Journal of Research Administration
Society of Research Administrators International

# ENVIRONMENTAL STRATEGY AND GREEN PRODUCT INNOVATION IN LARGE MANUFACTURING FIRMS IN THE UK: A MODEL FOR ENHANCING ENVIRONMENTAL PERFORMANCE

**Amina Elshamly**

Department of Management, College of Business Administration- Yanbu at Taibah university, Saudi Arabia

**Abstract:**
With the escalating concerns over environmental degradation and climate change, adopting sustainable practices and green innovation has become imperative for large manufacturing firms. Despite this crucial issue, the researcher ignored this area. Therefore, this study hypothesises that in the industry (i.e., manufacturing) of developed nations, the relationship between EP (i.e., environmental performance) and SHRM (i.e., sustainable human resource management) is strengthened through environmental strategy, green innovation, and pro-environmental behaviour. We collected data from N=410 large manufacturing firms to analyse this relationship and performed SEM through Smart-Pls. The study's results showed that the influence of mediation-moderation has dramatically enhanced environmental performance in big manufacturing enterprises in the UK through proper environmental strategy, operational efficiency, and people's motivation to engage in environmental activities. Overall, an in-depth analysis demonstrates that implementing effective environmental strategies and adopting green innovation practices contribute significantly to improving EP in the manufacturing sector. The research findings offer insights for policymakers and managers seeking to promote sustainability and environmental responsibility in the UK's manufacturing industry.
**Keyword** Environmental strategy, innovation, large manufacturing firms, UK, Enhancing, Environmental performance, Structural equation Model, Sustainability

## Introduction

Human resource management (HRM) academics have recently shown a growing interest in researching Sustainable Human Resource Management (SHRM). This new strategy seeks to comprehend how businesses can use HRM tactics to accomplish their environmental objectives (Saeidi *et al.,* 2022;). The SHRM strongly emphasises incorporating environmental sustainability into HRM procedures and practices (Silveira Ramalho & de Fátima Martins, 2022). Organisations try to match their human resource strategy with their environmental goals by implementing SHRM methods (Karatepe *et al.,* 2022; Nisar *et al.,* 2021). This strategy encourages employees' engagement and participation in environmental activities while acknowledging their crucial role in supporting sustainability efforts (Rehman *et al.,* 2021).

The analysis of SHRM viewpoints by HRM academics provides insightful information on the potential advantages of integrating environmentally friendly practices within organisations (Rehman *et al.,* 2021; Saeidi *et al.,* 2022). Businesses can improve their environmental

performance, promote sustainable practices and lessen their environmental impact by implementing SHRM concepts (Apascaritei & Elvira, 2022; Tirno *et al.,* 2023). Additionally, SHRM procedures can improve staff members' attitudes and behaviours. Job satisfaction, organisational commitment, and overall performance are likely to increase when employees believe their company is socially and environmentally conscious (Tirno *et al.,* 2023). Organisations can promote a sense of purpose and harmonise employee goals with the organisation's larger environmental objectives by incorporating sustainability values into HRM initiatives(Apascaritei & Elvira, 2022; Cachón-Rodríguez *et al.,* 2022; Tirno *et al.,* 2023).

Scholars research a variety of topics to fully comprehend the implications of SHRM, including environmental awareness and competency-based recruitment and selection processes, sustainability-focused training programs, performance evaluation systems with environmental criteria, and reward and recognition programs that recognise employees' involvement in environmental initiatives (Apascaritei & Elvira, 2022; Cachón-Rodríguez *et al.,* 2022; Kumar *et al.,* 2023; Mishra & Sarkar, 2020; Tirno *et al.,* 2023). Although it is widely acknowledged that SHRM positively affects environmental performance, few studies have examined this impact holistically. Wang (2005) makes the case for more study in order to create a human resource development model that successfully integrates culture, organisational change, and cutting-edge technology. Future research should concentrate on this research goal (p.486). Silveira Ramalho and de Fátima Martins (2022) framework, which includes four perspectives on sustainable human resource management—sociological, psychological, strategic, and environmental—illustrates such a thorough framework. Promoting environmentally friendly practices within organisations is another critical function of SHRM. Organisations can achieve sustainability goals and gain a competitive advantage by incorporating environmental considerations into HRM strategy and operations(Cachón-Rodríguez *et al.,* 2022). Building on existing research and adopting a holistic outlook covering various facets of human resource development and sustainable practices are crucial to improving our comprehension of SHRM's potential.

Investigating how SHRM processes affect environmental performance in the context of organisational sub-processes is essential in the field of SHRM processes (Apascaritei & Elvira, 2022; Rehman *et al.,* 2021; Saeidi *et al.,* 2022). Furthermore, it is critical to investigate how these processes might act as mediators and moderators in forming the connection between SHRM and environmental outcomes. This study seeks to close this knowledge gap by creating a thorough multidimensional framework. The Global Reporting Initiative (GRI), environmental strategy, and pro-environmental behaviours will all be considered as we use this method to examine the complex relationships between SHRM and environmental performance. In doing so, we hope to clarify the complex interactions and significantly contribute to the field.

It is vital to note that no previous framework has thoroughly evaluated all the qualities in single research. This is especially important to remember when considering the setting of a fast-rising nation like the UK. It is vital to note that no previous framework has thoroughly evaluated all the qualities in single research. This is especially important to remember when considering the setting of a fast-rising nation like the UK. This study seeks to advance sustainable operational

practices(SOP) while also boosting operational effectiveness by concentrating on UK's manufacturing sector, which is a significant contributor its GDP and is linked to severe environmental concerns like pollution and resource depletion(Rehman *et al.,* 2021; X. Ren *et al.,* 2022).

The main objective of this study is to learn more about how SHRM, Global product innovation practices (GPI), pro-environmental behaviour proxy by E-EEB, and environmental strategy measured through SOP can help to reduce businesses' adverse environmental effects and improve environmental performance (EnvP). We gathered data from a sample of 410 firms to test our hypotheses. Utilising Partial Least Squares-Structural Equation Modeling analysis, we investigated the role of SHRM practices in environmental management. The empirical findings underscore that implementing SHRM practices positively influences the Environmental Performance (EnvP) of manufacturing firms operating in the UK. Moreover, we observed that Employee Environmental Engagement Behavior (E-EEB) and Green Product Innovation (GPI) serve as mediating mechanisms, bridging the relationship between SHRM and EnvP. Additionally, our study reveals that proactive Sustainable Operations Practices (SOP) enhance the nexus between GPI and EnvP. These findings have significant repercussions for businesses around the globe, particularly in developing countries and industrialised nations, which are still mired in outdated practices that are not sustainable.

By shedding light on several important topics, this research contributes to the corpus of knowledge already available on SHRM. Despite the UK's significant environmental protection and conservation efforts, there is a glaring research gap regarding SHRM, GRI, Employee Environmental Engagement Behavior (E-EEB), SOP, and Environmental Performance (EnvP), specifically in the Chinese context (Fawehinmi *et al.,* 2020). This study aims to close this research gap and increase our knowledge of these factors. The results of this study may be helpful to people in other developing nations as well as UK’s industrial practitioners and policymakers. Implementing SHRM can give a thorough understanding of these traits' crucial role and how they affect environmental performance, ultimately assisting in creating sustainable environmental practices.

In the second part of this investigation, in addition to looking at the direct correlations between variables, the researchers analyse SOP's moderating function and the mediating roles that GPI and E-EEB play. The study offers important insights into the underlying effects of these variables on addressing significant environmental challenges by examining these dynamics. Researchers now have a new perspective on the complex mechanisms of the moderator SOP and the mediators GPI and E-EEB.

The remainder is organised as follows: he theoretical underpinnings of this research are thoroughly covered in Section 2. The conceptual model is built upon a thorough literature review in Section 3. The research methodology used in this study is described in Section 4. The research is concluded with valuable policy implications and recommendations for further study in this area in Section 6, which also presents the findings and analysis from Section 5.

**Theoretical context**

Because of the growing interest in "green" business practices, sustainability has risen to the top of the corporate agenda.(Cachón-Rodríguez *et al.,* 2022; Islam *et al.,* 2022; Li *et al.,* 2023; Saeidi *et al.,* 2022; Zheng *et al.,* 2021). In response to environmental degradation and social sustainability, organisations are increasingly focusing on implementing SHRM and adopting sustainable policies for their employees (Apascaritei & Elvira, 2022; Rehman *et al.,* 2021).

Research has established a close connection between environmental management and human resource management, as employees are considered the lifeblood of an organisation (Cachón-Rodríguez *et al.,* 2022; Rehman *et al.,* 2021). SHRM practices enable organisations to cultivate a workforce that values and understands green initiatives (Apascaritei & Elvira, 2022; Rehman *et al.,* 2021; Silveira Ramalho & de Fátima Martins, 2022). SHRM promotes the adoption of the GRI and enhances environmental performance by fostering the development of Employee Environmental Engagement Behavior (E-EEB). Recent research has offered extensive frameworks and considerable evidence clarifying the elements that lead small and medium-sized firms (SMEs) to engage in GRI to enhance their environmental performance and contribute to the United Nations' Sustainable Development Goals (Cezarino *et al.,* 2023). Chen and Chang's research revealed that SHRM significantly influences GRI, positively impacting environmental performance. GRI encompasses technical improvements in production and administrative processes, directly influencing product development and manufacturing in an environmentally friendly manner, thereby providing organisations with a competitive edge. Employee E-EEB encompasses employees' willingness to engage in environmental activities, and SHRM plays a crucial role in shaping and fostering these behaviours, resulting in collective efforts that contribute to improved environmental performance.

Other aspects, such as SOP and employees' E-EEB, are crucial for maintaining environmental performance. It is important to note that studying the impact of SHRM systems rather than focusing on individual practices would provide valuable insights. Therefore, we contend that a "bundles view," which emphasises a comprehensive approach to SHRM activities, is necessary. This perspective recognises the effectiveness of the internally consisten HR practices as opposed to isolated practices, as previously discussed in the literature.

We advocate for a more holistic and comprehensive approach to measuring sustainability within SHRM practices, akin to methodologies employed in other academic disciplines, as supported by prior research. It is imperative to acknowledge that firms adopting a cohesive set of SHRM practices are more likely to attain their desired business objectives related to environmental sustainability. The integration of sustainability systematically calls for the utilisation of integrated SHRM practices, which enables the establishment of a comprehensive framework comprising exceptional components.

It is essential to emphasise that this approach does not diminish the significance of individual components that elucidate various facets of the SHRM process; instead, it underscores the value of adopting a holistic approach to enhance environmental performance effectively. For firms to gain sustainable competitive advantage they must effectively implement SHRM practices. As a

result, we emphasise the need of examining the influence of SHRM processes on environmental performance within the larger context of other sub-processes working within organisations.
Despite the well-established correlation between SHRM practices and environmental performance, we believe that other essential components of this relationship must be investigated further to appreciate it properly. In the following sections, we present and assess a complete model that evaluates the importance of all of these components in the overall environmental performance of businesses.

**Relevant Literature**

"Environmental Performance (EnvP)" refers to the overall ecological impact of organizational activities (Adu et al., 2022; Apascaritei & Elvira, 2022). It includes measures taken by organizations to improve their environmental footprint, such as using recycled materials, adopting clean production methods, and implementing eco-friendly administrative practices, leading to reduced waste and emissions (Anwar et al., 2020; Apascaritei & Elvira, 2022; Haldorai et al., 2022; S. Ren et al., 2022). Recently, there has been increased recognition among industry practitioners of the importance of sustainable resource management for environmental protection. Strategic Human Resource Management (SHRM) has emerged as a practice aiming to enhance businesses' environmental impact and performance. Researchers view SHRM as integrating environmental initiatives with HR functions like recruitment, training, and performance management to involve employees in reducing enterprises' environmental footprint (Anwar et al., 2020; Apascaritei & Elvira, 2022; S. Ren et al., 2022; Ren et al., 2021).
Therefore, this study hypothesis that
$H_1$: SHRM influences the Environmental Performance positively.

**Employee Environmental Engagement Behavior (E-EEB)**

Employee Environmental Engagement Behavior (E-EEB) is an alternative term used to describe the willingness of employees to engage in an organisation's environmental activities (Tirno *et al.,* 2023). It encompasses various actions related to job responsibilities and a concern for the environment, such as resource utilisation (e.g., recycling paper, conserving water, or electricity), contributing to the organisation's efforts to protect the environment. Recent scholarly attention has emphasised the significance of E-EEB and the need for research that identifies the factors influencing its promotion (Apascaritei & Elvira, 2022; Cachón-Rodríguez *et al.,* 2022; Rehman *et al.,* 2021; S. Ren *et al.,* 2022; Saeidi *et al.,* 2022; Sepahvand & Bagherzadeh Khodashahri, 2021; Tirno *et al.,* 2023). Additionally, SHRM has been identified as a crucial driver of E-EEB (Rehman *et al.,* 2021)
SHRM can communicate an organization's environmental commitment during employee recruitment, training, and development (Apascaritei & Elvira, 2022; Cachón-Rodríguez et al., 2022; Rehman et al., 2021; S. Ren et al., 2022; Saeidi et al., 2022; Sepahvand & Bagherzadeh Khodashahri, 2021; Tirno et al., 2023). SHRM helps workers accept environmental objectives and participate in green projects at work (Apascaritei & Elvira, 2022; Cachón-Rodríguez et al., 2022;

Rehman et al., 2021; S. Ren et al., 2022; Saeidi et al., 2022; Sepahvand & Bagherzadeh Khodashahri, 2021; Tirno et al., 2023). Employees' environmental sensitivity is closely tied to their E-EEB (Rehman et al., 2021). SHRM is considered a fundamental driver of E-EEB, enhancing an organization's environmental commitment and mitigating negative impacts from manufacturing (Cachón-Rodríguez et al., 2022; Tirno et al., 2023). However, it's important to note that antecedents of E-EEB may vary across contexts, with SHRM being one potential driver among others (Apascaritei & Elvira, 2022; Cachón-Rodríguez et al., 2022; Rehman et al., 2021; S. Ren et al., 2022; Saeidi et al., 2022; Sepahvand & Bagherzadeh Khodashahri, 2021; Tirno et al., 2023). Further research is needed to explore how SHRM practices influence E-EEB within organizations (Rehman et al., 2021). Employees' willingness to engage in eco-friendly behaviors supports organizational goals and enhances environmental performance by minimizing harmful human activities (Apascaritei & Elvira, 2022; Cachón-Rodríguez et al., 2022; Rehman et al., 2021; S. Ren et al., 2022; Saeidi et al., 2022; Sepahvand & Bagherzadeh Khodashahri, 2021; Tirno et al., 2023). Previous studies also indicate that E-EEB positively influences environmental performance, with SHRM playing a role in fostering employees' environmental awareness and engagement in eco-friendly activities (Apascaritei & Elvira, 2022; Cachón-Rodríguez et al., 2022; Rehman et al., 2021; S. Ren et al., 2022; Saeidi et al., 2022; Sepahvand & Bagherzadeh Khodashahri, 2021; Tirno et al., 2023).

Several studies support the relationship between E-EEB and environmental performance, with E-EEB acting as a mediator between SHRM and environmental performance (Apascaritei & Elvira, 2022; Cachón-Rodríguez et al., 2022; Rehman et al., 2021; S. Ren et al., 2022; Saeidi et al., 2022; Sepahvand & Bagherzadeh Khodashahri, 2021; Tirno et al., 2023). Drawing on Bandura's theoretical framework (1986), this study proposes hypotheses based on this literature review.

$H_{2(a)}$: There is a positive relationship between SHRM and E-EEB.

$H_{2(b)}$: There is a positive relationship between E-EEB and environmental performance (EnvP).

$H_2$: E-EEB mediates the relationship between SHRM and EnvP.

**Green Product Innovation (GPI)**

A substantial body of literature has established a clear association between Green Product Innovation (GPI) and Environmental Performance (EnvP). GPI, also known as Green Product Development (GPD) or Eco-Innovation, refers to implementing novel ideas, technologies, and practices in manufacturing and administrative processes to enhance production output while improving environmental sustainability. Scholars such as Dangelico (2016); Kara and Edinsel (2022) have provided definitions of GPI, highlighting its importance in driving organisational excellence in production while safeguarding the environment. Additionally, researchers like Bernauer *et al*. (2007) view GPI as a mechanism to modify systems, products, and processes for enhanced environmental performance and sustainability.

GPI encompasses both “Green Product Innovation” and “Green Process Innovation”, as posited by (Khan *et al.,* 2021). Organisational adoption of GPI has been associated with greater success and overall performance compared to competitors, as argued by(Kara & Edinsel, 2022).

Organisations embracing GPI effectively utilise green resources and practices, contributing to their competitive advantage(Kara & Edinsel, 2022). Furthermore, adopting SHRM fosters environmental commitment within organisations, leading to increased innovation and efficiency in environmental-oriented practices(Ramalho & de Fátima Martin, 2022). Ramalho and de Fátima Martin (2022) contend that SHRM and GPI compel organisations to adopt practices encouraging clean energy resources, eco-friendly technologies, and emission-reducing systems through efficient resource utilisation. Although there is some agreement among authors regarding the link between GHRM and GPI, Singh *et al*. (2020)argue that this relationship is dynamic, and existing findings are mixed and contradictory.

Both GPI and EnvP are concerned with the environmental outcomes of organisational activities, including raw material sourcing, energy usage, technology adoption, and the environmental impact of operational and administrative tasks (Apascaritei & Elvira, 2022; Mishra & Sarkar, 2020; Singh *et al.,* 2020). To sustain EnvP, a mechanism that aligns with organisational objectives is required. GPI plays a significant role in organisations' environmental plans and accelerates the achievement of environmental goals while contributing to overall organisational efficiency (Silveira Ramalho & de Fátima Martins, 2022). Adopting green products, processes, and GPI activities has been shown to minimise environmental impacts and enhance overall firm performance (Dangelico, 2016).

SHRM is critical in fostering Green Product Innovation (GPI) initiatives by fostering a culture of green creativity and enhancing corporate performance with environmental considerations. The research clearly shows a strong relationship between Green Human Resource Management (GHRM) practises and a firm's degree of innovation. Researchers, like Chen and Chang (2013) and Song et al. (2020), agree that GHRM improves GPI.

However, it is essential to highlight that Singh *et al*. (2020) have noted the limited research focused on manufacturing enterprises in developing countries, especially those operating in challenging business environments.

Beyond its GPI promotion, GHRM is a strategic resource contributing to the organisation's Environmental Performance (EnvP). By adopting environmentally conscious practices, companies can effectively achieve their environmental objectives with the support of GHRM practices (Kammerer, 2009; Chen *et al.,* 2006). This emphasises the significance of GHRM in fostering sustainability and aligning the organisation's objectives with environmentally responsible practices.

Based on the studied literature, we proposed the following hypotheses:

$H_{3(a)}$: SHRM positively influences the adoption of GPI practices within organisations.

$H_{3(b)}$: Green Product Innovation (GPI) positively impacts Environmental Performance (EnvP) within the organisation..

$H_3$: GPI serves as a mediator in the relationship between SHRM practices and Environmental Performance (EnvP).

**Sustainable Operational Practices**

SOP encompass various actions and initiatives companies implement to minimise environmental impact and enhance operational and production sustainability (Adu *et al.,* 2022; Ramalho & de Fátima Martin, 2022). These practices involve the development and implementation of programs, policies, and procedures that promote sustainable energy sources, effective environmental management systems, and product development aimed at reducing energy consumption and waste (Adu *et al.,* 2022; Apascaritei & Elvira, 2022; Aravindaraj & Rajan Chinna, 2022; Cezarino *et al.,* 2023; Mishra & Sarkar, 2020; Rehman *et al.,* 2021; Sharma *et al.,* 2022). Given the increasing environmental concerns and external pressures, businesses are increasingly adopting and executing appropriate SOP to address their environmental responsibilities. It has been observed that organisations with robust SOP tend to exhibit superior environmental performance compared to those lacking such systems(Adu *et al.,* 2022).

SOP integrates environmental considerations into an organisation's operational strategies and ensures the implementation of environmental initiatives to achieve sustainable environmental performance(Adu *et al.,* 2022; Apascaritei & Elvira, 2022; Aravindaraj & Rajan Chinna, 2022; Cezarino *et al.,* 2023; Mishra & Sarkar, 2020; Rehman *et al.,* 2021; Sharma *et al.,* 2022). Even though SOP substantially impacts environmental performance, establishing a direct causal relationship might be difficult. Previous research has looked at the role of SOP as an intermediary variable or moderator in examining the relationship between SOP and organisational performance. SOP's effectiveness in improving environmental performance may vary based on the situation and conditions (Adu *et al.,* 2022; Apascaritei & Elvira, 2022; Aravindaraj & Rajan Chinna, 2022; Cezarino *et al.,* 2023; Mishra & Sarkar, 2020; Rehman *et al.,* 2021; Sharma *et al.,* 2022). As a result, we believe that SOP can help to mitigate the link between Green Research and Innovation (GRI) and environmental performance.

The concept of standard operating procedures (SOP) is critical in fostering sustainable practices inside enterprises. Companies can connect their activities with sustainable aims and lower their environmental footprint by incorporating environmental considerations into operational strategy (Adu *et al.,* 2022). SOPs provide a foundation for enterprises to establish environmentally friendly policies and procedures, enhancing environmental performance.

The empirical evidence reveals that organisations with well-established SOPs outperform those without such practices in terms of environmental performance (Adu *et al.,* 2022; Apascaritei & Elvira, 2022; Aravindaraj & Rajan Chinna, 2022; Cezarino *et al.,* 2023; Mishra & Sarkar, 2020; Rehman *et al.,* 2021; Sharma *et al.,* 2022). This discovery emphasises the significance of incorporating sustainability principles into operational strategy and implementing robust environmental management systems. It also emphasises the importance of organisations taking the initiative to encourage sustainable energy consumption, waste reduction, and the adoption of environmentally friendly technologies.

Furthermore, SOP can be an essential mediator or moderator in the relationship between GRI & environmental performance. GRI focuses on developing and implementing innovative practices that minimise environmental impact and promote sustainable growth. However, the effectiveness of GRI in improving environmental performance may be contingent upon the presence of robust

SOP. SOPs can offer the framework and support required for the successful implementation of GRI practises, increasing their influence on environmental performance.
Based on the literature, we hypothesise:

$H_4$: SOPs considerably modify the association between GRI and environmental performance.

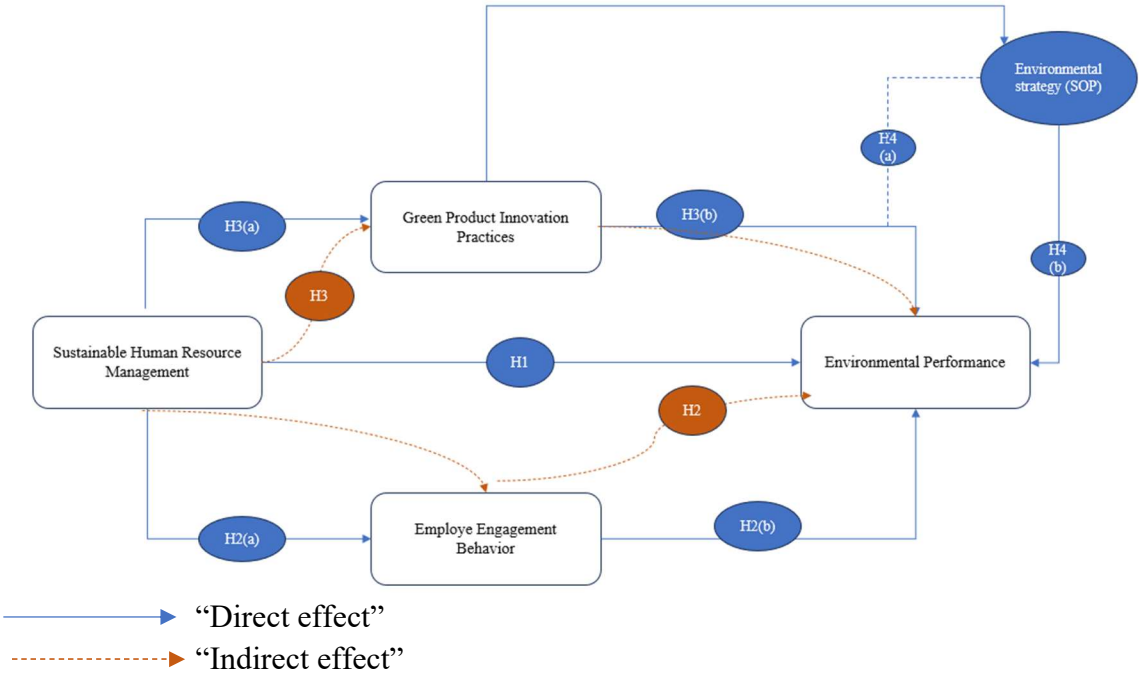


**Figure 1** Conceptual framework

**Research Methodology**

To investigate the relationship between SHRM practices, Employee Environmental Engagement Behavior (E-EEB), GRI, SOP, and environmental impact reduction in the manufacturing sector in the UK, data from managers of medium- to large-sized manufacturing companies were collected. The manufacturing sector was selected due to its significant contribution to the national economy and the pressing need for sustainable production and consumption. Additionally, the industry is known for its environmental impact and faces institutional and environmental challenges on a global scale. As a result, it is critical to investigate how manufacturing companies in the UK might reduce their environmental effect by applying these practises.

A cross-sectional design and a self-reported survey were employed to ensure data efficiency. A list of 120 randomly selected manufacturing enterprises was generated with the assistance of the relevant chamber of commerce. These companies' human resource department directors were contacted to verify their adherence to SHRM practices. Only companies practising SHRM were invited to participate, resulting in a final sample of 79 manufacturing companies.

Once permission was obtained, 600 surveys were distributed between January and May 2023. Sealed packets containing the survey questionnaire and a cover letter describing the study's

objectives and ensuring the confidentiality of responses were provided to the managers of the 79 manufacturing companies. After three reminders at two-week intervals, 428 completed surveys were collected. Of these, 410 accurately completed surveys (a response rate of 68.33 %) were included in the study.

It is vital to highlight that the original questionnaire was written in English. Following Brilin's advice, the English version was translated into Urdu before being back translated into English to guarantee content clarity. To detect and resolve any ambiguities, the questionnaire was pilot tested twice, with 15 and 18 people, respectively.

The participating manufacturing enterprises were established between 1997 and 2013. Most companies (73 %) had between 51 and 250 employees, while the remaining 27 % had over 250 employees. The average age of managers was 41.7 years, with 64.3% male and 35.7 % female. Regarding educational qualifications, 35.6 % held a bachelor's degree, 52.8 % held a master's degree, 9.2 % held a doctoral degree, and 2.4 % held professional certifications.

Two statistical tests were conducted to address potential common method bias. Harman's single-factor test revealed that the first factor accounted for 29.71 % of the variance, below the 50 % threshold. Additionally, no significant multicollinearity concerns among the constructs, as all VIF values were below 5 were shown in variance inflation factor (VIF) test.

By conducting this research and ensuring data validity and reliability, the study aims to contribute to understanding the relationship between SHRM, E-EEB, GRI, SOP, and environmental impact reduction in the UK manufacturing sector. These results will be useful for practitioners and policymakers looking to develop sustainable practises and address environmental issues in the industrial business.

**Measurement:**

The measuring instruments used in this study were derived from available resources to evaluate the variables SHRM, Environmental Performance (EnvP), GRI, Employee Environmental Engagement Behavior (E-EEB), and SOP. Each characteristic was rated using a Likert-type scale ranging from one (strongly disagree) to five (strongly agree), with acceptable levels of reliability (> 0.70). (Hair et al., 2019).

To measure the exogenous variable SHRM, a 6-item scale modified from Dumont *et al*. (2017) was employed. An example statement included, "My organisation provides sustainable training to develop the knowledge and skills necessary for eco-friendly management." The scale demonstrated a reliability coefficient of 0.83. The endogenous variable EnvP was assessed using a 5-item scale created by Chow and Chen (2012), capturing aspects such as reducing the usage of non-renewable resources, chemicals, and components. The scale exhibited a Cronbach's alpha value of 0.855.

The mediators GRI and E-EEB were assessed using 7- and 8-item measures modified from Cai et al (2020). An example item from the GRI scale is, "My organisation actively utilises products that consume less energy and resources," while a sample item from the E-EEB scale is, "I properly

dispose of compostable items." These scales demonstrated alpha values of 0.82 for GRI and 0.87 for E-EEB.

The moderator scale SOP, designed by Banerjee *et al*. (2003), consisted of three items. An example item stated, "We emphasise the eco-friendliness of our products and services in our advertising campaigns." The scale exhibited a reliability coefficient of 0.72.

By employing established scales with satisfactory reliability, this study ensured the validity and consistency of the collected data, enabling a comprehensive examination of the relationships between the investigated variables. The SHRM scale captured employees' perceptions of sustainable training programs offered by their organisations, fostering the development of environmental management-related knowledge and skills. The EnvP scale assessed enterprises' efforts to reduce their consumption of non-renewable resources, chemicals, and components. The GRI and E-EEB scales aimed to capture employees' perceptions of their firms' consistent utilisation of materials that promote energy and resource efficiency and the appropriate disposal of compostable products. The SOP scale explored the extent to which sustainability factors were integrated into firms' overall business strategies.

**Analysis and Results**

To examine the latent variables and their relationships with the constructs, and test the proposed hypotheses, we employed structural equation modelling (SEM) using the partial least squares (PLS) approach in the SmartPLS V3.3.3 software (Zaiţ & Bertea, 2011). PLS-SEM was chosen for its suitability in estimating complex frameworks and handling moderation and mediation effects (Hair *et al.,* 2019). It also provides an easy-to-use graphic user interface and therefore does not need the premise of normalcy (Hair *et al.,* 2019)

The research used a two-stage estimating model, consisting of structural & measurement models (Anderson & Gerbing, 1988). The measurement model evaluated the variables' factor loadings, reliability, convergent and discriminant validity. Factor loadings were analysed, and the required threshold of 0.5 over all factors was exceeded (Hair et al., 2019). The composite reliability (CR) values, which assess the internal consistency of scales, ranged from 0.787 (SOP) to 0.869 (SHRM), indicating satisfactory reliability (Hair *et al.,* 2019).

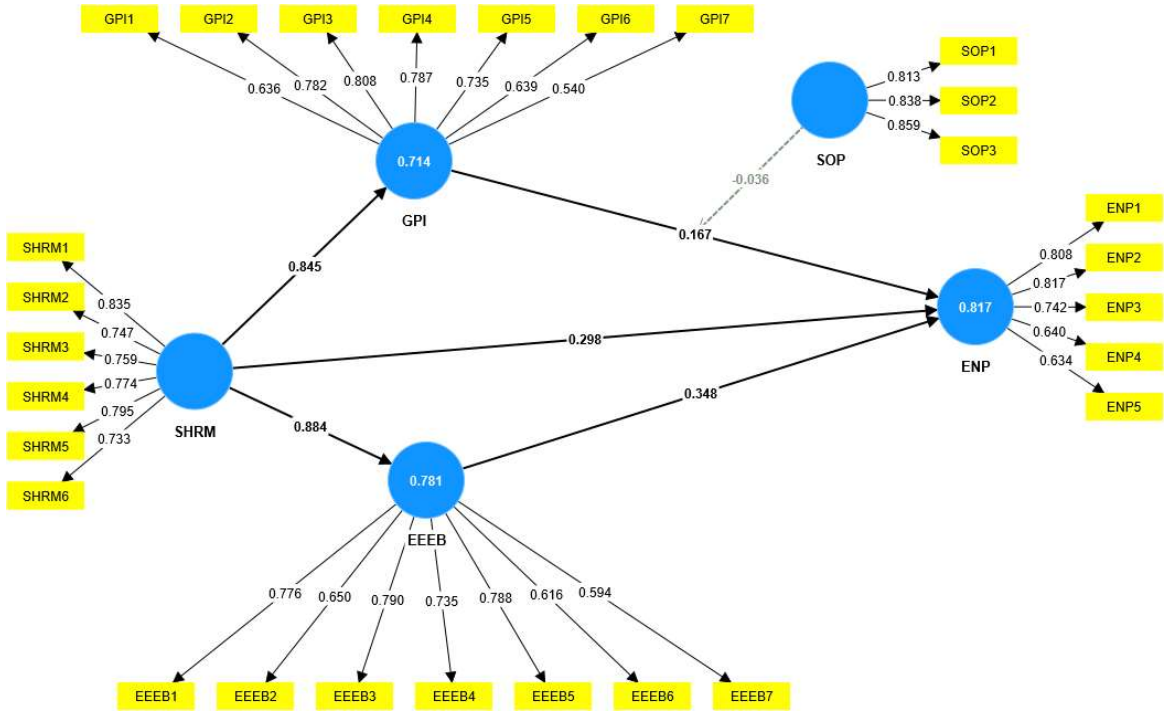


**Figure 2** Measurement Model

Convergent validity was assessed using average variance extracted (AVE), and all constructs exceeded the minimal criterion of 0.5. (Hair et al., 2019). To determine discriminant validity, the heterotrait-monotrait ratio (HTMT) correlation ratio was calculated, and all HTMT correlations fell below the required threshold of 0.90 (Henseler *et al.,* 2015)

**TABLE1** CONVERGENT & DISCRIMINANT VALIDITIES

| | FL Range | Cronbach's alpha | CR | AVE | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|
| **1.EEEB** | 0.594-0.790 | 0.836 | 0.855 | 0.506 | **0.711** | | | | |
| **2.ENP** | 0.634-0.808 | 0.782 | 0.804 | 0.536 | 0.853 | **0.732** | | | |
| **3.GPI** | 0.540-0.808 | 0.833 | 0.846 | 0.504 | 0.790 | 0.817 | **0.710** | | |
| **4.SHRM** | 0.733-0.835 | 0.866 | 0.869 | 0.600 | 0.884 | 0.871 | 0.845 | **0.774** | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **5.SOP** | 0.813-0.859 | 0.786 | 0.787 | 0.700 | 0.681 | 0.749 | 0.744 | 0.755 | **0.837** |

**ABBREVIATION: FL, FACTOR LOADINGS**

Moving to the structural model (figure 2), we assessed the hypotheses by examining the path relationships between the constructs. The standard "t-value" ($t > 1.96$) or "p-value" ($p < 0.05$) determines the significance of the path coefficients. Five direct hypotheses were developed, and the results from bootstrapping with 5,000 resamples indicated support for all of them:

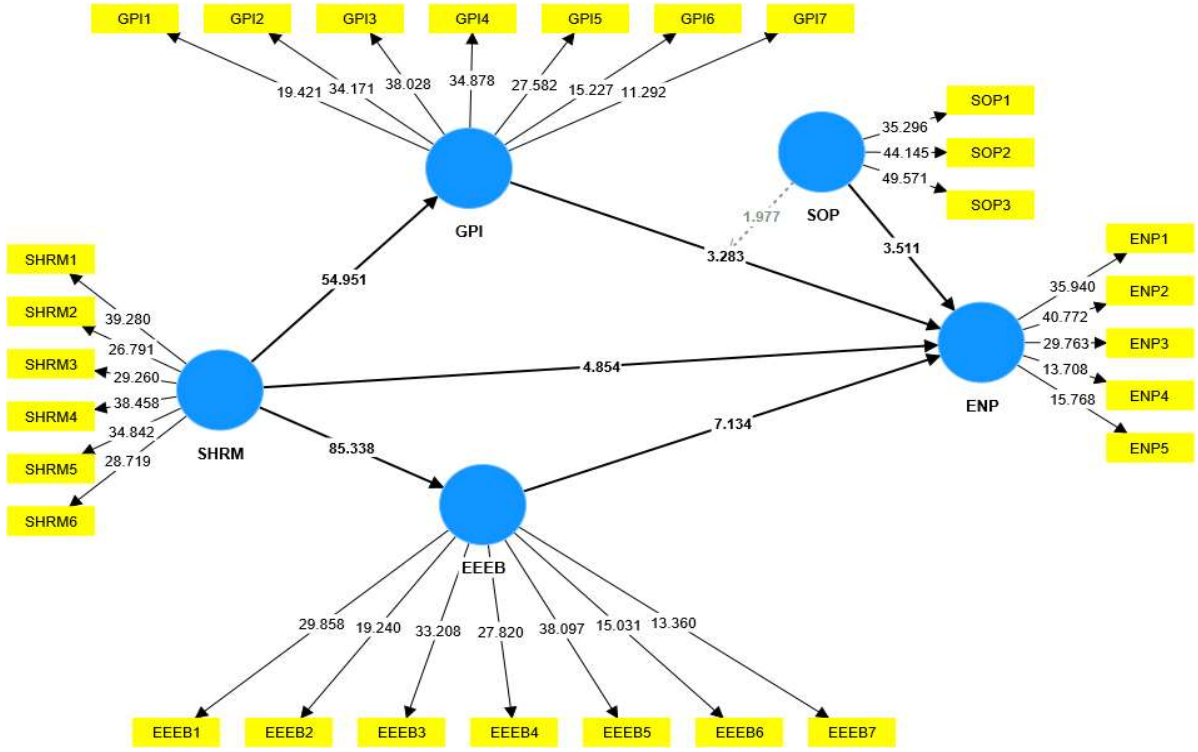


**Figure 3.** Measurement Model

1. EnvP was positively and directly associated with SHRM(t-value = 4.854, β = 0.298).
2. SHRM was directly and positively related to GPI(t-value = 54.951, β = 0.845).
3. SHRM was directly and positively related to E-EEB (t-value = 85.338, β = 0.884).
4. EnvP was positively correlated with GPI (t-value = 3.283, β = 0.167).
5. E-EEB had a direct and beneficial relationship with EnvP. (t-value = 7.134, β = 0.348).

Additionally, we tested two mediating hypotheses (Hair *et al.,* 2014):

1. "GPI partially mediated the relationship between SHRM and EnvP (t-value = 3,261, β = 0.141). The variance accounted for (VAF) value for GPI was 0.043, indicating partial mediation."

2. "E-EEB partially mediated the relationship between SHRM and EnvP (t-value = 7.223, β = 0.308). The VAF value for E-EEB was 0.235, indicating partial mediation."

Furthermore, we examined the moderating effect (see Figure 3) of SOP on the relationship between GRI and EnvP. We found a positive moderation effect between GRI and SOP using the product indicator method (t-value = 1.977, β = 0.036). These results support the proposed hypotheses, indicating the positive influence of SHRM, GRI, and E-EEB on environmental performance (EnvP). Additionally, GRI and E-EEB were found to mediate the relationship between SHRM and EnvP partially. Moreover, SOP was identified as a significant moderator in the relationship between GRI and EnvP.

**TABLE 3:** HYPOTHESIS TESTING AND RESULTS

| | Beta value | STDEV | T value | P values | Result |
|---|---|---|---|---|---|
| **EEEB -> ENP** | 0.348 | 0.049 | 7.134 | 0.000 | Accepted |
| **GPI -> ENP** | 0.167 | 0.051 | 3.283 | 0.001 | Accepted |
| **SHRM -> EEEB** | 0.884 | 0.010 | 85.338 | 0.000 | Accepted |
| **SHRM -> ENP** | 0.298 | 0.061 | 4.854 | 0.000 | Accepted |
| **SHRM -> GPI** | 0.845 | 0.015 | 54.951 | 0.000 | Accepted |
| **SOP -> ENP** | 0.149 | 0.042 | 3.511 | 0.000 | Accepted |
| **SHRM -> GPI -> ENP** | 0.141 | 0.043 | 3.261 | 0.001 | Accepted & Partially Mediated |
| SHRM -> EEEB -> ENP | 0.308 | 0.043 | 7.223 | 0.000 | Accepted & Partially Mediated |
| **SOP X GPI -> ENP** | -0.036 | 0.018 | 1.977 | 0.049 | Moderated |


**Figure 4** Moderation (SOP*GOP ➔ EnvP)

**Coefficient of determination, effect magnitude, predictive significance, and model fitness**

To examine the relevance and fit of our model, we used a variety of factors. To begin, we utilised the coefficient of determination (R2) to assess the model's explanatory power, which indicates how much variance in the endogenous variables can be explained by the exogenous variables. The results in Table 3 show the R2 values for the primary dependent variables: Environmental Performance (EnvP), Global Product Initiative (GPI), and Employee Environmental Engagement Behavior (E-EEB). The R2 values for these variables were 0.773, 0.714, and 0.781, respectively.

Second, we estimated effect sizes (f2) to assess the relevance of the predictor factors on the criterion variable, following Götz et alguidelines. .'s (2009). Cohen's (1988) criteria define small, medium, and large effects as those bigger than 0.02, 0.15, and 0.35. Our results show that SHRM has a modest effect on EnvP (f2 = 0.068), a considerable effect on GPI (f2 = 0.402), and a medium influence on E-EEB (f2 = 0.278). Similarly, GPI and E-EEB show moderate (f2 = 0.178) and minor (f2 = 0.057) effects on SHRM, respectively.

Third, we investigated the predictive relevance of our study model by using the blindfolding procedure in SmartPLS to get the Q2 value (Geisser, 1974). The Q2 value is a measure of predictive relevance, with thresholds of 0.02 (small), 0.15 (medium), and 0.35 (big) (Cohen et al., 2000). The results in Table 3 show that the Q2 values for Environmental Performance (EnvP), Green Product Innovation (GPI), and Employee Environmental Engagement Behavior (E-EEB) were 0.773, 0.711, and 0.779, respectively, indicating medium to high predictive significance.

Finally, to evaluate the model fit, we used the "standard root mean square residual" (SRMR) metric, which measures the difference between observed correlations and those predicted by the model. An SRMR score of less than 0.08 suggests a good match. In our investigation, the SRMR score was 0.074, indicating a well-fitted model.

The results obtained from the Q2 values and SRMR score contribute to the robustness and reliability of our research model. The medium to substantial predictive significance observed in the Q2 values suggests that the model can reasonably accurately predict Environmental Performance, Green Product Innovation, and Employee Environmental Engagement Behavior.

Furthermore, the excellent fit indicated by the SRMR score validates the overall coherence and adequacy of the model in capturing the relationships among the variables under investigation.
These findings bolster the credibility of our research outcomes, and they reinforce the notion that the proposed model effectively captures the intricate interplay between "SHRM practices and their impact on environmental outcomes". By establishing the predictive relevance and model fit, our study provides valuable insights into organisations' complex dynamics and environmental performance, making it a valuable resource for academics and practitioners seeking to advance sustainable practices and achieve environmental goals.
In summary, the results in Table 3 demonstrate that based on the SRMR value, model is a good fit and the R2 and Q2 values indicate a high level of explanatory power and predictive relevance for the variables in the model. Therefore, the effect sizes provide insights into the magnitude of the relationships between the predictor and criterion variables, highlighting significant and medium effects between different variables in the model. Overall, these findings support the relevance and validity of our research model.

**TABLE 3:** R2 AND Q2

| | $Q^2$ | R-square |
|---|---|---|
| **EEEB** | 0.779 | 0.781 |
| **ENP** | 0.773 | 0.817 |
| **GPI** | 0.711 | 0.714 |

**Discussion and implications**

Researchers have displayed a robust curiosity in exploring the role of HRM in enhancing environmental management in recent times. In accordance with this scholarly trend, our study aims to contribute to the current literature by investigating the relationship between strategic HRM (SHRM) practises and environmental performance (EnvP), especially in the UK manufacturing sector. This focus on the UK is particularly pertinent due to its status as the world's most populous nation, boasting a significant manufacturing industry, yet it remains an underexplored context in investigating the interplay between SHRM and EnvP. By addressing this research gap, our study seeks to shed new light on the complex dynamics of sustainable practices within the UK manufacturing landscape and contribute valuable insights to the broader HRM and environmental management discourse.
The results of this research offer several theoretical insights. Firstly, it broadens comprehension of HRM and environmental management by examining how SHRM practices influence EnvP in the UK manufacturing sector. Prior studies have mainly concentrated on developed nations, leaving a dearth of empirical data in countries like the UK. By underscoring the significance of SHRM

practices in enhancing EnvP, this study addresses a vital void in the literature and adds to theoretical understanding in the domain.

Secondly, the research findings indicate a direct and favourable correlation between SHRM practices and green research and innovation (GRI), with the implementation of SHRM practices significantly affecting this association. The results imply that SHRM practices, including green recruitment, training, empowerment, and performance-based incentives, have the capacity to draw in and retain employees who embrace environmentally sustainable principles. This, in turn, contributes to the adoption of GPI practices in both processes and products, leading to enhanced EnvP. The study emphasises the need for organisations to integrate SHRM practices into their social systems and develop an aggressive SHRM style to align human capital with environmental management goals effectively.

Thirdly, the study demonstrates that the relationship between GRI and EnvP is strengthened by SOP. Proactive SOP creates an enabling environment for adopting GRI practices, subsequently improving EnvP. This finding highlights the importance of SOP in achieving environmental goals and suggests that organisations should develop and adhere to SOP to mitigate adverse environmental impacts and enhance EnvP.

The managerial implications of this study are significant for top managers and policymakers in the UK who are committed to environmental sustainability. The research framework offers practical guidance for integrating SHRM practices, employee eco-friendly behaviour (E-EEB), GPI, and SOP to improve environmental performance and achieve sustainable development goals.

First, managers may use SHRM practises to encourage workers to actively participate in environmental efforts. By hiring environmentally conscious employees and implementing practical training and measurement systems, organisations can foster environmental awareness and behaviour among employees. Over time, these behaviours can become ingrained habits contributing to E-EEB and reducing adverse environmental effects. Therefore, investing in SHRM practices and considering them as strategic resources can effectively channel human potential toward environmental management goals.

Secondly, the study emphasises the strategic value of GPI in achieving competitive advantage and improving EnvP. Managers should recognise the importance of GPI practices and provide unwavering support to SHRM practices to drive GPI adoption. Furthermore, organisations should focus on exploitative GPI that advances current processes and products.

Thirdly, proactive SOP plays a crucial role in achieving environmental goals. Organisations should develop and adhere to SOP, integrating it with GPI, creating an environment that fosters sustainable practices and enhances EnvP. Organisations can mitigate negative environmental impacts and improve EnvP by aligning their operations with SOP and GPI.

Although this study offers valuable insights, it possesses certain limitations that pave the way for future research opportunities. Initially, the study concentrated on the UK manufacturing sector, thereby constraining the applicability of the findings to other industries and nations. Subsequent research endeavors could broaden the conceptual framework to encompass non-manufacturing

sectors and incorporate a more diverse array of countries to bolster the external validity of the conclusions.

Secondly, the analysis depends on perceptual or primary data, which may present a subjective perspective. Future research could incorporate objective secondary environmental data to complement the outcomes and provide a more comprehensive understanding of the relationships between SHRM, GPI, and EnvP.

Lastly, this study investigated selected determinants of the variables, but other determinants may exist in the literature. Future empirical studies could explore additional determinants to gain deeper insights and contribute to a more nuanced understanding of the relationships identified in this research.

**Theoretical Implications**

This study enhances the theoretical understanding of the correlation between SHRM and environmental performance (EnvP) within the UK manufacturing sector by introducing the mediating influence of employees' environmentally friendly behavior (E-EEB) and green research and innovation (GPI), along with the moderating impact of standard operating procedures (SOP). By integrating these elements into a comprehensive conceptual framework, this research offers novel insights into the intricate dynamics between SHRM and EnvP, illuminating previously overlooked facets.

Firstly, this study expands upon existing literature on environmental management by investigating the connection between SHRM and EnvP in the context of the evolving Chinese manufacturing landscape. While prior research has predominantly focused on developing nations, the role of SHRM in environmental management within developed countries like the UK remains relatively unexplored. Through emphasizing the importance of SHRM practices in advancing environmental sustainability, this study addresses a critical gap in the literature and delivers valuable insights for both scholars and practitioners operating within similar environments.

Secondly, the findings reveal that GPI directly influences firms' EnvP, and SHRM is critical in facilitating this relationship. The study underscores the importance of SHRM practices, “such as green recruitment, training, empowerment, and performance-based incentives”, in attracting and retaining employees who embody green principles. These practices contribute to GRI in processes and products, leading to sustained superior EnvP. The study emphasises the need for organisations to embed SHRM practices within their social systems, leveraging human capital to address organisation-specific factors and gain a competitive advantage. Furthermore, the study highlights the importance of an aggressive SHRM style in attracting, developing, and retaining environmentally conscious employees, aligning them with the organisation's environmental goals. The study reveals that SOP moderates the relationship between GPI and EnvP. Proactive SOP creates an environment conducive to practising GPI, leading to improved EnvP. This finding underscores the significance of SOP in driving environmental goals. Managers and policymakers can utilise this insight to develop and actively implement SOP, as it strengthens the nexus between

GPI and EnvP. By adopting proactive SOP, organisations can mitigate risks, enhance their reputation, and achieve better financial outcomes.

**Managerial Implications**

The study's findings have important management implications for top UK managers and politicians who are devoted to environmental sustainability. The study framework offers useful guidelines for combining SHRM, E-EEB, GPI, and SOP to enhance EnvP and meet sustainable development objectives.

Firstly, managers can use SHRM practices to encourage employees to embrace pro-environmental initiatives daily. Organisations can embed environmental consciousness in employee habits and behaviours by hiring environmentally aware employees and implementing effective training and measurement systems. Over time, these behaviours can shape E-EEB, reducing adverse environmental effects and improving EnvP. As a result, investing in SHRM practises and treating them as a strategic resource helps direct human talent toward environmental management objectives.

Secondly, the study highlights the importance of viewing GPI as a strategic asset contributing to competitive advantage and enhanced EnvP. Managers should recognise the value of GPI in achieving environmental objectives and provide unconditional support to SHRM practices. Organizations may remediate negative environmental harm and favourably impact the environment in the long run by concentrating on both exploitative and exploratory GPI.

Thirdly, proactive SOP plays a crucial role in achieving environmental goals. Organisations should develop and strictly adhere to SOP, integrating it with GPI to mitigate adverse environmental impacts and enhance EnvP. Organisations can effectively align their operations with sustainability objectives by creating a conducive environment for GPI practices.

**Limitations and Future Research Directions**

While this study offers valuable insights, it also has limitations that open avenues for future research. Primarily, the study focused on the manufacturing industry in the UK, which restricts the applicability of the findings to other industries and nations. Subsequent research could broaden the conceptual framework to encompass non-manufacturing sectors and developed countries, providing a more comprehensive understanding of the correlation between SHRM and EnvP.

Secondly, this study relied on perceptual or primary data, which may present a limited perspective. Incorporating secondary environmental data can enhance the robustness of the study results and provide a more comprehensive understanding of the relationship between SHRM, GPI, and EnvP.

Lastly, this study examined selected determinants of the variables, while other potential determinants may exist in the literature. Future empirical studies could explore additional determinants to expand the knowledge base and provide further evidence of the relationships identified in this research.

**References**


1. Adu, D. A., Flynn, A., & Grey, C. (2022). Executive compensation and sustainable business practices: The moderating role of sustainability-based compensation. *Business Strategy and the Environment*, *31*(3), 698-736.
2. Anwar, N., Mahmood, N. H. N., Yusliza, M. Y., Ramayah, T., Faezah, J. N., & Khalid, W. (2020). Green Human Resource Management for organisational citizenship behaviour towards the environment and environmental performance on a university campus. *Journal of Cleaner Production*, *256*, 120401.
3. Apascaritei, P., & Elvira, M. M. (2022). Dynamizing human resources: An integrative review of SHRM and dynamic capabilities research. *Human Resource Management Review*, *32*(4), 100878. https://doi.org/https://doi.org/10.1016/j.hrmr.2021.100878
4. Aravindaraj, K., & Rajan Chinna, P. (2022). A systematic literature review of integration of industry 4.0 and warehouse management to achieve Sustainable Development Goals (SDGs). *Cleaner Logistics and Supply Chain*, *5*, 100072. https://doi.org/https://doi.org/10.1016/j.clscn.2022.100072
5. Banerjee, S. B., Iyer, E. S., & Kashyap, R. K. (2003). Corporate environmentalism: Antecedents and influence of industry type. *Journal of marketing*, *67*(2), 106-122.
6. Cachón-Rodríguez, G., Blanco-González, A., Prado-Román, C., & Del-Castillo-Feito, C. (2022). How sustainable human resources management helps in the evaluation and planning of employee loyalty and retention: Can social capital make a difference? *Evaluation and Program Planning*, *95*, 102171. https://doi.org/https://doi.org/10.1016/j.evalprogplan.2022.102171
7. Cai, X., Zhu, B., Zhang, H., Li, L., & Xie, M. (2020). Can direct environmental regulation promote green technology innovation in heavily polluting industries? Evidence from Chinese listed companies. *Science of the total environment*, *746*, 140810.
8. Cezarino, L. O., Liboni, L. B., Martins, F. P., Aveiro, P., & Caldan, A. F. (2023). Unveiling Diversity and the Unwanted Inequality in Organizational Leadership. In *The Route Towards Global Sustainability: Challenges and Management Practices* (pp. 163-176). Springer.
9. Chow, W. S., & Chen, Y. (2012). Corporate sustainable development: Testing a new scale based on the mainland Chinese context. *Journal of business ethics*, *105*, 519-533.
10. Dangelico, R. M. (2016). Green product innovation: Where we are and where we are going. *Business Strategy and the Environment*, *25*(8), 560-576.
11. Dumont, J., Shen, J., & Deng, X. (2017). Effects of green HRM practices on employee workplace green behavior: The role of psychological green climate and employee green values. *Human Resource Management*, *56*(4), 613-627.
12. Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European business review*, *31*(1), 2-24.
13. Haldorai, K., Kim, W. G., & Garcia, R. F. (2022). Top management green commitment and green intellectual capital as enablers of hotel environmental performance: The mediating role of green human resource management. *Tourism Management*, *88*, 104431.

14. Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science*, *43*, 115-135.
15. Islam, S. N., Reinstädtler, S., Reza, M. S., Afroze, S., & Azad, A. K. (2022). Climate change versus livelihoods, heritage and ecosystems in small Island states of the Pacific: a case study on Tuvalu. *Environment, Development and Sustainability*, 1-44.
16. Kara, K., & Edinsel, S. (2022). The mediating role of green product innovation (GPI) between green human resources management (GHRM) and green supply chain management (GSCM): evidence from automotive industry companies in Turkey. Supply Chain Forum: An International Journal,
17. Khan, S. J., Dhir, A., Parida, V., & Papa, A. (2021). Past, present, and future of green product innovation. *Business Strategy and the Environment*, *30*(8), 4081-4106.
18. Kraus, S., Rehman, S. U., & García, F. J. S. (2020). Corporate social responsibility and environmental performance: The mediating role of environmental strategy and green innovation. *Technological Forecasting and Social Change*, *160*, 120262. https://doi.org/https://doi.org/ 10.1016/j.techfore.2020.120262
19. Kumar, A., Singh, E., Mishra, R., Lo, S. L., & Kumar, S. (2023). Global trends in municipal solid waste treatment technologies through the lens of sustainable energy development opportunity. *Energy*, *275*, 127471. https://doi.org/https://doi.org/10.1016/j.energy.2023.127471
20. Li, T., Umar, M., Mirza, N., & Yue, X.-G. (2023). Green financing and resources utilization: A story of N-11 economies in the climate change era. *Economic Analysis and Policy*, *78*, 1174-1184. https://doi.org/https://doi.org/10.1016/j.eap.2023.05.007
21. Mishra, R., & Sarkar, S. (2020). Sustainable HRM Practices-A Drive Towards Sustainability (The case of NLCIL). *Sustainable Human Resource Management: Transforming Organizations, Societies and Environment*, 183-196.
22. Ramalho, T. S., & de Fátima Martin, M. (2022). Sustainable Human Resource Management in the Supply Chain: A New Framework. *Cleaner Logistics and Supply Chain*, 100075.
23. Rehman, K. U., Mata, M. N., Martins, J. M., Mariam, S., Rita, J. X., & Correia, A. B. (2021). SHRM Practices Employee and Organizational Resilient Behavior: Implications for Open Innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(2), 159. https://doi.org/https://doi.org/10.3390/joitmc7020159
24. Ren, S., Jiang, K., & Tang, G. (2022). Leveraging green HRM for firm performance: The joint effects of CEO environmental belief and external pollution severity and the mediating role of employee environmental commitment. *Human Resource Management*, *61*(1), 75-90.
25. Ren, S., Tang, G., & Jackson, S. E. (2021). Effects of Green HRM and CEO ethical leadership on organizations' environmental performance. *International Journal of Manpower*, *42*(6), 961-983.
26. Ren, X., Zhang, X., Yan, C., & Gozgor, G. (2022). Climate policy uncertainty and firm-level total factor productivity: Evidence from China. *Energy Economics*, *113*, 106209.

27. Saeidi, P., Mardani, A., Mishra, A. R., Cajas Cajas, V. E., & Carvajal, M. G. (2022). Evaluate sustainable human resource management in the manufacturing companies using an extended Pythagorean fuzzy SWARA-TOPSIS method. *Journal of Cleaner Production*, *370*, 133380. https://doi.org/https://doi.org/10.1016/j.jclepro.2022.133380
28. Sepahvand, R., & Bagherzadeh Khodashahri, R. (2021). Strategic human resource management practices and employee retention: A study of the moderating role of job engagement. *Iranian Journal of Management Studies*, *14*(2), 437-468.
29. Sharma, M., Luthra, S., Joshi, S., & Kumar, A. (2022). Analysing the impact of sustainable human resource management practices and industry 4.0 technologies adoption on employability skills. *International Journal of Manpower*, *43*(2), 463-485.
30. Silveira Ramalho, T., & de Fátima Martins, M. (2022). Sustainable Human Resource Management in the Supply Chain: A new framework. *Cleaner Logistics and Supply Chain*, *5*, 100075. https://doi.org/https://doi.org/10.1016/j.clscn.2022.100075
31. Singh, S. K., Giudice, M. D., Chierici, R., & Graziano, D. (2020). Green innovation and environmental performance: The role of green transformational leadership and green human resource management. *Technological Forecasting and Social Change*, *150*, 119762. https://doi.org/https://doi.org/10.1016/j.techfore.2019.119762
32. Tirno, R. R., Islam, N., & Happy, K. (2023). Green HRM and ecofriendly behavior of employees: Relevance of proecological climate and environmental knowledge. *Heliyon*, *9*(4), e14632. https://doi.org/https://doi.org/10.1016/j.heliyon.2023.e14632
33. Wang, Y., & Chen, X. (2020). Natural resource endowment and ecological efficiency in China: Revisiting resource curse in the context of ecological efficiency. *Resources Policy*, *66*, 101610.
34. Wang, Z. (2005). Organizational effectiveness through technology innovation and HRM strategies. *International Journal of Manpower*, *26*(6), 481-487.
35. Zaiț, A., & Bertea, P. (2011). Methods for testing discriminant validity. *Management & Marketing Journal*, *9*(2), 217-224.
36. Zheng, G.-W., Siddik, A. B., Masukujjaman, M., Fatema, N., & Alam, S. S. (2021). Green finance development in Bangladesh: The role of private commercial banks (PCBs). *Sustainability*, *13*(2), 795.