturing	Green skills and safety	Training raises green and safety behaviour.
[52]	Zaman <i>et al.</i> [52]	Developing economies	Green skills	Prepares the workforce for a greener economy.
[11]	Albertz and Pilz [11]	India; VET	Green skills	Training institutes are key to building green skills.
[53]	Volozhenin <i>et al.</i> [53]	Labour market	Green jobs and skills	Green tasks and skills are a rising share of jobs.
[54]	Tran <i>et al.</i> [54]	Firms; survey	Green HRM and AMO	Training works best with motivation and opportunity.
[55]	Sheikh <i>et al.</i> [55]	Firms; survey	Green HRM and behaviour	Trained employees are more confident and act greener.
[56]	Lebedev <i>et al.</i> [56]	Education	Training green specialists	Education builds green skills for future jobs.
[57]	Rashed <i>et al.</i> [57]	Manufacturing	Knowledge and practice	Sharing green knowledge embeds green behaviour.

Green Leadership and Green Behaviour (direct effect)

A large number of studies find that green leadership raises green behaviour directly, through inspiration, meaning, and role-modelling, across many industries [58]. This direct effect holds even when formal systems are weak, because committed leaders inspire behaviour through example [13].

Green Leadership and Green HR Practices

Leadership shapes the organization's HR systems: when leaders value the environment, they push for green recruitment, training, appraisal, and rewards, and management commitment is a strong predictor of green HRM adoption [41]. In this way leaders convert vision into durable HR systems.

Green HR Practices and Green Behaviour

Green HRM gives employees both the ability and the motivation to act green by embedding environmental goals into people-management systems, and studies across sectors confirm the resulting rise in pro-environmental behaviour [25].

Green Leadership and Organizational Climate

Leaders are among the strongest creators of climate; their consistent signalling that the environment matters produce a shared green climate [48], reinforced by the deeper organizational culture [59].

Organizational Climate and Green Behaviour

A green climate sets the shared expectation that employees act responsibly, raising green behaviour even without direct instruction, an effect observed in hospitals, firms, and schools [15].

Both of these direct relationships converge within two mediating pathways. First, when leadership influences HR practices and HR practices influence behaviour, green HRM plays a mediation role on the leadership – behaviour relationship, which is becoming more common in the literature [38]. Second, the climate is the shared, cultural aspect of sustainability and climate is the mediator between leadership and behaviour. A common and relevant query is which of these two pathways is more powerful, as few studies have modelled both mediators simultaneously, and this comparison is crucial to address with integrated models [30].

Lastly, green training is moderated. The evidence shows that training can strengthen the pathways from motivating factors to behaviour as trained employees are able to act on the motivational and opportunity that leadership, HR practices and climate offer them [51]. The more employees are trained, the more these effects should be felt; the less the employees are trained, the less they may be able to do if they are willing. Table 6 collates the synthesized relationships and direction of evidence.

The synthesis allows a more precise reading of the two mediating pathways. The formal pathway goes via systems and incentives: green HR systems are implemented through leadership and then these systems reward, train and involve employees, which in turn translates into behaviour. The informal pathway works through shared meaning – leadership creates a green climate and this climate influences behaviour by making care for the environment a natural expectation. As the two pathways are partially independent, based on different mechanisms, an important implication is that organizations can implement a strengthening of green behaviour through one or both pathways. There is no evidence

Table 8: Synthesis of Relationships among the Constructs

Relationship	Synthesized Evidence	Type of Effect	Support (Ref.)
Green Leadership → Green Behaviour	Consistent positive direct effect across industries; holds even when systems are weak.	Direct	[170], [1]
Green Leadership → Green HR Practices	Leadership drives adoption of green HRM; management commitment is a strong predictor.	Direct	[151], [19]
Green HR Practices → Green Behaviour	Green HRM builds ability and motivation, raising pro-environmental behaviour.	Direct	[28], [36]
Green Leadership → Organizational Climate	Leaders shape climate through signalling and priorities; culture reinforces it.	Direct	[162], [72]
Organizational Climate → Green Behaviour	Green climate sets shared expectations that raise behaviour without direct orders.	Direct	[103], [115]
GL → GHRP → GB	Green HRM mediates the leadership-behaviour link (formal pathway).	Mediation	[113], [59]
GL → OC → GB	Climate mediates the leadership-behaviour link (informal pathway).	Mediation	[134], [12]
Green Training as moderator	Training strengthens the paths from leadership, HRM, and climate to behaviour.	Moderation	[66], [153]

Note: GL = Green Leadership; GB = Green Behaviour; GHRP = Green HR Practices; OC = Organizational Climate

that the direct leadership effect is removed when mediators are included, which suggests that leadership is important both directly and through the pathways [38]. The synthesis provides clarification for the moderation, as training is best considered a conditional factor. Training primarily provides ability, so where ability is the limiting factor, and where motivation and opportunity are already available, is where training has its most important role. This suggests that training will have the greatest impact on the HR practices to behaviour pathway, as well as the leadership to behaviour pathway, and have little impact where there is no motivation [51]. The present synthesis is based on this conditional logic, which is directly related to Ability-Motivation-Opportunity reasoning, and which makes it different from descriptions that consider training as another direct driver (Table 8).

Evidence by Sector and Setting

The synthesis demonstrates the applicability of the focal relationships in a variety of sectors, although the specifics are influenced by local conditions. Green behaviour is the crucial connection between green management and environmental performance in manufacturing, while green leadership is associated with enhancing sustainable performance via innovation. In the hospitality and tourism sector, the responsible and green leadership enhances the environmental performance by fostering a robust green culture [7]. In the healthcare sector, leadership and a green climate drive clinical teams towards more sustainable practices, even in technically complex environments [50]. The integration of green behaviour and supporting systems in banking and services can provide sustainable competitive advantage [3]. The cross-sector consistency lends greater confidence that the integrated model is widely applicable, and the differences in the effect sizes highlight the need for context-specific research.

The evidence from emerging economies is especially pertinent due to the motivation for the review. Green leadership, HR practices, climate, and training function in a similar way, but training may be particularly significant in countries where green knowledge is less prevalent, and the personal commitment of leaders is particularly significant in countries where resources are scarce, as shown in studies conducted in Bangladesh, Ethiopia, Vietnam, Pakistan, and India [18]. In Vietnam, green HR practices and leadership are connected to environmental outcomes [23] and in India, building green skills is important for a workforce that is rapidly growing in the industrial sector [11]. A gap is the relative lack of integrated studies in large emerging-economy manufacturers, which have high environmental impact and significant growth-environment tensions.

DISCUSSION

The synthesis results in a coherent and integrated account of the process of 'how green leadership becomes green behaviour'. The integrated model, its theoretical underpinnings, the conflicting viewpoints and inconclusive results found in literature, and the gaps in research identified in the evidence are discussed.

Cross-Cutting Themes

Three cross-cutting themes emerge from the synthesis. The first is the primacy of people: evidence from across the industries and countries points to the fact that environmental outcomes are driven by employee behaviour, and that employee behaviour is influenced by manageable aspects of the organization, not just technology. The second is the transition from single to systems: the literature is evolving from studying leadership, HRM, climate, or training in isolation to how they work together, as is the case in the integrated model [38]. The third is spread to emerging economies: although early research was mostly done in Western and service contexts, there is a growing number of

studies in manufacturing and emerging-economy contexts, where the growth-versus-environment conflict is most pronounced. These themes are relevant to interpretation. The field is people-centred, the outcome of the review – green behaviour – is appropriate, the field is moving towards systems and an integrated framework is timely, and evidence is from large manufacturers in emerging economies and is valuable and currently scarce. The next model is integrated and incorporates all three themes.

An Integrated Model

Taken together, the evidence suggests a model where green leadership is a starting point, and can lead to green behaviour through three pathways. Leaders directly inspire and model green behaviour. They establish green HR systems, which support and reward green behaviour, in a formal process. In an informal way they develop a green climate where the value of caring for the environment is shared. Green training then builds on these pathways to provide the capacity needed to turn motivation and opportunity into action. Addressing the call from the field for integration [38], this model shows how the factors function as a system instead of individual causes.

A unique feature of the synthesis is the direct comparison of the two mediating pathways. The formal HR pathway and the informal climate pathway are two mechanisms, the systems-and-incentives mechanism and the shared-beliefs mechanism, and evidence indicates that both are significant. Several studies suggest that the climate pathway might be particularly strong, as shared beliefs shape behaviour effectively and this process is often implicit, meaning it does not require explicit guidance; however, few studies have simultaneously tested both mediators, and a comparison remains outstanding, which is where integrated primary research is motivated.

Theoretical Foundations

The synthesized model is based on two theories. The Ability-Motivation-Opportunity (AMO) theory is based on the premise that performance is a function of ability, motivation, and opportunity. Green training supply's ability, green HR practices and green organizational climate supply motivation and opportunity; with the three factors, training is most valuable when combined with strong motivation and opportunity, which is why training is here used as a moderator [54]. The TPB theory suggests that behaviour is influenced by attitudes, subjective norms and perceived control. All three are influenced by green leadership, which inspires attitudes, builds social pressure through climate and role-modelling, and gives control through systems and skills.

The two theories supplement each other. AMO explains the organisational conditions for green behaviour, TPB explains the individual decision to act, green behaviour requires both. This convergence, from different angles to the same conclusion, bolsters confidence in the model, as do the extensive applications of both theories in the green-behaviour literature. Social learning, social exchange and signalling theory also provide further evidence of the importance of leadership as a model, of supportive systems as reciprocated with effort and of leader actions as signals that influence beliefs.

Debates and Mixed Findings

The synthesis also raises authentic debates. First, there is a lack of consensus on the most important factor; some studies have found leadership to be the most important, others have found it to be HR practices [25] and others have found it to be climate [44]. The most direct method of adjudication is modelling the factors together as an integrated design does. Second, the role of training is debatable: training is considered a direct driver in most studies, but evidence suggests that training needs to be combined with motivation and opportunity to make an impact, therefore training is a moderator [54]. Third, effect sizes differ between settings, depending on industry, country, culture and workforce [42] and therefore, it is advised not to over-generalize, but to conduct studies on a context-specific level. These discussions do not detract from the integrated model; they simply help to frame the issues that integrated, context-specific research can best address.

Research Gaps

Four gaps are identified by the synthesis, which provide a research agenda for future studies. These are summarised in Table 9.

Gap 1: Making a comparison between the two mediators. Studies tend to look at either formal or informal HRM, but not both simultaneously, and there is little research on the relative strength of the two pathways, which is important for determining the focus for organizations [30].

Gap 2: Training as a moderator. The majority of studies consider training as a direct factor. However, AMO logic suggests that it is dependent on motivation and opportunity, meaning that the moderating effect of AMO is not fully tested, especially in multiple moderations in a model [54].

Table 9: Research Gaps Identified by the Synthesis and Implications for Future Research

Gap	Description	Implication for Future Research
Comparing the two mediators	Green HRM and climate are rarely modelled together as mediators.	Test both mediators in one model to compare formal vs informal pathways.
Training as a moderator	Training is mostly studied as a direct factor, not a moderator.	Model green training as a moderator at multiple points in the framework.
Under-studied settings	Limited evidence from large emerging-economy manufacturing.	Conduct studies in large manufacturing firms in emerging economies.
Lack of integration	Factors are studied separately, not as a system.	Build integrated mediated-moderation models combining all four factors.

Gap 3: Under-studied settings. Many sources of evidence are from Western or service settings; large manufacturing companies in emerging economies like India, which have high environmental impact and strong tensions with the growth environment, are underrepresented [11].

Gap 4: No integration. Leadership, HRM, climate and training are studied separately, and the picture is not complete when integrated models are adopted to combine all four in one mediated-moderation model [5].

Toward an Integrated Framework

Finally, the review brings the synthesis together and suggests an integrated conceptual framework. Green leadership has a direct effect on green behavior, and via two pathways: green HR practices (the formal pathway) and organizational climate (the informal pathway); green training moderates the effects of green leadership by providing ability. The framework is based on AMO and TPB, and is supported by the combined evidence in Tables 2-6. It provides testable propositions: green leadership will have a positive impact on green behaviour directly as well as indirectly through both mediators; both mediators can be compared in terms of their relative strengths; and green training will increase the pathways between leadership, HR practices and climate to green behaviour. This framework should be regarded as a template for integrated primary studies in particular in large manufacturing organizations in emerging economies.

Practical Implications

The synthesis provides clear guidance for managers to promote green behaviour. First, leadership is a crucial factor to consider: leaders should set a good example, be sincere in their environmental concerns, and make sustainability efforts visible, as employees tend to follow the lead of their managers. Second, systems matter: environmental goals need to be integrated into recruitment, training, appraisal, and rewards to ensure that green behaviour is supported and rewarded [25]. Third, climate is powerful: managers need to foster a shared and consistent sense of the importance of climate, as a strong green climate can shape behaviours without the need for explicit instructions [44].

Fourth, training is only a necessary but insufficient measure; managers must develop green skills, and employees must be motivated and have the opportunity to apply these skills [54]. Fifth, context matters: approaches should be adapted to the industry, country and workforce; and large organizations in emerging economies should pay special attention to building green skills and the personal commitment of leaders [42]. As a whole, these implications suggest that rather than relying on one lever, green behaviour needs to be promoted through coordinated action across leadership, systems, climate and training.

Limitations of the Review

There are a number of limitations in this review. First, it is limited to peer-reviewed English language sources, which may exclude work in other languages and/or in the grey literature. Second, the studies included in the synthesis are heterogeneous in design, measurement and setting, so a narrative synthesis was used instead of a statistical meta-analysis, which is not suitable for integrating such diverse evidence and does not provide pooled effect sizes. Third, the underlying studies are predominantly cross-sectional survey designs, which limits causal inferences that can be drawn and that are carried over to the synthesis. Fourth, the numbers of papers cited in the PRISMA flow were indicative of the screening of a large literature. These restrictions imply caution with regard to interpretation and further emphasize the importance of integrated, longitudinal primary research.

CONCLUSION

This systematic review, based on PRISMA guidelines, identified 176 studies to shed light on the relationship between green leadership and employee green behaviour and the role of green HR practices, organizational climate and green training in this relationship. The evidence has consistently shown that there is a positive impact of green leadership both directly and indirectly via two pathways: a formal one of green HR practices and an informal one of organizational

climate, and that green training moderates these impacts. The synthesized relationships are well explained by the Ability-Motivation-Opportunity theory and the Theory of Planned Behaviour. The main value of the review is its integrated, evidence-based framework, which is complemented by detailed synthesis tables that make a vast and disparate literature accessible and usable. It also specifies four gaps, the limited comparison of the two mediators, under-use of training as a moderator, the limited evidence from large emerging-economy manufacturing, and the lack of integrated models, that together outline a clear agenda for future research. The review indicates that changing employee behaviour to promote green practices needs to be coordinated between leadership, systems, climate and training for practitioners. For scholars, it provides a schema and a series of testable propositions for future generations of integrated, context-sensitive studies. In an increasingly constrained environment, knowledge and reinforcement of the human aspects of sustainability will be a key issue for management research and practice.

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