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Nexus of Green Transformational Leadership, GHRM, Green Innovation, and Environmental Performance: Insights from SMEs and Social Entrepreneurs in Sri Lanka

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Abstract

Green Human Resource Management (GHRM) is a salient investment for firms to stay sustainably competitive and is instrumental in enhancing organisational environmental performance for natural environmental sustainability. While there has been a significant increase in GHRM, there is a lack of academic empirical studies examining the nexus of green transformational leadership, GHRM, green innovation and environmental performance. Nonetheless, the nexus of those variables must be explored in developing countries, especially Sri Lanka. Drawing upon the Ability Motivation Opportunity (AMO) theory and Resource-Based View (RBV) of the firm, this study aims to substantiate that GHRM fosters environmental performance, especially of Small and Medium Enterprises (SMEs), thus yielding them a competitive edge. The study used bibliometric analysis to analyse unstructured data from 86 journal publications from the Scopus database. Subsequently, a research gap was identified, and a conceptual framework was constructed based on the findings. The theoretical framework was confirmed by analyzing data from a sample of 128 small and medium-sized companies (SMEs) and social entrepreneurs in Sri Lanka employing partial least squares structural equation modeling (PLS-SEM). Strong green transformational leadership is required to improve GHRM and environmental performance, raise the caliber of green innovation, and promote environmental performance within small and medium-sized businesses (SMEs), according to the results of the bibliometric study and the application of partial least squares methods.

Keywords: *Green Human Resource Management, Green Innovation, Environmental Performance, Ability Motivation Opportunity Theory, Resource-Based View, Bibliometric Study.*

Introduction

Addressing environmental issues is currently the foremost challenge (Agyabeng-Mensah and Tang, 2021). Increasingly, stakeholders urge firms to adopt sustainability efforts (Yu et al., 2020), thus creating environmentally friendly methods and products (Zia et al., 2021; Doh et al., 2019). Extensively, firms rely on intangible assets to tackle the complexities associated with environmental sustainability and meet diverse stakeholder demands (El-Kassar and Singh, 2019; Dubey et al., 2015). Despite the environmental challenges discussed, the literature provides significant challenges for emerging economies and has wide-ranging impacts on affected populations (Sun et al., 2021). Findings claim that the firm's vital efforts are implementing a strategic effort that emphasises identifying and prioritising ecological issues and formulating plans to minimise operational effects and enhance overall environmental performance (Ruggerio, 2021).

Similarly, emerging nations like Sri Lanka encounter drastic environmental issues and experience biodiversity declines owing to global warming. Several studies are concerned about environmental performance, nonetheless warranting comprehensive understanding from several viewpoints (Agyabeng-Mensah and Tang, 2021; Ding et al., 2021). This impetus drives firms to align their interactions with the natural environment. In this vein, adopting sustainable development (SD) philosophy is driven by an increasing recognition of the interconnectedness between environmental challenges, socio-economic

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factors, and the need for long-term planning (Ruggerio, 2021; Hermundsdottir and Aspelund, 2021; Hopwood et al., 2005).

Building and sustaining internal competences and capacities is essential to the efficacy of environmental management systems inside an organization (Biscotti et al., 2018; Russo, 2009; Yin & Schmeidler, 2009). Additionally, the abilities and motivation of employees and the necessary organisational capabilities are essential in addressing the intricate challenges associated with environmental sustainability (Boiral et al., 2014). Singh et al. (2020) propose that the development of a business's internal competencies and capacities, which are crucial for firm performance, is influenced by leadership and human resource management (Leroy et al., 2018). The AMO theory posits that employees' abilities, motivations, and opportunities play a role in organisational performance. This perspective provides a comprehensive understanding of how leaders and strategic HRM practices enhance firm performance (Appelbaum et al., 2000; Bos-Nehles et al., 2013). The theory of AMO is often used in the Human Resource Management (HRM) field to study performance (Appelbaum et al., 2000). HRM performance research has extensively referenced this theory (Bos-Nehles et al., 2013).

According to the AMO theory, HRM **practices** impact employees' capabilities via recruiting and selection processes and training and development initiatives. HRM practices affect employee motivation by implementing rewards, incentives, and pay strategies. Moreover, HRM practices also provide employees with opportunities for collaboration and empowerment, contributing to the organisation's overall success (Gerhart, 2005). In this vein, firms require effective human resource (HR) practices to implement sustainability initiatives (Daily and Huang, 2001). Thus, GHRM is seen as the key organizational role that encourages businesses to improve their environmental performance. According to Ansari et al. (2020), Singh et al. (2020), and Sun et al. (2022), GHRM entails integrating HR practices with an organization's ecological goals. This includes matching hiring, development, and compensation procedures with environmental sustainability principles (Cheema and Javed, 2017; Singh et al., 2020).

GHRM is the umbrella term for all actions related to the creation, deployment, and continuous upkeep of a system designed to help employees of an organization become more environmentally conscious (Opatha, 2013). According to Opatha and Arulrajah (2014), it refers to the procedures, practices, and policies that make an organization's workers environmentally conscious for the good of the organization, society as a whole surroundings, and the individual Based on the AMO theory, the present study argues that adopting GHRM practices aims to efficiently engage, incentivise, acknowledge, and maintain favourable employee job behaviours consistent with environmental management objectives. The improved performance of green enterprises is eventually accomplished via the facilitation of green innovation (Boselie et al., 2005; Boselie et al., 2021). Furthermore, the AMO theory by Appelbaum et al. (2000) posits that implementing GHRM may aid firms in establishing a complete framework. A variety of methods are offered by this framework, such as performance-based rewards, empowerment of workers, instruction and growth, and green recruiting and selection. These practices aim to effectively recruit, train, motivate, and retain environmentally conscientious personnel to enhance the overall environmental performance (Arulrajah, Opatha and Nawaratne, 2015). The enhancement is attained by employing ongoing innovation in processes, goods, and services (Gerhart, 2005).

Competitive advantage can be achieved by implementing green innovation strategies as consumer awareness and concern for the environment continue growing and green goods' availability becomes more prevalent in the marketplace (Razzaq et al., 2021). Organisations use green innovation to distinguish themselves from their rivals, yet it may also serve as a strategy to meet environmental demands within the marketplace (Takalo and Tooranloo, 2021; Ding et al., 2022). During the contemporary era of environmental concerns, organisations need to develop an environmental management ideology to stimulate their eco-friendly advancements (Ding et al., 2021). Green innovation is crucial in determining firm success and achieving sustainable outcomes, making it a prominent application of environmental policy. Sustainable innovation enhances performance, resilience, and competitiveness in escalating competition. While the determinants of green innovation have garnered significant interest, more scholarly investigation is needed into the precursors of radical green innovation. The increasing environmental

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degradation from mining operations has become a prominent issue among the corporate community. This worry stems from a growing societal consciousness about social and environmental matters, which has led to heightened expectations for firms to fulfil their social and environmental obligations. This promotes the development of green innovation aimed at mitigating ecological harm (Mansoor et al., 2022).

Significant gaps within the current body of research require attention and resolution. Previous empirical studies on GHRM have exhibited limitations in their conceptualisations, either overly restricted or lacking consideration for academic theory. Paradoxically, previous study has focused less on examining the influence of GHRM and green innovation on environmental performance. Moreover, the mediating effects of GHRM and green innovation on environmental performance are not emphasised. However, it is important to remember that this field of study is still in its infancy and needs more quantitative investigation. This study fills a vacuum in the literature by looking at how green innovation affects environmental performance in relation to GHRM. The current corpus of research on the impact of green innovation and GHRM on environmental performance offers conflicting and evasive results. Therefore, the current study offers conclusive findings in this regard. To completely understand the relationship between GHRM practices, green innovation, and environmental performance, more antecedents need to be investigated and clarified (Pham et al., 2019; Amrutha and Geetha, 2020).

The present research used a sample of 86 journal articles to gather unstructured data, which was then used to construct a theoretical model. Subsequently, structured data from 128 decision-makers of Sri Lankan small and medium-sized enterprises (SMEs) were studied to empirically assess the proposed model's associations. The findings have paved the way for the authors with insights into the unresolved inquiries on evaluating the influence of GHRM and green innovation on environmental performance, potentially affecting the innovative capabilities of SMEs. The discoveries of the current investigation would also provide novel opportunities for both managerial professionals and scholars.

To explore the present status of research in GHRM, the present study employs a unique analytical approach that combines bibliometric analysis (namely VOSviewer Co-occurrence Analysis) with partial least square structural equation modeling. The approach used in the Co-occurrence Analysis of VOSviewer utilises the VOSviewer software package, which may be easily accessed via the website (www.vosviewer.com). Bibliometric analysis is a widely used and demanding approach for investigating and examining vast scientific data. This allows for exploring the intricate evolutionary aspects within a particular discipline while also illuminating the emergent domains within this discipline. However, the use of this technique in business research is very nascent and, in several cases, not fully developed.

The paper's structure is outlined: The following part provides an overview of Study 1, including bibliometric analysis and the formulation of hypotheses. The following part is dedicated to Study 2, which examines the theoretical framework, methodologies, findings, and discussions. Furthermore, the authors expound upon some significant discoveries, thereby providing implications for researchers and management at large. Finally, this study examines potential future research areas, limits, and conclusions.

Study 1

Bibliometric Analysis

A thorough picture of the performance and intellectual structure of a field can be obtained by synthesizing large amounts of bibliometric data using bibliometric analysis, which is an objective, quantitative approach. One analytical technique that is frequently applied in the context of systematic literature reviews is bibliometric analysis. It quantitatively examines scholarly publications (Donthu et al., 2021; Kraus et al., 2022; Lim, Kumar et al., 2022; Mukherjee et al., 2022; Kumar et al., 2021). Furthermore, it is possible to identify the primary themes, such as management and marketing, and specific topics within them, such as human resource management, leadership, organisational behaviour, consumer behaviour, branding, and retailing. Additionally, noteworthy trends, such as topical evolution, and gaps in the field, such as areas that have been unexplored or underexplored, can be revealed using bibliometric analysis. This analysis is closely related to the concept of "science mapping," which is an integral component of bibliometric analysis.

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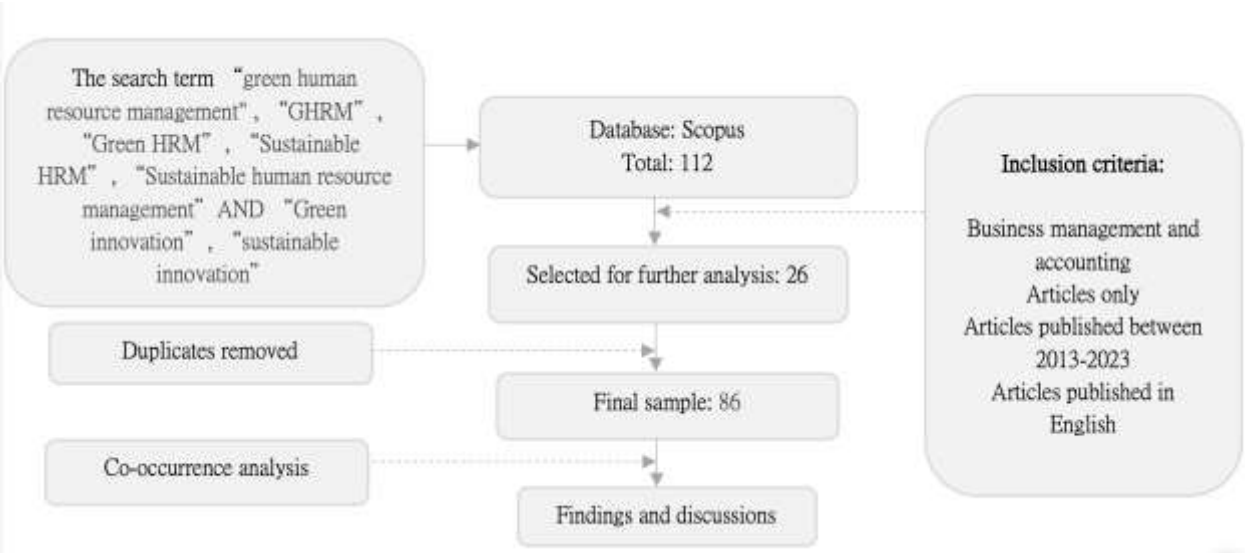

Figure 1. PRISMA Methodology for the Bibliometric Analysis

The PRISMA approach was used to investigate the study topics. The PRISMA approach has been established as a standard for transparent and comprehensive methods in conducting systematic literature reviews and meta-analyses (Moher et al., 2009). Moher et al. (2009) advocate using the PRISMA technique instead of relying exclusively on thematic analysis or bibliometric review. They argue that the PRISMA method has advantages such as promoting transparency in selecting articles for inclusion or exclusion and providing a distinct reference point within a particular research topic. Figure 1 provides a comprehensive overview of the sequential procedures for implementing the PRISMA technique in the present research. The publications included in this study were obtained from the Scopus database due to its stringent journal selection standards, ensuring the inclusion of authoritative academic research (Merigó et al., 2016). Table 1 shows the main synopsis of the research protocol.

Table 1. The Search Protocol

Filtering and search criteria
Database: Scopus
Search date: 14 February 2023
Search terms: "green human resource management" , "GHRM", "Green HRM", "Sustainable HRM", "Sustainable human resource management"
Year: 2013-2022
Document type: research article
Language screening: only English language articles are included. Analysis software: VOSViewer
Relevance screening: articles selected for inclusion only where "titles, abstracts, and keywords
Number of items selected for bibliometric analysis: 86

After being taken out of the database, the data was saved in "the.txt" file format. The downloaded file underwent a series of transformations, restructuring, and subsequent importation into a statistical tool for the final analysis. A total of 112 articles were obtained using the iterative search procedure. Including peer-reviewed journals ensures that a literature review maintains a certain standard of quality and dependability (Tang and Musa, 2011). Therefore, conference papers, periodicals, and master's/doctoral dissertations were excluded. Consequently, 26 publications were excluded, resulting in a final selection of 86 articles published in 13 internationally recognised peer-reviewed journals. Graphical visualisations depicting the study of

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keyword co-occurrence were generated using VOSviewer 1.6.15 (https://www.vosviewer.com/). These graphics were based on data extracted from 86 publications, aiming to provide valuable insights into the current trends and potential research gaps within the field of GHRM.

Co-Occurrence Network Analysis

The conversion of information in a co-occurrence array into a spatial configuration, often called a map, can be achieved via data-analytical approaches rooted in mathematical ideas and algorithms established within applied statistics (Donthu et al., 2021). Various types of co-occurrence analysis have been used to examine multiple inquiries, including academic communication, research frontiers, and the intellectual composition of study domains. The bibliometric approach used for mapping the study area was the analysis of the co-occurrence of keywords. The VOSviewer program, created by the Centre for Science and Technology Studies of the University of Leiden, the Netherlands (Van Eck and Waltman, 2009), facilitated the implementation of keyword network creation and keyword clustering processes. Consequently, a bibliometric study was conducted using VOSviewer software to create a co-word network derived from the 86 journal articles from Scopus (Figure 2).

The co-occurrence network is an intriguing way to visualize the relative strength and frequency of links between keywords based on how frequently they occur. A co-occurrence map, shown in Figure 2, shows how different topics have received more attention in the context of environmental performance in GHRM literature. Six significant clusters have emerged, according to the bibliometric analysis. Implementing green innovation methods, GHRM research, green transformational leadership, and the connection between GHRM and environmental performance are the main areas of attention (cluster 1) for GHRM research.

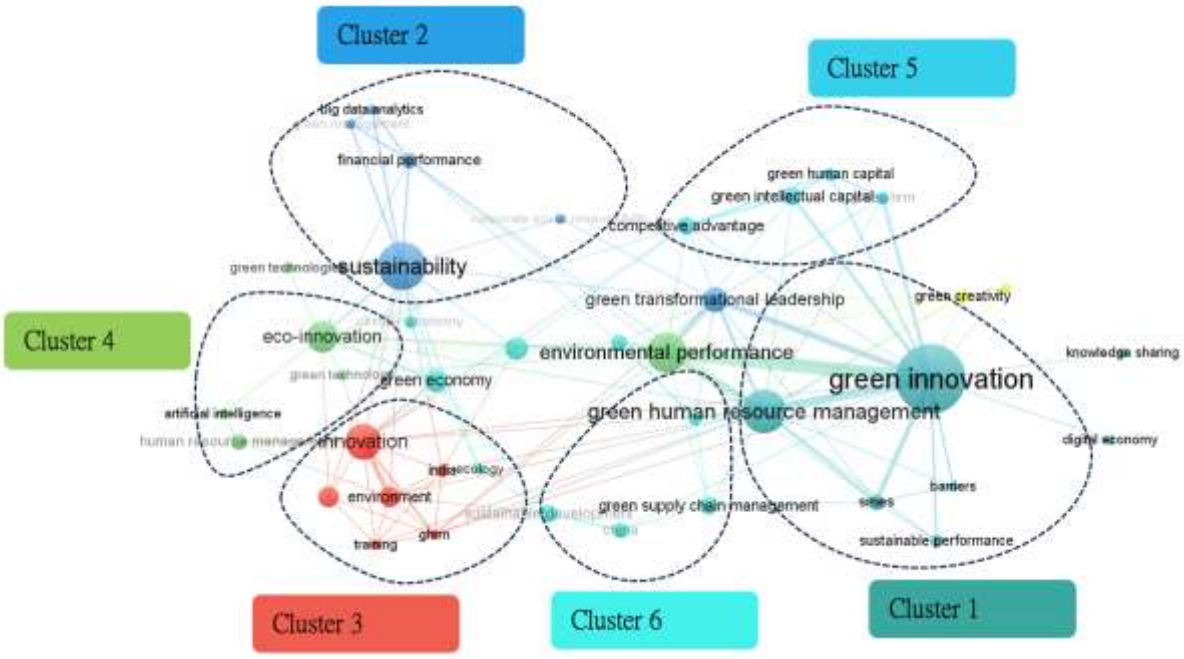

Figure 2. Keyword Clustering Analysis

Green innovation (GI) has been recognised as a crucial element in environmental management (Arenhardt et al., 2016; Takalo and Tooranloo, 2021; Chen et al., 2012; Oduro et al., 2021). Its significance extends to organisations and communities, and research in this area has experienced a notable increase in recent years. Furthermore, environmental degradation has emerged as a significant danger to the continued existence of the human species. Numerous organisations and localities have adopted the implementation of Green Infrastructure (GI) as a strategic approach to achieve environmental conservation and foster economic development.

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Cluster 1 signifies terms corresponding with green innovation made up of GHRM research and practices; they are designated by green creativity, knowledge sharing, sustainable performance, digital economy, and barriers to green innovation.

The literature on green innovation (GI) has seen significant development and growth in recent decades. This may be attributed to the increasing recognition of its wide-ranging and crucial uses, the growing environmental consciousness, and the adoption of green goods and practices. Past literature reports that the significance of managing green innovation is increasing in practical applications and academic circles. Despite this, our current understanding is a dearth of fresh and complete literature reviews. Environmental innovation research is still nascent, with a limited number of scholars globally dedicated to studying and advancing innovations in environmental challenges. The primary emphasis of eco-innovation research should be how environmental concerns are incorporated into the economic framework. The notion of eco-innovation has significant relevance for both commercial entities and policy officials. It focuses on technologies with a reduced environmental effect compared to their counterparts. The innovations might include technology and non-technological aspects, such as organisational, institutional, or marketing-based elements. Economic or environmental factors may serve as motivators for the development of eco-innovations.

Cluster 2 contains sustainability, big data analytics, financial performance, and corporate social responsibility. This cluster mainly discusses big data analytics alignment with business strategy to attain enhanced financial and environmental performance. The literature shows that, unprecedentedly, firms are adopting big data technologies such as data storage, data mining, data analytics, and data visualisation to elevate their financial and environmental performance.

Cluster 3 contains the terms innovation, GHRM, training, and environment. This cluster discusses how innovation and employee training affect GHRM and environment performance. Firms prefer implementing green training to achieve their environmental sustainability goals while also considering the economic viability of such initiatives. Green training, one of the techniques within GHRM, is a structured process of on-the-job training and further education. Its purpose is to align the aims and objectives of environmental management. This particular aspect of GHRM has garnered significant attention. Green training has been recognised as a crucial factor in overcoming obstacles to environmental conservation and fostering its integration within the workplace.

Cluster 4 covers eco-innovation, artificial intelligence, green technology, and HRM. This cluster discusses how green technology, artificial intelligence, and eco-innovation influence HRM performance. The advent of green technology innovation often gives rise to intricate and unforeseeable circumstances that pose challenges in terms of resolution. The significance of green technology innovation is growing for organisations as they strive to address environmental governance successfully. A key element in this endeavour is the adoption of green behaviours by workers, who play a crucial role in supporting these efforts.

Competitive advantage, green intellectual capital, and green human capital are all included in Cluster 5. This cluster makes the case that green intellectual and human capital can provide businesses a competitive edge. Research has shown that firms must effectively cultivate green human capital preparedness (Agyabeng-Mensah and Tang, 2021). This is crucial as they are critical in promoting green market orientation, boosting green supply chain management, and augmenting overall company performance (Tjahjadi et al., 2022). Green intellectual capital is the amalgamation of intellectual capital and environmental considerations at the corporate or individual level. This encompasses many intangible assets, such as competencies, knowledge, and relationships (Chen, 2008). Academic scholars have mostly overlooked and neglected the significance of green intellectual capital despite its acknowledged contribution to sustainable performance (Yong et al., 2019). A small amount of research has explicitly looked into the relationship between green intellectual capital and sustainable performance, despite the fact that numerous studies have looked at the effect of green intellectual capital on organizational performance (Chen, 2008; Yong et al., 2019).

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Cluster 6 comprises green supply chain management, sustainable development, green economy, and circular economy. This cluster reports that sustainable development can be achieved through green supply chain management practices such as materials recycling, green transportation, green energy sources, reducing waste, recyclable packaging materials, and green manufacturing processes. Under the principles of cleaner production, recent scholarly investigations have indicated an increased emphasis on sustainable performance, with particular attention being directed towards the examination of its association with GHRM (Zaid et al., 2018), green supply chain management (Yildiz Çankaya and Sezen, 2019), and sustainable manufacturing practices (Abdul-Rashid et al., 2017).

Based on the network visualisation analysis, it is possible to draw the conclusion that GHRM research has extensively examined the concept of green innovation in general. But in the context of GHRM, there hasn't been enough research done in poor nations on green innovation methods, green transformational leadership, and environmental performance.

Intriguingly, the salience of transformative leadership in driving innovation and achieving success has been emphasised in the scholarly literature (Rehman et al., 2020). Despite the potential significance of transformational leadership in promoting environmental sustainability, there remains a need for global emphasis on this particular research domain. Transformational leadership and green creativity have a strong and beneficial association, according to research done in India by Mittal and Dhar (2016). Begum et al. (2021) found that there is a substantial connection between green transformational leadership and green innovation in their study done in China.

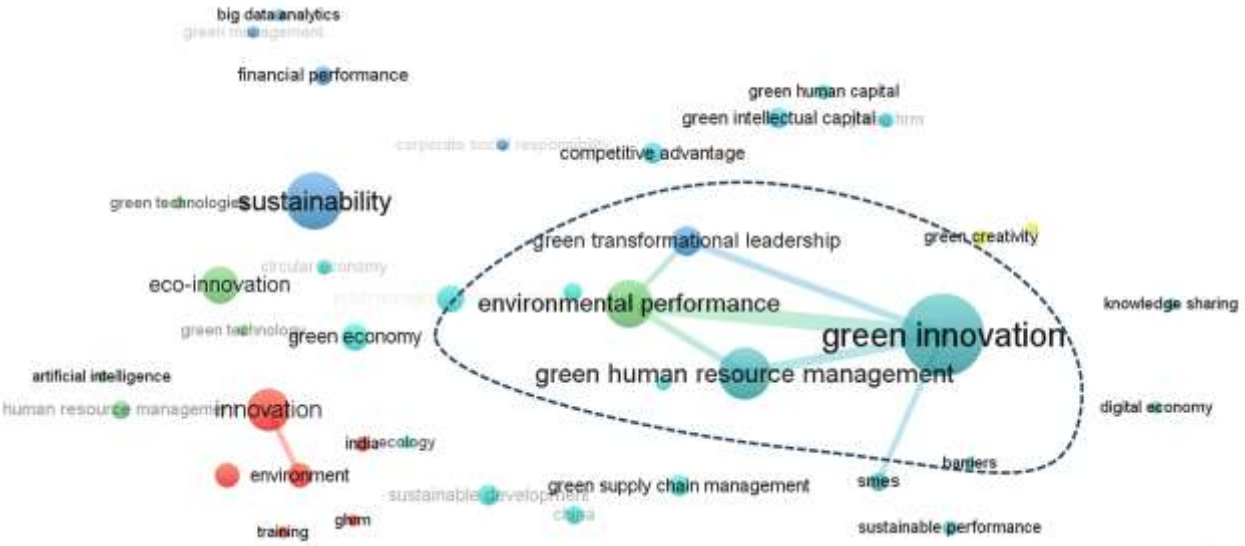

Figure 3. Research Gap

Literature Review and Hypotheses Development

Ability Motivation Opportunity (AMO) and Resource-Based View (RBV).

The well-established theoretical frameworks of Resource-Based View (RBV) and Ability Motivation Opportunity (AMO) serve as the foundation for this study. The relationship between human capital and business performance is a well-established notion in HRM, with a well-documented history and methodology in the body of current literature (Takeuchi et al., 2007).

A widely held perspective in the field of human resources research posits that the performance of employees is contingent upon their capacities, levels of motivation, and the presence of conducive work environments.

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The AMO theory is constructed using fundamental principles derived from psychology. These principles include motivation, which refers to the driving force behind a behaviour; ability, which encompasses the skills and capacities necessary for performing a behaviour; and opportunity, which involves the contextual and situational restrictions that influence behaviour performance. The (AMO) theory expands upon this underlying principle by suggesting that an organisation can enhance its performance by ensuring that all its employees possess the necessary abilities and motivation to carry out their job responsibilities while also providing them with ample opportunities to make meaningful contributions (Appelbaum, Bailey, Berg, and Kalleberg, 2000). The significance of employees' capacity, drive, and chance (A-M-O) coexisting within an integrated framework has been highlighted by Martinez-Del-Rio et al. (2012). Renwick et al. (2016) claim that the AOM theory offers a thorough and reasoned explanation of how GHRM contributes to environmental sustainability.

According to the resource-based view (RBV), competitive advantage and performance of firms is contingent upon their ability to effectively leverage necessary strategic resources that include characteristics of rarity, inimitability, and non-substitutability, hence creating barriers for competitors to replicate them in the market (Nishii et al., 2008). The AMO theory posits that high-performance work systems (HPWS) consist of a collection of human resource practices that are organised around three fundamental dimensions: ability, motivation, and opportunity (AMO) (Appelbaum et al., 2000). In the context of abilities, many approaches guarantee that personnel have the requisite knowledge and skills to carry out specific tasks effectively. These approaches encompass recruitment and selection processes and training and development programs.

In a similar vein, motivation depends on performance evaluation and the use of financial and non-financial incentives to encourage people to meet their performance goals. The phrase 'opportunity' encompasses a range of policies promoting employee engagement in diverse activities by fostering increased participation, interchange of information, and individual autonomy. This study asserts that HRM adheres to the fundamental principles of the Resource-Based View (RBV) to enhance performance and sustain a competitive advantage. The effectiveness of an organisation is closely tied to its multilayered social system, which is primarily built upon human capital. This characteristic sets the business apart from its competitors in the market, allowing it to be utilised efficiently inside the organisation (Khan et al., 2021; Singh et al., 2020).

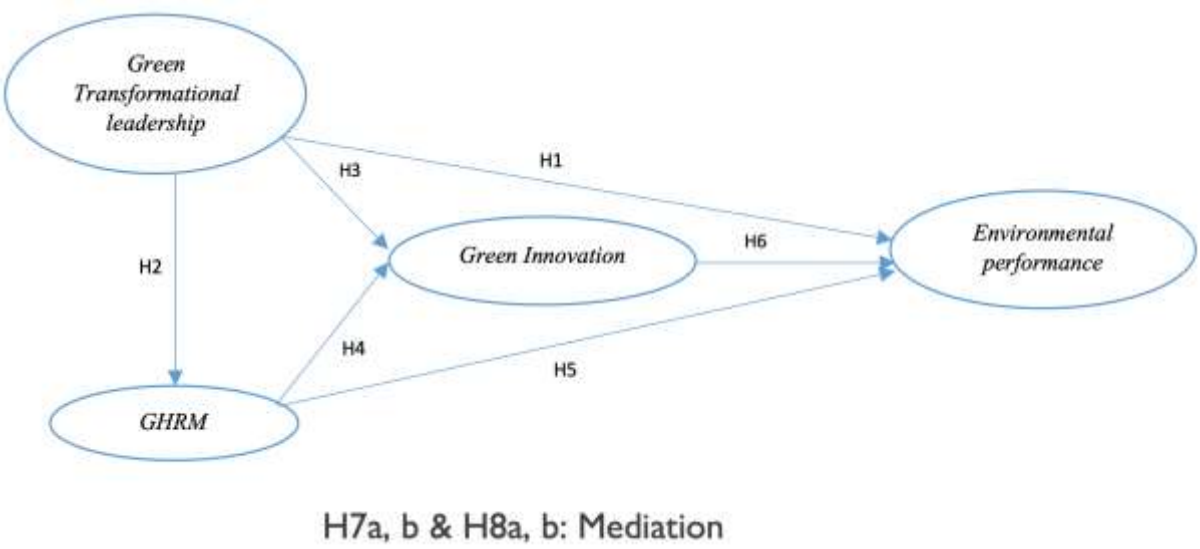

Figure 4. Theoretical Framework

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Green Transformational Leadership and Environmental Performance

The world community is currently dealing with a wide range of environmental issues. The environmental challenges discussed in the literature have been identified as significant obstacles to developing economies and the overall well-being of affected regions (Sharif et al., 2021; Sun et al., 2021). The conventional methods used in operations management entail the assessment of a firm's performance across four primary dimensions: cost, quality, time, and service. The need to implement environmental conservation measures inside companies to attain sustainable development has necessitated a reevaluation of the operations function.

Transformational leaders establish a compelling vision that motivates followers to fulfil their responsibilities and attain environmental goals proactively. Literature reports that transformational leaders cultivate new concepts and ideas and exhibit required behaviours to enhance firm performance. Chen and Chang (2013) define green transformational leadership as a leader's capacity to encourage and inspire followers to go above and beyond accepted environmental standards and accomplish environmental goals. Past research found a positive association between Green transformational leadership and environmental performance (Sun et al., 2

022; Niazi et al., 2023). Chen et al. (2014) found that implementing green transformational leadership favoured mindfulness, self-efficacy, and performance levels. Using a sample of 110 from small and medium enterprises, Nisar et al., 2017 found that there is a notable impact of green transformational leadership on green performance. Chen and Chang (2013) explained green transformational leadership (GTL) as a leadership style encompassing followers with a clear vision, inspiration, and motivation while addressing their developmental needs. This leadership approach is aimed at achieving the environmental goals of the organisation. Resource-Based View (RBV) claims that GTL serves as a contextual resource for the effective implementation of environmental management (EM) activities (Guest and Teplitzky, 2010). As a contextual resource, the GTFL offers followers a more distinct and environmentally conscious perspective on the firm. It inspires, encourages, and cultivates individuals towards achieving green organizational goals. Further, it is argued that the GTL of the chief executive officer in the organization gives an act of influence based on his or her authority and power for positive change towards the organizational attempt of minimizing and circumventing harmful belongings of business work on the natural environment. Hence, the present study proposes that:

H1: Green transformational leadership affects environmental performance.

Green Transformational Leadership and Green Human Resource Management Practices

GTL refers to a leader who stimulates and motivates subordinates to outdo conventional environmental prospects and strive towards environmental objectives (Chen and Chang, 2013). Strong faith among employees can be facilitated by transformational leaders who have a robust belief in their vision, generate innovative visions, and effectively interconnect them to their people. Zhu et al. (2005) posit that transformational leadership fosters motivation, inspiration, confidence, stability, and performance. Jia et al. (2018) found a positive relationship between knowledgeable-driven transformational leadership and its impact on talent management, performance administration, and employee proficiency. The green elements of GHRM pertain to strategies and objectives to assist organisations in achieving, promoting, motivating, and sustaining environmentally responsible behaviour among employees (Dumont et al., 2017). It is argued that GTL is crucial in formulating and implementing policies supporting GHRM, facilitating environmentally sustainable performance and innovation. This viewpoint is supported by Jia et al. (2018), who propose that GTL enables firms to effectively align their visions and strategies with green objectives, ultimately leading to improved environmental performance. The GTL emphasises recognising the unique needs of its employees, thereby motivating them to develop and implement GHRM practices that inspire and empower their subordinates. Therefore, it is anticipated that GTL will play a significant role in facilitating favourable GHRM practices, including training and development, recruitment and selection, and

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performance-based incentives. These practices rely on GTL to accomplish organisations' objectives (Zhu et al., 2005). GTL influences the relevant HR department to embed greening into HRM functions, which results in green-oriented HRM practices. Therefore, the present study hypothesises that:

H2: Green transformational leadership affects green human resource management practices.

Green Transformational Leadership and Green Innovation

Green innovation encompasses developing environmentally friendly products and processes. This involves adopting firm practices that adhere to eco-friendly principles, such as reducing emissions, minimising material usage in production and design, utilising green raw materials, and optimising electricity and water consumption (Albort-Morant et al., 2016). Several studies have demonstrated that firms prioritising green innovation exhibit superior performance to their competitors. This advantage stems from their ability to leverage their green capabilities and resources to recognise client needs promptly and efficiently while also incorporating essential benefits and resources into their organisational framework. Green thinking and creative processes have become crucial mechanisms for promoting green innovation. Past studies offer new perspectives on fostering green innovation by promoting green transformational leadership (GTL) and cognitive processes inside organisations.

Begum et al. (2022) conducted a study to gain insights into the significance of GTL and green innovation practises inside organisations, specifically focusing on the cognitive processes of green thinking and creative process engagement (CPE). The study's results indicate that implementing GTL significantly impacts individuals' environmental consciousness, corporate environmental performance (CEP), and the development of environmentally friendly innovations.

The literature indicates a significant relationship between transformational leadership and firm innovation (Zuraik and Kelly, 2019; García-Morales et al., 2012; Gumusluoglu and İlsev, 2009; Elkins and Keller, 2003). García-Morales et al. (2012) provide evidence in favour of the impact of transformational leadership on innovation. This impact is achieved by cultivating essential talents and capacities, facilitated by a joint decision-making process, aiming to accomplish shared objectives. Transformational leadership is characterised by a commitment to ongoing learning and the use of a shared vision to enhance awareness and understanding of the purpose and mission of an organisation among its members (García-Morales et al., 2012). Transformational leaders play a crucial role in fostering innovation inside organisations and benefitting the market success of innovative goods and services (Gumusluoglu and İlsev, 2009). GTL encourages subordinates or followers to do exceptional things to achieve green innovation and encourages them to go beyond expectations and stability. Therefore, the present study proposes that:

H3: Green transformational leadership affects green innovation.

Green Human Resource Management Practices and Green Innovation

Green innovation assesses how well a company implements efficient management practices to enhance its environmental performance. Firms employ green innovation in their operational endeavours by implementing environmentally sustainable processes and producing eco-friendly products. Green innovation bolsters competitiveness through technological advancements and environmentally conscious management practices.

Conversely, GHRM practices facilitate employee engagement in environmentally sustainable projects that align with the organisation's overarching strategy (Pham et al., 2020). GHRM functions assist firms in establishing a connection between HRM practices and environmental management activities (Ansari et al., 2020; Masri and Jaaron, 2017). The GHRM concept aligns with the company's strategic focus on environmental protection. It emphasises the importance of senior management's awareness and involvement in organisational strategies and initiatives that promote environmentally friendly work practices. These practices aim to reduce environmental pollution in the workplace (Longoni et al., 2018). Seeck and Diehl (2017) examined previous research on HRM innovation, explicitly comparing the impact

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of administrative and process innovation to that of product and technology innovation. They found that the latter two types of innovation had a more significant influence than administrative and process innovation. GHRM practices increase green competence and green attitudes of employees so that they can create green results which include green innovations and green outputs (Opatha and Arulrajah, 2014). Drawing upon the Resource-Based View (RBV) Barney (2001) and the Ability-Motivation-Opportunity (AMO, Appelbaum et al. (2000), Sun et al. (2022) propose that firms that place a high value on their employees and exert influence over them will be able to implement GHRM practices effectively. This can be accomplished by offering incentives and chances for staff members to direct their energies into producing innovative and ecologically friendly products (Shahzad et al., 2021; Singh et al., 2020). Thus, this study hypothesises that:

H4: Green human resource management practices affect green innovation.

Green Human Resource Management Practices and Environmental Performance

Achieving a firm's environmental aims and objectives is pivotal (Rawashdeh, 2018), as this is becoming increasingly significant in enhancing environmental performance (Renwick et al., 2013). Existing scholarly research evidenced the association between GHRM and EP (Employee Performance). GHRM involves practices aimed at attracting and retaining environmentally conscious employees. It is essential to include environmental goals into critical HR processes like hiring, selection, training, development, performance reviews, and incentive programs. (Masri and Jaaron, 2017; Dumont et al., 2017). Firms adopt GHRM practises to foster an environmentally sustainable society by implementing green workplaces and associated initiatives.

It is important to remember, nevertheless, that the majority of research has mostly concentrated on the hotel and tourism sectors (Elshaer et al., 2021; Mansoor et al., 2021; Nisar et al., 2021; Pham et al., 2020; Sobaih et al., 2020). Gilal et al. (2019) identified a statistically significant positive relationship between GHRM and environmental performance. Furthermore, Assyofa et al. (2019) conducted a study focusing on the banking industry and emphasised the potential of GHRM practices to impact environmental performance positively. In contrast, Nawangsari and Sutawijaya (2019) assert that despite the growing significance of GHRM practises, there is a discernible disparity in the execution of GHRM inside businesses. In a study conducted by Kim et al. (2019), a correlation was discovered between the implementation of GHRM practices and the environmental performance of the hotel business. Roscoe et al. (2019) also investigated the relationship between GHRM and environmental performance in their study. The results indicate that GHRM significantly enhances environmental performance. In a survey conducted by Rawashdeh (2018), it was discovered that the implementation of GHRM has a favourable and statistically significant impact on the overall work environment within the health sector of Jordan. It is asserted that GHRM practices result in employee green performance of job which leads to green organisational performance (Opatha, 2019). Thus, the present study proposes that:

H5: Green human resource management practices affect environmental performance.

Green Innovation and Environmental Performance

Due to their increased understanding of the impact of environmental issues, there has been a growing global trend of customers demonstrating greater care for these issues (Chen et al., 2014; Ding et al., 2019). Thus, in order to take advantage of this environmental trend, improve their green image, and obtain a competitive advantage, enterprises should proactively implement environmental management practices (Chen, 2007). As consumer knowledge and concern for the environment continue to develop and the availability of green products becomes more prominent in the marketplace, green innovation can be used to acquire a competitive advantage (Chen and Chang, 2012; Razzaq et al., 2021). Firms employ green innovation to distinguish themselves from their rivals, yet it may also serve as a strategy for meeting environmental demands within the marketplace (Ding et al., 2020). During the contemporary era of environmental concerns, companies must have an environmental management ideology to stimulate their green innovations (Chen et al., 2014; Razzaq et al., 2021).

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Previous studies have indicated that the quality of green products, eco-friendly products, and process innovation have an impact on the integration of company operations and product creation based on environmental performance (Dubey et al., 2015; Rehman et al., 2021). Furthermore, a company's social and financial performance can be improved by cutting waste costs through the implementation of green products and green process innovation, all while mitigating negative environmental effects (Weng et al., 2015; Yan and Zhang, 2021). As a result, by applying the Resource-Based View (RBV) paradigm, our analysis projects that implementing green products and green process innovation will remain important resources that improve environmental performance and cultivate favorable connections with important stakeholders.

Thus, it is hypothesised as:

H6: Green innovation affects environmental performance.

Green Transformational Leadership and Environmental Performance: Green Human Resource Management Practices as A Mediator

Past studies report that leaders must have a visionary mindset that fosters innovation (Stone and Patterson, 2023). Accordingly, leaders must possess unwavering faith in their vision and effectively explain and convey it to their followers. This approach is vital in instilling employee confidence and generating enthusiasm towards the vision (Stone and Patterson, 2023; Zhu et al., 2005; Jia et al., 2018). The establishment of a creative environment and inspiring, motivating, and encouraging colleagues to believe in and connect with the leader's vision are all components of transformational leadership. The performance and innovation of the company are greatly impacted by this leadership (Ng, 2017; Boehm et al., 2015; Mittal and Dhar, 2015). In order to fulfill its environmental goals, GTFL's primary objectives are to give employees a clear vision, excite and motivate them, and support their development requirements (Mittal and Dhar, 2016; Chen and Chang, 2013).

On the other hand, GHRM has evolved, transitioning from traditional practices characterised by limited employee engagement to more inclusive and supportive processes. This shift has provided employees with enhanced opportunities for skill development, knowledge acquisition, and attitude cultivation (Singh et al., 2019; Lengnick-Hall et al., 2009). Correspondingly, GHRM pertains to implementing HRM practices specifically designed to address organisations' environmental and ecological impact. GHRM is closely associated with the environmental strategies used by enterprises and environmentally friendly behaviours (Renwick et al., 2013).

TFL embodies the opinions and principles of senior management, which has a big impact on the company's GHRM (Jia et al., 2018; Renwick et al., 2013). Therefore, it is postulated that having GTFL inside a company is essential to creating and executing GHRM practices and policies that work (Jia et al., 2018; Singh et al., 2020). According to Singh et al. (2020), these policies and practises are crucial in helping the organisation align its objectives and visions in order to achieve the best possible green performance.

Within the framework of stakeholder influence on firms' environmental management efforts (Song and Yu, 2018; Mittal and Dhar, 2016), prior research has indicated that adopting GTFL is essential (Singh et al., 2020). This leadership approach fosters an environment that encourages and motivates employees to engage in green job behaviours, ultimately achieving green performance outcomes (Singh et al., 2020; Chen and Chang, 2013; Chen et al., 2006). In addition, the GTFL promotes and fosters workers' environmentally conscious interests (Jia et al., 2018), creative endeavours with an environmental focus (Jia et al., 2018), innovative efforts towards sustainability (Zhou et al., 2018; Chen and Chang, 2013), and the overall environmental performance of the organisation (Chen and Chang, 2013; Chen et al., 2006).

Renwick et al. (2013) classified GHRM into three main duties: developing green employee competencies, motivating green workers, and providing green chances. The use of GHRM practices has been shown to have a positive impact on workers' environmental performance. This, in turn, may contribute to organisations' overall environmental preservation efforts. For example, GHRM might involve projects like

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cutting back on paper use, generating less trash, and encouraging water recycling for hygienic purposes (Singh et al., 2020). Organisations can accomplish environmental goals by adopting GHRM practices. To reduce the company's environmental pollution, for example, one strategy is to increase employee involvement (Dumont et al., 2016). Setting up measurable environmental performance indicators is another tactic (de Souza Freitas et al., 2011). Additionally, organisations can align executive compensation with pollution prevention strategies to promote environmental responsibility (Berrone and Gomez-Mejia, 2009). GHRM practices being a bundle surface as a function of GTL and explains the influence of GTL on environmental performance. Through the establishment and application of GHRM practices, GTL persuades its followers to achieve improved environmental performance by inspiring support and confidence in them.

It is argued that GTL Therefore, the present study predicts that:

H7: Green human resource management practices mediate the relationship between (a) green transformational leadership and (b) environmental performance.

Green Transformational Leadership and Environmental Performance: Green Innovation as A Mediator

Due to the increasing significance of environmental concerns and global warming worldwide, embracing green innovation in the contemporary business world has been recognized. Hence, firms must adopt green growth strategies since their long-term survival depends on sustainability, a primary obligation for organizations operating in the global competitive landscape. Implementing green innovation offers several advantages in mitigating environmental pollution, facilitating trash recycling, and conserving non-biodegradable energy resources. Companies need to collaborate within their organizational ecosystems to execute and realize the goal of green innovativeness (Muisyo et al., 2022). Organizations can improve their performance by implementing green innovation. Adopting environmentally friendly practices enables them to develop strategies that promote resource efficiency, minimise potential damage, and mitigate the organisation's carbon footprint. The green revolution is an innovative approach that allows organisations to develop novel strategies and systems to improve performance.

Organizations consistently strive to generate items that provide substantial economic value. Concurrently, the decision-makers within an organization always prioritize the consideration of eco-friendly goods and processes, emphasizing the need for environmental sustainability (Zhang et al., 2020). Organizations must embrace and execute innovative strategies and technology advancements to maintain a sustainable and environmentally friendly atmosphere. This approach is crucial for effectively managing organizational resources (Ahmed et al., 2021). Within the organizational environment, it is essential to acknowledge stakeholders' perspectives towards green goods, their inclination towards green consumption, and their desire for green products. This understanding is a foundation for developing strategies that align with these viewpoints (Kahupi et al., 2021). Furthermore, considering the innate relationship between organizations and the human aspect, it is imperative to ascertain the level of dedication exhibited by managers and the strategies the human resource department implements to address the technological challenges effectively. This strategy improves overall economic and environmental performance while giving firms a competitive edge (Haldorai et al., 2022). GTL focuses on positive change (rather than stability) and introduces new techniques, methods, and systems to enhance environmental performance. GTL inspires staff members to come up with fresh approaches to going green, which leads to new environmental projects, waste reduction strategies, ways to cut back on air, water, and other pollution, and creative ways to repurpose materials and items that have been utilized. These improvements help to improve environmental performance. Thus, the present study proposes that:

H8: Green innovation mediates the relationship between (a) green transformational leadership and (b) environmental performance.

Study 2

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Methodology

The data was collected from small and medium-sized firms (SMEs) and social entrepreneurs in Jaffna, Vavuniya, and Badulla in Sri Lanka. To identify organizations in Sri Lanka that have adopted GHRM practices and demonstrate concern for environmental sustainability, the authors compiled a comprehensive list of 25 such organizations. This was accomplished by examining their official websites and social media platforms. Data collection from the sample firms was conducted using a self-administered questionnaire, and a purposive sampling technique (Sun et al., 2022) was applied to ensure the selection of a representative sample. The purposive sampling approach involves intentionally choosing participants based on specific criteria they possess. The approach is nonrandom and does not need underlying theories or a predetermined number of participants. Data was collected via a survey from employees, managers, and owners who actively participated in the implementation of eco-friendly procedures.

Surveyors were hired to gather sufficient data. By providing instructions for surveyors, the respondents were given a comprehensive overview of the research's objective and thereafter asked to complete the questionnaire, a task they promptly carried out. A total of 150 surveys were distributed, 139 were returned, and 128 of them could be used, resulting in an 85.3% response rate.

Results

This study used partial least squares structural equation modeling (PLS-SEM) with SmartPLS 3.0 to test the validity of the research hypotheses (Hair et al., 2021; Hair et al., 2022). PLS-SEM is more suited for theory creation and does not require stringent sample distribution assumptions, which is the main reason for this (Verma et al., 2019). Table 2 displays the results of the evaluation of the measurement model's quality. The average variance extracted (AVE), which produced a value larger than 0.50, was used to evaluate convergent validity (see Table 2). Furthermore, Cronbach's alpha and composite reliability were evaluated to confirm the construct's dependability; both measures were above the 0.60 and 0.70 criteria, respectively (Cepeda-Carrión et al., 2022).

Moreover, the discriminant validity of the model was demonstrated using two traditional methods. First, the usual criteria that Fornell and Larcker had suggested were used. According to Table 3's results, the square root of AVE is greater in size than the correlation coefficients (bolded).

According to Table 3, all HTMT ratio values were below the recommended cutoff point of 0.90 (Côrte-Real et al., 2019), indicating that the heterotrait-monotrait (HTMT) requirements were satisfied.

Table 2. Cronbach's Alpha, Composite Reliability, And Convergent Validity

Constructs	Items	Loadings	Cronbach's alpha	Composite reliability	(AVE)
GHRM	GHRM1	.777	.915	.926	.571
	GHRM2	.912			
	GHRM3	.862			
	GHRM4	.751			
	GHRM5	.717			
	GHRM6	.732			
	GHRM7	.618			
	GHRM8	.775			
	GHRM9	.652			
	GHRM10	.717			
GI	GI1	.690	.834	.858	.557
	GI2	.695			
	GI3	.755			

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	GI4 GI5 GI6	.939 .771 .583			
GTL	GTL1 GTL2 GTL3	.509 .939 .877	.718	.971	.636
EP	EP1 EP2 EP3 EP4 EP5	.828 .696 .769 .731 .737	.810	.822	.568

A strong and positive association between the exogenous and endogenous dimensions is suggested by the results of the predictive relevance analysis utilizing Stone-Geisser's Q2 (Table 4). This suggests that the exogenous variables have a significant role in forecasting the endogenously generated constructs' results.

Table 3. Fornell–Lacker's Criterion and HTMT Ratio for Discriminant Validity

	GTL	GHRM	GI	EP
Fornell–Lacker's criterion				
GTL	**.797**			
GHRM	.530	**.756**		
GI	.521	.664	**.747**	
EP	.463	.615	.517	**.754**
HTMT				
GTL				
GHRM	.588			
GI	.637	.682		
EP	.525	.734	.697	

Table 4. Effect Size (F2), Predictive Relevance (R2), And Stone–Geisser's Q2 Value (Geisser, 1975; Stone, 1974)

			Cross-validated redundancy Q^2			f^2 effect size Endogenous constructs			
	R^2	R^2 adjusted	Q^2	RMSE	MAE	GTL	GHRM	GI	EP
GTL							.386	.303	.109
GHRM	.279	.275	.264	.915	.671			.823	.617
GI	.928	.928	.255	.877	.626				
EP	.856	.854	.194	.915	.671			.823	

Notes: RMSE=Root-Mean-Square Deviation; MAE=Mean Absolute Error

Hair et al. (2012) advise interpreting f2 values as follows: 0.02 represents a modest impact size, 0.15 represents a medium effect size, and 0.35 represents a large effect size. Table 4 demonstrates that GHRM has a significant impact on GI and EP, but GTL has a significant impact on GHRM and GI. In a similar

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vein, GI has a significant impact on EP. The last exogenous component (GTL on EP) has a negligible effect size.

Structural Model

Eight of the ten paths are significant, according to the structural model (Figure 5), resulting in an 85.6% significant path percentage.

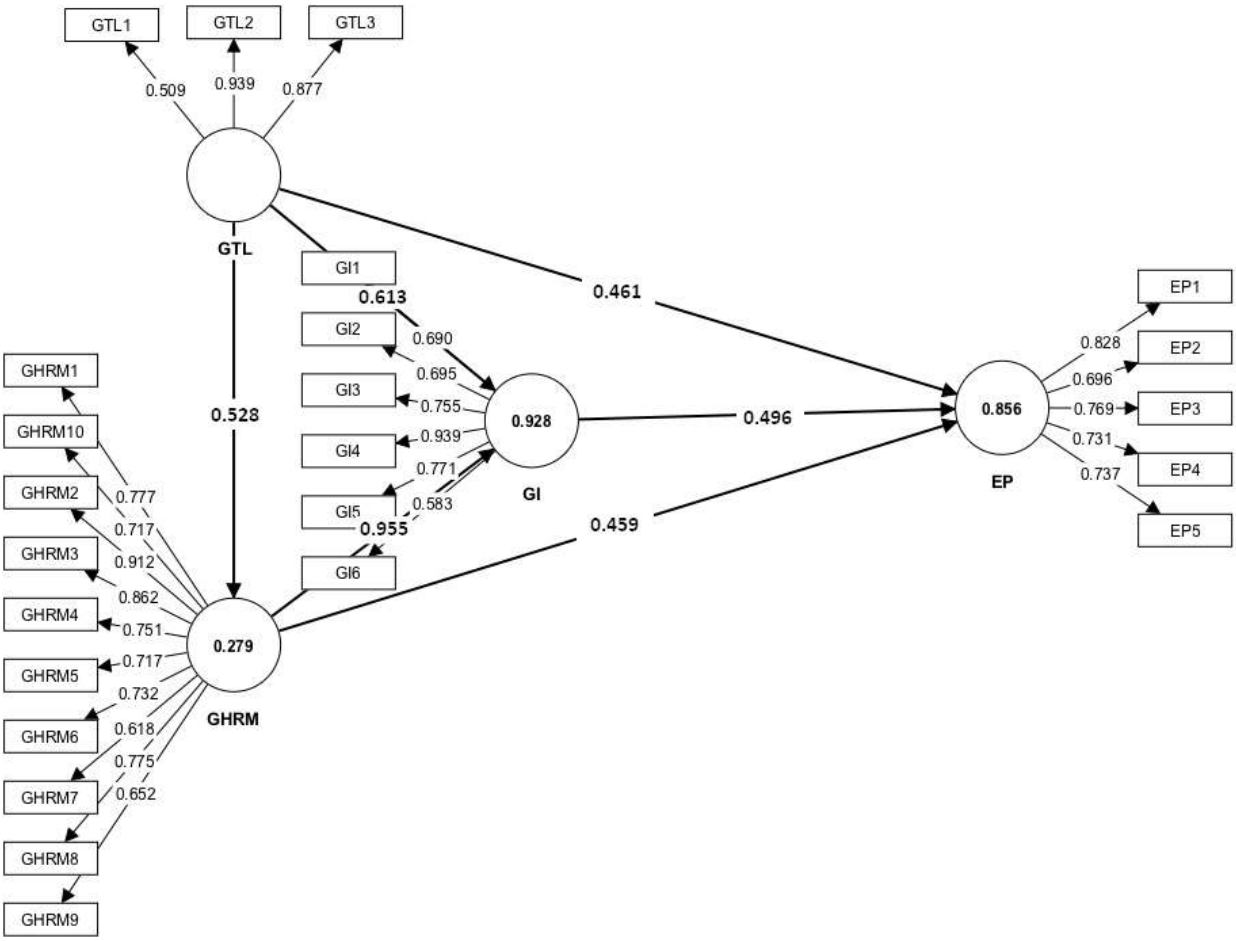

Figure 5. Results Of Conceptual Model

Table 5. Path Analysis of Proposed Conceptual Model

Hypotheses (effects)	Path	β	T statistics	P values	Remark
H1	GTL →EP	.461	2.817	.023**	Supported
H2	GTL → GHRM	.528	7.545	.000 ***	Supported
H3	GTL → GI	.613	3.758	.000***	Supported
H4	GHRM → GI	.955	14.198	.000 ***	Supported
H5	GHRM → EP	.459	5.066	.000 ***	Supported
H6	GI → EP	.496	5.190	.000 ***	Supported
Notes: * p < 0.1; **p < 0.05; ***p < 0.001					

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Table 10 shows GHRM (b = .528, p < .001) and GI (b = .613, p < .001) influenced by GTL. Moreover, GTL (b = .461, p < .001), GHRM (b = .459, p < .001), and GI (b = .496, p < .001) significantly affect environmental performance. Further, GHRM significantly affects GI (b = .955, p < .030).

The Mediating Role of Green Human Resource Management Practices and Green Innovation

The proposed research model was tested for full nomological validity using a mediation analysis in this study. With regard to the relationship between green transformational leadership and environmental performance, this study established the mediating role of GHRM practices and green innovation. GHRM and GI's mediating effects were evaluated in this study, according to Hair et al. (2022).

The results of the mediator assessment are presented in Table 6, which indicates that GI mediates the association between GTL and EP and GHRM and EP to some extent. Furthermore, the association between GTL and GI and the relationship between GTL and EP are partially mediated by GHRM practices.

Table 6. Specific Indirect Effect

Hypothesis	Path	Specific indirect Effects	Direct effect	Decision
H7a	GTL -> GHRM -> EP	.250**	.461***	Supported
H7b	GTL -> GHRM > GI	.504**	.613***	Supported
H8a	GTL -> GI -> EP	.308**	.461***	Supported
H8b	GHRM -> GI -> EP	.474**	.459***	Supported

Notes: *p < .1; **p <.05; ***p < .001

Discussion

The current work developed and verified a theoretical model that explains how GTL, GHRM, and GI affect environmental performance using a multi-method approach. Additionally, it evaluated how GHRM and GI mediated the link between GTL and environmental performance. Based on data gathered from Sri Lankan firms, an empirical study was conducted to validate the suggested conceptual model. It was noted that every hypothesis was confirmed to be true. Overall, the findings were consistent with earlier research showing that (H1) Green transformational leadership influences environmental performance (Singh et al., 2020; Sun et al., 2022, Awan et al., 2023, Riva et al., 2021).

(H2) Green transformational leadership influences green HRM(Jia et al., 2018; Renwick et al., 2013) practices. The effects of green transformational leadership (H4) on green innovation (Singh et al., 2020; Begum et al., 2022); green human resource management practices (H5) on green innovation (Singh and El-Kassar, 2019; El-Kassar and Singh, 2018; Albort-Morant et al., 2016); and (H6) on environmental performance (Nisar et al., 2021); Green Innovation influences on Environmental Performance (e.g., Wang et al., 2022; Singh et al., 2020).

The study's findings also lend credence to the theory that GHRM mediates the relationship between GTL and EP, with GHRM practices having a significant impact on GTL, which in turn influences EP prediction (Sun et al., 2022). Stated differently, this study adds to the body of research that shows how transformational leadership affects HRM practices, particularly with regard to how it affects green innovation and how that affects environmental performance (Singh et al., 2020).

Additionally, the study demonstrates that the connection between environmental performance and transformational leadership is mediated by green innovation. The results of our study shed light on how GI affects GTL and GHRM procedures. The AMO theory, which has been demonstrated to improve these

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organizations' environmental performance, lends credence to the body of research that already exists recognizing the importance of green innovation in the context of small and medium-sized firms (SMEs) (Singh et al., 2020). The results offer more support for the Resource-Based View (RBV) and the AMO theory, which contend that improving employee and leadership performance is essential to increasing an organization's competitiveness. Overall, the research's conclusions have important theoretical and practical ramifications and offer strong support for both the direct and indirect hypotheses.

Implications for Theory and Practice

Scholarly research on the degree to which HRM systems, practices, policies, and activities align with environmental performance is becoming more and more common. The results suggest that encouraging sustainability in the environment can be greatly enhanced by putting GHRM techniques into practice. This is achieved by fostering the development of environmentally conscious employee "Ability" through the recruitment and training of high-performing individuals and by enhancing their skills and competencies. Additionally, GHRM aims to cultivate employee "Motivation" by encouraging commitment to green initiatives. In addition, GHRM gives its workers "Opportunities" to get involved in environmentally friendly projects. Developing green competency has greater benefits than having innate green competency. According to Haddock-Millar et al. (2016), training might raise commitment levels, but it's important to remember that motivation and active participation in environmental cooperation are not always ensured by training. The observed and actual ease of engagement, performance evaluation, and motivation are a few elements that can affect how motivated trained professionals are.

It is essential that HRM practices—such as hiring, selection, training, performance evaluation, rewards, cooperation, engagement, empowerment, and culture—align with the objectives and roles of the company's environmental performance. Organizational structures that facilitate increased employee participation in decision-making, such as self-managing teams, also foster a climate that is favorable to improved learning. The learning associated with GHRM is more likely to flourish in a work environment that facilitates employees' ability to exert control and possess enough autonomy to shape their problem-solving approaches. The optimal learning environment is characterized by psychologically solid demands and sufficient decision-making freedom, which empowers individuals to react creatively.

The present study suggests that HRM functions, including active participation, communication of environmental information, and continuous learning, are crucial in implementing environmental management practices. Furthermore, organizational structures that allow employees greater latitude to engage in decision-making, like self-managing teams, foster an atmosphere that is favorable to improved learning. The learning associated with GHRM is more likely to flourish in a work environment that facilitates employees' ability to exert control and possess enough autonomy to shape their problem-solving approaches. The optimal learning environment is characterized by psychologically solid demands and sufficient decision-making freedom, which empowers individuals to react creatively.

Conclusion

This work uses bibliometric analysis to provide a novel GHRM model, which advances current research and practice. It examines how GI and GHRM practices are affected by GTL and evaluates how these capabilities affect environmental performance. The results offer a theoretical framework for comprehending the significance of GTL in HR divisions. It also provides top management and HR specialists with guidance on what to anticipate when utilizing effective GHRM practices and tactics. The results demonstrate that HR professionals may make more precise and detailed judgments with the help of GTL.

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