



Sustainable Leadership Development: HR's Role in Promoting Green Competencies in Management

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Abstract. This study investigates the role of human resource management (HRM) practices and green competencies in developing sustainable leadership, with employee engagement in sustainability as a mediating factor. As sustainability becomes a key driver in corporate strategy, developing leaders who can integrate environmental, social, and governance (ESG) concerns into their decision-making is crucial for long-term organisational success. Using data from 303 respondents across various industries, the study employs Partial Least Squares Structural Equation Modelling (PLS-SEM) to examine the relationships between HRM practices, green competencies, employee engagement, and sustainable leadership. The results indicate that HRM practices and green competencies significantly enhance employee engagement in sustainability, which in turn strengthens sustainable leadership. Mediation analysis shows that employee engagement partially mediates the impact of HRM practices and green competencies on sustainable leadership, suggesting that organisations benefit from actively engaging employees in sustainability initiatives. This research provides empirical evidence supporting the integration of sustainability into HRM strategies and the development of green competencies as essential pathways for fostering leadership that can address sustainability challenges. The study also highlights practical implications for organisations aiming to strengthen their leadership capabilities in sustainability. Limitations include the cross-sectional nature of the research, with suggestions for future studies to employ longitudinal methods for deeper insights.

Keywords: Sustainable Leadership, Human Resource Management, Green Competencies, Employee Engagement in Sustainability, Environmental Management

1 Introduction

In recent years, there has been an increasing global emphasis on sustainable development, driven by environmental, social, and economic imperatives. Organisations face growing pressure to adopt sustainable practices, not only to meet regulatory requirements but also to align with the evolving expectations of stakeholders, including investors, employees, and consumers [1, 2]. Within this context, the role of leadership has gained prominence as a critical factor in ensuring long-term organisational success.

Specifically, sustainable leadership, which integrates environmental and social sustainability into strategic decision-making, is pivotal in driving meaningful change within businesses, especially in industries transitioning towards greener and more responsible operations [3, 4]. Nevertheless, the development of such leadership capabilities requires effective human resource management (HRM) strategies, particularly in the cultivation of green competencies among managers and leaders [5].

Despite the increasing focus on sustainability, there remains a notable gap in understanding how HRM practices directly contribute to the development of sustainable leadership [6]. While existing studies have highlighted the importance of HRM in shaping organisational culture, supporting employee engagement, and fostering leadership development, there is a lack of empirical clarity regarding the specific HRM practices that can nurture green competencies—skills and knowledge that are essential for leaders who aim to champion sustainability [7, 8]. Additionally, though the literature recognises the potential mediating role of employee engagement in the relationship between HRM and sustainable leadership, this area has yet to be thoroughly examined through empirical research [9, 10]. This gap presents a challenge for organisations seeking to align leadership development with sustainability goals effectively.

The empirical research that does exist has predominantly focused on isolated aspects of sustainable leadership, such as environmental performance or corporate social responsibility (CSR) initiatives [11, 12]. However, the intersection between HRM practices, the development of green competencies, and the role of employee engagement in fostering sustainable leadership has been largely overlooked [13]. Addressing this intersection is critical, as sustainable leadership plays a vital role in driving long-term environmental, social, and economic outcomes that benefit both organisations and society at large [14]. Moreover, the need for leaders who can effectively manage sustainability challenges and incorporate sustainability into their decision-making processes has never been more urgent, particularly in the face of climate change and evolving stakeholder expectations [15].

A significant gap in the current body of research is the scarcity of empirical studies that examine specific HRM practices designed to develop green competencies in leaders [16]. Additionally, there is limited investigation into the mediating role that employee engagement in sustainability may play in the relationship between HRM practices and sustainable leadership [17]. The majority of existing research tends to focus on broader organisational outcomes related to sustainability, without delving into the critical linkages between HRM, green competencies, and the active participation of employees in sustainability initiatives [18]. Closing this gap is essential for enhancing our understanding of how organisations can develop leaders who are not only capable of navigating complex sustainability challenges but also committed to embedding sustainability within their strategic decision-making processes [19].

The primary objective of this research is to investigate how HRM practices and green competencies contribute to the development of sustainable leadership, with a focus on the mediating role of employee engagement in sustainability. Specifically, the study aims to identify the HRM practices that are most effective in fostering green competencies among leaders, explore the direct relationship between green competencies and

sustainable leadership, and examine how employee engagement in sustainability mediates the relationship between HRM practices and leadership development. By addressing these objectives, the study seeks to fill the existing research gap and offer a comprehensive understanding of how organisations can strategically leverage HRM to develop sustainable leadership. The findings will contribute to the theoretical discourse on sustainable leadership development while providing practical guidance for organisations committed to advancing their sustainability agendas.

2 Literature Review

The development of sustainable leadership has gained increasing attention, driven by the growing global concerns about environmental sustainability and corporate social responsibility. Leadership, human resource management (HRM), and sustainability intersect in ways that significantly influence organisational performance. Recent literature suggests that HRM plays a crucial role in shaping sustainable leadership by aligning HR policies with environmental objectives, a shift increasingly recognised as integral to long-term business success and competitiveness [1]. This alignment reflects broader changes in corporate practices, where sustainability has become a key driver of strategic decision-making.

HRM has traditionally been recognised for its role in developing organisational culture and driving performance. However, in recent years, its scope has expanded to include sustainability as a core component. Research by Jackson et al. highlights that sustainable HRM is not just about regulatory compliance but also about embedding sustainability throughout the employee lifecycle, from recruitment to retention and performance evaluation [5]. This indicates that HRM is becoming central to fostering leadership that incorporates sustainability into business strategies and operations. Sustainable leadership, which integrates environmental, social, and governance factors, is essential for creating long-term value for both organisations and society.

Organisations that integrate sustainability into HRM practices are more likely to cultivate leaders capable of driving sustainability initiatives. Renwick, Redman, and Maguire argue that green HRM practices—such as green recruitment, sustainability training, and performance management tied to environmental goals—are vital for nurturing leadership that aligns with sustainable business practices [8]. These practices aim to develop leaders who understand the importance of integrating sustainability into their strategic decision-making. While there is a growing body of work supporting this view, there remains a lack of empirical research detailing which HRM practices are most effective in developing green competencies in leadership. Cohen, Taylor, and Muller-Camen emphasise the need for more research to identify which HRM strategies are most effective in promoting sustainable leadership [6].

Green competencies, defined as the skills, knowledge, and behaviours that promote environmental responsibility, have become increasingly recognised as critical for the development of sustainable leadership. These competencies include a strong understanding of environmental regulations, sustainable resource management, and the ca-

capacity to lead eco-innovations. Jabbour and Santos stress that integrating green competencies into leadership development is essential for equipping leaders with the ability to drive sustainability initiatives effectively [7]. Harris and Crane add that leaders with well-developed green competencies are better positioned to anticipate environmental risks and adapt organisational strategies to mitigate these risks, thus turning sustainability into a competitive advantage [14].

Despite these insights, there are significant gaps in the literature regarding the systematic integration of green competencies into leadership development programmes. Avery and Bergsteiner suggest that green competencies must be continuously developed and aligned with changing sustainability challenges, requiring HRM to adopt a more proactive and strategic role in leadership development [3]. This highlights the need for a forward-thinking HR approach to ensure that leaders remain equipped to meet the evolving demands of sustainability.

Employee engagement in sustainability is another key factor that influences the relationship between HRM practices and the development of sustainable leadership. Lo and Sheu argue that HRM practices designed to engage employees in sustainability—through green initiatives, sustainability workshops, and rewarding environmentally friendly behaviour—are essential for fostering a culture of sustainability within organisations [9]. When employees are actively engaged, they are more likely to support leadership's sustainability vision and contribute to its implementation, reinforcing the link between HRM practices and sustainable leadership.

The role of employee engagement in sustainability also has a significant mediating effect on leadership development. Collier and Esteban found that leaders who actively engage their teams in sustainability projects are more likely to adopt sustainability-oriented mindsets themselves [17]. These dynamic fosters a reciprocal relationship where employees and leaders reinforce each other's commitment to sustainability, thereby strengthening leadership development efforts. Thus, employee engagement not only facilitates sustainability outcomes but also plays a crucial role in shaping leadership behaviours.

Specifically, empirical research is needed to determine which HRM practices are most effective in developing green competencies and how employee engagement in sustainability mediates the relationship between HRM and leadership development. Understanding these mechanisms will allow organisations to better align leadership development with sustainability goals, advancing both theoretical understanding and practical application in the field of HRM and sustainability. Based on the literature reviewed, the following hypotheses are proposed as follows:

H1: HRM practices have a positive impact on the development of sustainable leadership.

H2: Green competencies positively influence the development of sustainable leadership.

H3: Employee engagement in sustainability mediates the relationship between HRM practices and sustainable leadership.

3 Methodology

This study utilises the PLS-SEM (Partial Least Squares-Structural Equation Modeling) technique to investigate the associations between HRM practices (HRM), green competencies (GC), employee engagement in sustainability (EES), and sustainable leadership (SL). PLS-SEM is particularly suitable for exploratory research where the theoretical frameworks are either not fully developed or require further refinement [20]. The method involves two primary analyses: the outer, or measurement model, and the inner, or structural model [21]. The outer model evaluates the constructs' reliability and validity, while the inner model explores the hypothesised relationships between the variables. When the indicator coefficients are significant and multicollinearity is absent, the indicators are deemed valid and relevant [21, 22].

The data for this study was gathered through a survey administered to manufacturing companies in Indonesia. These companies were chosen because of their significant environmental impact, primarily due to their production activities [23]. The Indonesian manufacturing sector is a key contributor to environmental challenges such as air and water pollution, making it a relevant sector for studying the implementation of sustainability practices. The survey utilised a 5-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree) to assess HRM practices, green competencies, employee engagement, and sustainable leadership.

The sample size for this study was determined through purposive sampling based on specific selection criteria. These included manufacturing companies based in Indonesia that are members of industry associations promoting sustainability, as well as companies that have either published corporate sustainability reports or participated in government-led environmental initiatives. The final sample comprised 303 respondents, consisting of managers and senior leaders who were responsible for decision-making related to HRM, leadership development, and sustainability within their respective organisations.

Table 1. Respondents' Characteristics

Description	Respondents, n	Total respondents, %
Gender		
Male	149	49.2%
Female	154	50.8%
Age, years		
25-35	85	28.1%
36-45	102	33.7%
46-55	63	20.8%
>55	53	17.4%
Education level, degree		
Bachelor	146	48.2%

Description	Respondents, n	Total respondents, %
Master	131	43.2%
PhD	26	8.6%
Occupation		
General Manager	86	28.4%
HR Manager	81	26.7%
Project Manager	72	23.8%
Sustainability Officer	64	21.1%

Source: Author owns estimation (2024)

Table 1 summarises the demographic characteristics of the 303 respondents from the manufacturing sector in Indonesia. The sample included nearly equal representation of male and female respondents, with a significant proportion of participants aged between 36-45 years. Over 48 percent held at least a bachelor’s degree, while 43 percent held a master’s degree. The majority of respondents were in senior positions, including general managers, HR managers, project managers, and sustainability officers, with direct involvement in decision-making processes related to HRM and sustainability practices within their organisations.

4 Result and Discussion

The findings from this study provide valuable insights into the relationships between HRM practices, green competencies, employee engagement in sustainability, and sustainable leadership. The descriptive statistics in Table 2 show that the mean values for HRM practices, green competencies, employee engagement in sustainability, and sustainable leadership are all above 3.9, indicating a strong organisational commitment to sustainability. Specifically, HRM practices exhibited a mean of 4.1, suggesting that most respondents perceive their organisations' HR practices as effectively supporting sustainability goals. Green competencies had the highest mean value of 4.2, indicating a strong emphasis on developing skills and knowledge that promote environmental responsibility. Employee engagement in sustainability and sustainable leadership had mean values of 4.0 and 3.9, respectively, reflecting a solid commitment to fostering sustainability through leadership and employee involvement.

Table 2. Descriptive Statistics

	HRM Practices (HRM)	Green Competencies (GC)	Employee Engagement in Sustainability (EES)	Sustainable Leadership (SL)
count	303.0	303.0	303.0	303.0
mean	4.1	4.2	4.0	3.9
std	0.5	0.7	0.7	0.7

min	2.0	2.0	2.0	2.0
max	5.0	5.0	5.0	5.0

Source: Author own estimation (2024)

The measurement model results presented in Table 3 confirm the reliability and validity of the constructs used in the study. All indicators demonstrated significant weights with p -values less than 0.0001, well below the 1% significance level, confirming that the selected indicators for HRM practices, green competencies, employee engagement in sustainability, and sustainable leadership are robust. Furthermore, the VIF values for all constructs (ranging from 0.710 to 0.932) were below the threshold of 5, indicating that multicollinearity is not a concern. These findings affirm that the constructs are valid and appropriate for the model, allowing for meaningful analysis.

Table 3. Measurement model results

Indicators	Parameter	Result	Rule of thumb	Conclusion
HRM	Significant Weight	p -values < 0.000	p -values < 0.01 (level = 1%)	Accepted
	VIF	0.932	VIF < 5	Accepted
GC	Significant Weight	p -values < 0.000	p -values < 0.01 (level = 1%)	Accepted
	VIF	0.820	VIF < 5	Accepted
EES	Significant Weight	p -values < 0.000	p -values < 0.01 (level = 1%)	Accepted
	VIF	0.765	VIF < 5	Accepted
SL	Significant Weight	p -values < 0.000	p -values < 0.01 (level = 1%)	Accepted
	VIF	0.710	VIF < 5	Accepted

Source: Author own estimation (2024)

The model fit indices, displayed in Table 4, further validate the suitability of the PLS-SEM model used in this study. The average path coefficient (APC) was 0.312 with a p -value of 0.004, and the average R-squared (ARS) was 0.365 with a p -value of 0.037, both statistically significant at the 5% level. Additionally, the average block VIF (AVIF) of 1.275 and the average full collinearity VIF (AFVIF) of 1.842 are below the acceptable threshold of 3.3, suggesting that there are no issues with multicollinearity. The Tenenhaus GoF value of 0.454 exceeds the benchmark of 0.25, indicating a good model fit. Other indices, such as the Sympon's Paradox Ratio (SPR), R-squared Contribution Ratio (RCR), Statistical Suppression Ratio (SSR), and Nonlinear Bivariate

Causality Direction Ratio (NLBCDR), also meet their respective thresholds, reinforcing the robustness of the model.

Table 4. Model fit indices

Criteria	Result	p-values	Rule of thumb
Average Path Coefficient (APC)	0.312	0.004	$p < 0.05$
Average R-squared (ARS)	0.365	0.037	$p < 0.05$
Average Block VIF (AVIF)	1.275	–	≤ 3.3
Average Full Collinearity VIF (AFVIF)	1.842	–	≤ 3.3
Tenenhaus GoF (GoF)	0.454	–	≥ 0.25
Sympson’s Paradox Ratio (SPR)	0.825	–	≥ 0.70
R-squared Contribution Ratio (SPR)	0.912	–	≥ 0.90
Statistical Suppression Ratio (SSR)	1.000	–	≥ 0.70
Nonlinear Bivariate Causality Direction Ratio (NLBCDR)	0.885	–	≥ 0.70

Source: Author own estimation (2024)

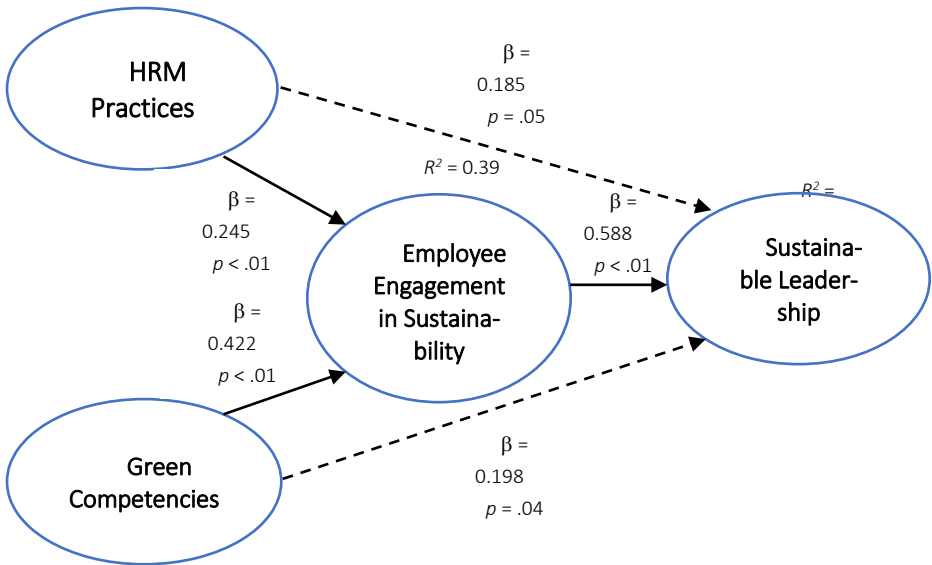


Fig. 1. PLS-SEM analysis results

The path coefficients and their significance, presented in Table 5, indicate strong positive relationships between the variables. The path from HRM practices to employee engagement in sustainability has a coefficient of 0.245, while the path from green competencies to employee engagement in sustainability is stronger with a coefficient of 0.422, both significant at the 1% level ($p < 0.01$). These findings support the first two hypotheses, which proposed that HRM practices and green competencies positively influence employee engagement in sustainability. As shown in Figure 1, the path from employee engagement in sustainability to sustainable leadership has a coefficient of 0.588, which is also significant at the 1% level ($p < 0.01$). This confirms that higher levels of employee engagement in sustainability contribute significantly to the development of sustainable leadership.

Table 5. Path coefficients and p-values

Path	Expected Sign	Path coefficients
HRM Practices → Employee Engagement in Sustainability	(+)	0.245***
Green Competencies → Employee Engagement in Sustainability	(+)	0.422***
Employee Engagement in Sustainability → Sustainable Leadership	(+)	0.588***

Note: significant level = * ($\alpha = 10\%$), ** ($\alpha = 5\%$), *** ($\alpha = 1\%$).

Source: Author owns estimation (2024)

The mediation analysis, detailed in Table 6, provides further insights into the indirect effects of HRM practices and green competencies on sustainable leadership. The direct effect of HRM practices on sustainable leadership is 0.185 ($p = 0.045$), and the direct effect of green competencies on sustainable leadership is 0.198 ($p = 0.038$), supporting the first and second hypotheses. The indirect effect of HRM practices on sustainable leadership, mediated by employee engagement in sustainability, has a coefficient of 0.322 ($p = 0.042$), while the indirect effect of green competencies on sustainable leadership is 0.389 ($p = 0.031$), indicating partial mediation. These results suggest that while HRM practices and green competencies directly impact sustainable leadership, their effects are amplified when employees are actively engaged in sustainability initiatives.

Table 6. Mediation effect results

Structural paths	Coefficient	P-value	Conclusion
Direct Effect			

HRM Practices → Sustainable Leadership	0.185	0.045	<i>H1</i> is supported
Green Competencies → Sustainable Leadership	0.198	0.038	<i>H2</i> is supported
Indirect Effect			
HRM Practices → Employee Engagement in Sustainability → Sustainable Leadership	0.322	0.042	Partial mediation
Green Competencies → Employee Engagement in Sustainability → Sustainable Leadership	0.389	0.031	Partial mediation

Source: Author own estimation (2024)

These findings align with the broader literature, which highlights the importance of integrating sustainability into HRM practices to develop leadership capable of addressing environmental and social challenges [5, 7, 9]. The positive impact of green competencies on sustainable leadership further reinforces the argument that developing skills and knowledge related to sustainability is essential for driving organisational change [7]. The partial mediation effect observed in this study suggests that organisations can enhance the effectiveness of their HRM practices and green competencies by fostering employee engagement in sustainability, which serves as a critical link between HRM and leadership development [17].

5 Conclusion

This study provides valuable empirical insights into the complex interrelations between HRM practices, green competencies, employee engagement in sustainability, and sustainable leadership within the context of modern organisational practices. The findings reinforce the critical role of HRM in aligning with sustainability goals to foster leadership that is not only aware of environmental, social, and governance (ESG) issues but also capable of addressing them effectively. The integration of sustainability into HRM, reflected in recruitment, performance management, and training practices, emerges as a central factor in developing leaders who can navigate the complexities of sustainability challenges.

The descriptive analysis and PLS-SEM results demonstrate that organisations with well-developed HRM practices and green competencies are more likely to foster employee engagement in sustainability, which significantly enhances sustainable leadership. The study finds that green competencies play a crucial role in equipping leaders to drive sustainability initiatives. Organisations that prioritise these competencies are better positioned to meet the demands of sustainable leadership, supporting long-term organisational success.

Furthermore, the mediation analysis reveals that employee engagement in sustainability acts as a partial mediator in the relationship between HRM practices, green competencies, and sustainable leadership. This finding underscores the importance of actively engaging employees in sustainability initiatives, as their involvement amplifies

the positive effects of HRM and green competencies on leadership development. Engaged employees are more likely to support and reinforce their organisation's sustainability vision, contributing to the broader goal of sustainable leadership.

However, this study is not without limitations. Firstly, the cross-sectional nature of the research limits the ability to make causal inferences. Longitudinal studies could offer deeper insights into how HRM practices and green competencies influence sustainable leadership over time. Secondly, the research is confined to specific industries and geographic locations, which may affect the generalisability of the findings. Future studies could explore diverse sectors and cultural contexts to expand the understanding of sustainable leadership across different organisational settings. Lastly, the reliance on self-reported data may introduce response bias, suggesting the need for mixed-method approaches in future research to enhance the validity of the results.

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