Effects of Green Human Resource Management Practices on Organizational Sustainability Mediated by Employee Engagement: Evidence from Ethiopian Manufacturing Industries

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ABSTRACT

Business organizations are increasingly recognizing the importance of adopting green practices and implementing environmental management strategies. It is essential to implement sustainable business practices. As a result, many firms are now implementing Green Human Resource Management (GHRM) practices on a global scale. The main objective of the study was to examine the effects of green HRM bundle practices on organizational sustainability mediated by employee engagement in the manufacturing industries of Ethiopia. This study employed an explanatory research design underpinned by a positivist philosophy. The data required for the study were collected using a self-administered structured questionnaire from 382 sample employees in the manufacturing industries through convenience sampling techniques. The study utilized covariance-based structural equation modeling techniques to analyze the data. The findings of the study revealed that green human resource management bundle practices positively and significantly contribute to organizational sustainability in the manufacturing industries. Additionally, the results of the study indicated that employee engagement mediates the relationship between GHRM bundle practices and organizational sustainability. The outcomes of the study underscore the critical role of Green HRM practices for sustainable manufacturing in a developing country context, particularly in Ethiopia. This study offers valuable insights and a fresh approach for senior managers and HR professionals in the manufacturing industries of developing countries.

The growth of the manufacturing sector has been a great blessing in the economic development of several nations, including developing countries. For instance, the growth of manufacturing industries is crucial for enhancing national levels of technical and industrial capabilities, productivity, and capital formation (Mishra, 2018). Additionally, it is an important sector for creating productive employment opportunities that support long-term economic growth (Hussain et al., 2023). However, the rapid growth of manufacturing industries, upon which most economies heavily rely, presents challenges, especially in terms of the environment, despite their significant global economic impacts. They are the biggest source of waste and pollution in the environment, endangering life on earth (Dal Mas, 2019).

Globally, large-scale manufacturing industries use excessive amounts of energy, creates a large volume of waste, and use labor practices that are not sustainable (Abdul-Rashid et al., 2017). This is particularly true in developing nations, where social and environmental crises pose a greater threat, even though they have the potential to grow (Kumar et al., 2022). As per the Global Environmental Outlook Report GEO4 (Afum et al., 2020), the earth's average temperature has risen by 0.74 % as a result of greenhouse gas emission from manufacturing activities. According to the "UNEP (2013), it is crucial to promote the concept of sustainable performance (Malik & Lenka, 2019). Green Human Resource Management is one of the strategies to enhance sustainable actions (Pham et al., 2020).

Green human resource management is a new concept that incorporates environmentally friendly practices into human resource management strategies and programs (Ren & Hussain, 2022). It is an innovative approach to carrying out human resource functions (Pham et al., 2020). GHRM ensures business outcomes that surpass short-term sustainability goals and continue to support long-term strategic objectives (Tabrizi et al., 2023). It is becoming widely acknowledged as a means of enhancing an organizations overall effectiveness and environmental performance (Munawar et al., 2022). According to Carmona-Moreno et al. (2012), the implementation of GHRM practices has several advantages for organizations, including gaining a competitive advantage over rivals, cost efficiency, optimizing environmental performance (Kim et al., 2019), retaining the workforce (Muster & Schrader, 2011), and fostering innovation within organizations (Wagner, 2013).

These days, the practices of GHRM have become widespread in the sectors because of the various advantages they have to the world (e.g., Sharma & Gupta, 2015), yet these practices have not been fully embraced by many organizations in Africa. This implies that there is still over-exploitation and mismanagement of resources in African organizations. The same case applies in Ethiopia, where a lot of factories discharge waste in the form of wastewater, airborne dust, and smoke to the surrounding water bodies and open areas (Tenaw, 2021). In Ethiopia, surface water quality is largely affected by pollution from domestic and industrial wastes (Environmental Protection Authority, 2003). This can be attributed to the limited knowledge and expertise of managers and employees on the strategies and structures that can be put in place to promote green behavior in the workplace (Atoko, 2023). This issue, however, has not received much attention in the African context (Oyedokun, 2019). Hence, a wide range of green practices has to be incorporated by the manufacturing industries in order to manage environmental issues successfully.

Employee engagement refers to the extent of cognitive, emotional, and behavioural involvement that an employee has with respect to his work as well as with the organization

(Iddagoda et al., 2016). It is essential for the long-term viability of the organization. Employee engagement increases productivity and organizational performance because engaged workers are more likely to feel inspired, content, and dedicated to their work (Zada & Ismael, 2023), as well as creative, innovative, and willing to go above and beyond the call of duty (Nabhan & Munajat, 2023). According to Schaufeli et al. (2006), employee engagement consists of dedication, absorption, and vigor. In the context of GHRM, when employees perceive GHRM practices as valuable resources, they are more likely to engage in sustainable activities, both at work and in their personal lives, ultimately enhancing the organization's overall environmental impact (Hobfoll, 2001).

Moreover, in terms of the sustainability of organizations, GHRM practices have emerged as a key issue (Paille et al., 2020) and have helped in developing strategies aimed at organizational sustainability (Khan & Faisal, 2023). Yong et al. (2020) have also suggested that GHRM practices help to achieve sustainability in the manufacturing industries. Therefore, GHRM practices are increasingly recognized in the current industrial era as a vital aspect of organization sustainability.

Contemporary research shows that implementing GHRM practices significantly contributes to an organization's sustainable development strategies, helping them achieve sustainability goals. This boosts business performance, employee satisfaction, and customer loyalty (e.g., Gupta, 2021). However, the existing GHRM literature contains limited and fragmented studies that clarify how GHRM practices contribute to organizational sustainability (Obeidat et al., 2020; Yong et al., 2020). Most GHRM literature on sustainability has demonstrated a positive correlation with environmental performance (Muisyo et al., 2021; Nisar et al., 2024; Roscoe et al., 2019). Additionally, there are few studies indicating that GHRM practices enhance an organization's economic performance (Marrucci et al., 2021), while some consideration is given to social sustainability (Amrutha & Geetha, 2019). However, there is a lack of research that examines the combined effects of GHRM practices integrating all three aspects of sustainability economic, environmental, and social on organizational sustainability in the manufacturing sector simultaneously. Therefore, the aim of this study is to examine the relationship between GHRM bundle practices and organizational sustainability while simultaneously taking the triple bottom line of sustainability into consideration.

Additionally, it has been noted that prior research on GHRM has concentrated on individual practices as opposed to a combination of practices (Longoni et al., 2018). This study considers GHRM as "bundle" that helps any company to achieve long-term objectives. This perspective corresponds to the standpoint of Khaskhely et al. (2022), Malik and Lenka (2019), and Renwick et al. (2013), who call for more investigations on bundled practices that advocate green HRM and their influence on organizational performance. The reason for this is that the 'bundling' human resource practices model aims to enhance the company's performance by leveraging the combined impact of various management aspects rather than relying solely on one aspect to drive performance (Tadić & Pivac, 2014). In a similar line of thought, Jadhav et al. (2013) contend that the efficacy that is inherent in GHRM bundled practices can enhance performance outcomes in the manufacturing sectors more than the use of single GHRM practices. Consequently, this research acknowledges the need to address sustainability performance holistically.

The research carried out by Mousa and Othman (2019) indicated a positive significant correlation between green human resource management practices and organizational sustainability. However, there are scant empirical studies on sustainable business performance and green HRM in the Sub-Saharan region, particularly in Ethiopia. Studies conducted in the past have tended to focus on the direct relationship between green HRM practices and sustainable business performance (Jabbour & de Sousa Jabbour, 2016; Renwick et al., 2013). Moreover, Ren et al. (2018) emphasized the significance of the mediating procedures in implementing green human resource management in businesses. The current study was motivated by the dearth of research in this field and intends to investigate employee engagement as a mediating variable in the relationship between sustainable manufacturing and green HRM practices in Ethiopia.

The study's findings make a meaningful contribution to the knowledge bases of GHRM and sustainability in various ways. First, it extends the understanding of GHRM by explaining contemporary practices in relation to organizational sustainability. Second, it offers empirical support in an area where little is known about GHRM practices, particularly in the manufacturing sectors of sub-Saharan developing nations. Third, using the Triple Bottom Line theory as a guide, we suggest and evaluate how GHRM bundle practices indirectly affect organizational sustainability through employee engagement. This study is the first to examine employee engagement as a mediator in the relationship between organizational sustainability and GHRM practices, making it novel. Additionally, the results of this research would help managers in Ethiopian manufacturing industries implement GHRM practices that enhance organizational sustainability.

Theoretical Review

This study looks at how green HRM practices affect organizational sustainability using the Triple Bottom Line (TBL) theory. The theory, which was created by Elkington in 1994, contends that businesses should take into account three bottom lines: profit, people, and the environment. As per the theory, a company cannot fully account for the entire cost of doing business if it solely prioritizes profit at the expense of people's well-being, which is vital to the organization and the environment. In order to protect the welfare of individuals, society, and the environment, businesses should, therefore, give equal weight to social and environmental issues as well as profit maximization (Islam et al., 2019). According to Yeye and Egbunike (2023), managers are urged to assume greater responsibility for society and the environment in addition to pursuing profit. Organizations are held responsible by the TBL theory for both the beneficial and detrimental effects of their activities on society and the environment. When it comes to creating and putting into practice green management strategies, this theory can help organizations, managers, entrepreneurs, business leaders, and legislators. Green HRM practices are essential to the TBL theory because they help the organization achieve its triple bottom line objectives (Bahmani et al., 2023). Organizations can promote sustainable performance by incorporating environmental considerations into HR policies and practices.

Empirical Review and Hypothesis Development
Green HRM Practices and Organizational Sustainability Link

Green HRM practices are considered a means of enhancing the capability of HRM and protecting the environment from disasters that may occur in the future. HRM regulations are implemented within the company to maximize the use of all available resources. This promotes sustainability ideas within the organization for a healthy environment by increasing employees' awareness of sustainability in both their work and personal lives (Veluchamy, 2021). Green HRM is an essential part of sustainable human resource management and stands for good environmental management practices. Within the realm of Sustainability HRM, Green HRM may be considered an amalgamation of all the green HR policies and practices that aim at the long-term financial, social, and ecological objectives of an organization (Hussain, 2018). Consequently, it is essential to apply the GHRM strategy appropriately at the organizational level in order to achieve sustainable performance. This strategy is connected with the environmental strategies of the organization.

Green HRM is an approach that involves several practices of HRM in organizations that encourage sustainable performance. However, we concentrated on five green HRM practices in this study: green employee relations, green performance management, green training and development, green hiring, and green reward. These practices together can give rise to a practicable Green HRM concept that can most likely produce positive environmental impacts at the firm level. The next section presents the details of the GHRM practices incorporated in this study.

Green Recruitment and Selection

Green recruitment and selection are essential components of green HRM practices. It has an environmental focus and looks for proactive applicants with environmental knowledge for both current and upcoming positions (Saeed et al., 2019). It involves strategic recruitment by aligning an applicant's environmental values, knowledge, and actions with those of the organization (Malik et al., 2021), eventually attracting prospective employees through the application of effective environmental practices of the company in the recruitment process by integrating ecological aspects throughout the recruitment process (Khan et al., 2020).

Green Training and Development

Training and development are systematic actions and events that enable employees to learn and develop skills for environmental protection issues, helping them make conscious decisions on environmental matters (Jabbour, 2013). Green training increases an employee's sensitivity towards pro-environmental behavior within the organization. It helps them understand the functioning and importance of the ecosystem, making them more conscious of environmental protection, sources of pollution, and the prevention process (Saeed et al., 2019).

Green Performance Management

Eco-friendly performance management and appraisal systems help employees understand how to enhance an organization's green performance (Jackson et al., 2011). These systems not only measure and evaluate individuals' environmental performance but also guide and align them with sustainability goals through proper measurement, continuous feedback, goal setting, and

progress monitoring to achieve environmental objectives (Ahmad, 2015). Organizations should establish a common standard for implementing green performance management, with clear indicators for members, such as reducing carbon emissions, promoting cooperation, and implementing environmental policies.

Green Reward

Green rewards are monetary and non-monetary incentives given to delight workers in support of environmental management (Jackson et al., 2011). It has been asserted that non-monetary rewards like recognition and praise increase employee motivation (Jabbour & Santos, 2008). Incentives are more effective tools for attaining the company's objectives when used to align employee performance. Examples of non-monetary incentives that should be offered in addition to monetary ones include green taxes, green recognition, and green travel benefits.

Green Employee Relation

The philosophy of employee relations is based on the successful involvement and participation of workers in organizations' decisions, functions, and processes. The participation of employees in various environmental management activities also promotes green involvement (Renwick et al., 2013). This would undoubtedly impact efficient resource use and waste reduction in the organization as part of its environmental management systems. Therefore, environmental management should not be viewed as an issue for top management alone but as a shared responsibility and commitment from various actors in the organization: employees, customers, and management (Mashala, 2018).

It has been established in the existing literature that implementing green human resource management promotes sustainability within an organization (Kim et al., 2019; Peng et al., 2022). This suggests that providing continuous training and adequate compensation for employees who embrace green human resources will lead to high motivation in cultivating eco-friendly awareness. A study by Marrucci et al. (2021) showed that Eco-friendly HRM practices have a significant impact on all sustainability dimensions. Nonetheless, the majority of current GHRM research focuses primarily on the environmental component (Muisyo et al., 2021; Nisar et al., 2024), but research on how GHRM practices affect the three aspects of sustainable performance is still scarce. Additionally, earlier studies (e.g., Malik et al., 2021; Jamal et al., 2021; Yusoff, 2015) have focused on the effects of each component of green HRM practices on sustainable performance without taking into account their combined (synergistic) impact on organizational sustainability. This demonstrates that there is a substantial research gap in comprehending the full links between these ideas. Furthermore, Green HRM practices have not received significant attention from the perspective of developing nations. Hence, to fill this gap, the current study uses the TBL theory. In line with this, the following research hypothesis has been outlined:

H1: Green HRM bundle practices have a significantly positive effect on organizational sustainability.

Green Human Resource Management Practices and Employee Engagement

In the contemporary environment of competition that most organizations are facing, green HRM is no longer an option but a prerequisite for the organization's long-term survival (Dumont et al., 2017). This helps not just improve productivity but also foster employee engagement in the work environment. According to Pham et al. (2019), it is one of the most likely tools for highly engaged workers. In organizations that implement GHRM practices, it is often observed that employees tend to become more committed, hence resultant positive outcomes and feelings toward their organization (Deshwal, 2015). For instance, Darban et al. (2022) conducted a study to examine how employee work engagement influences the relationship between Green HRM practices, absenteeism, and green recovery performance. Their findings demonstrated that emphasizing environmentally friendly HRM practices fosters greater employee engagement. Likewise, Krishna and Pandey (2020) found the existence of a correlation between employee engagement and Green HRM practices. According to the studies, green HRM increases employees' work engagement and promotes environmentally friendly behaviors. When employees perceive their organization's commitment to implement green HRM practices and treating them as a critical asset, they are motivated to fully engage in their work. However, there are only a limited number of empirical studies that explore how green HRM practices impact employee engagement. Additionally, research on the effects of GHRM practices on employee engagement is lacking, especially within the specific context of manufacturing sectors in developing nations (Yusliza et al., 2021). In an effort to address this gap, the current study examines how GHRM bundle practices influence worker engagement in Ethiopian manufacturing sectors. As a result, we propose the following hypothesis:

H2: Green HRM bundle practices have a significant positive effect on employee engagement.

The Mediating Role Employee Engagement

While attempts have been made to investigate the link between GHRM practices and organizational sustainability, it is still not clear how GHRM practices actually support sustainability. In the current business environment, there is a high degree of employee engagement. Therefore, it would be fascinating to examine the role of employee engagement in strengthening the relationship between GHRM and organizational sustainability. The significance of engaging employees at all levels for organizational success has been well-documented (Ahmed et al., 2019). Employee engagement has been considered a major factor contributing to the long-term effectiveness of an organization and is composed of three elements: i.e. dedication, vigor, and absorption (Gomez-Salgado et al., 2021). These days, most firms have in place Human Resource strategies that allow them to involve their workers.

Employee engagement was shown to be a significant mediator in several studies (e.g., Aboramadan et al., 2022; Muduli et al., 2016). It is considered the motivational mechanism of an employee that enacts performance outcomes (Abdulrahman et al. 2022). Specifically, Muduli et al. (2016) asserted that employee engagement functions as an intervening variable in the relationship between HRM and organizational performance. GHRM practices foster a business practice that is more sustainable by motivating, supporting, and encouraging employees to take part in environmentally friendly activities (Kannappa & Bharathi, 2020).

Likewise, Alkashami et al. (2024) stated that the combination of comprehensive GHRM practices and high levels of employee engagement significantly enhances an organization's environmental performance. Thus, GHRM practice accounts for the engagement of employees, since the employees who are highly engaged are most likely to have made great efforts to ensure the long-term viability of their organizations.

While there is evidence supporting the idea that employee engagement mediates the relationship between organizational sustainability and Green HRM practices, no specific study has explored the role of employee engagement as a mediator between these two concepts. Therefore, further research is needed to investigate the potential impact of employee engagement on the connection between organizational sustainability and Green HRM practices. This will improve our comprehension of the connection between sustainable performance and green HRM practices and give us a thorough understanding of the variables affecting sustainability initiatives in Ethiopia's manufacturing sector. To bridge this gap, the present study will test the following set of hypotheses:

H3: Organizational sustainability significantly impacted by employee engagement
H4: The relationship between GHRM bundle practices and organizational sustainability is mediated by employee engagement

Conceptual Framework of the Study

The conceptual framework illustrates the connections between the variables examined in this study, highlighting a crucial mechanism through which GHRM practices promote organizational sustainability by engaging employees. The model comprises three key components, as depicted in Figure 1: employee engagement as the mediating variable, organizational sustainability as the dependent variable, and green HRM practices as the independent variable. Green HRM practices encompass green employee relations, performance management, training and development, hiring, and rewards. Employee engagement is measured through vigor, dedication, and absorption, while organizational sustainability is evaluated based on environmental, economic, and social dimensions. Moreover, the industries included in the study vary in terms of their longevity in business and ownership structure. Some are joint ventures or domestically owned, while others are multinational corporations. This diversity may impact their approaches to organizational sustainability. To address these differences and account for potential discrepancies, industry age and ownership are incorporated as control variables to mitigate their potential influence on organizational sustainability outcomes.

Figure 1

Conceptual Framework of the Study
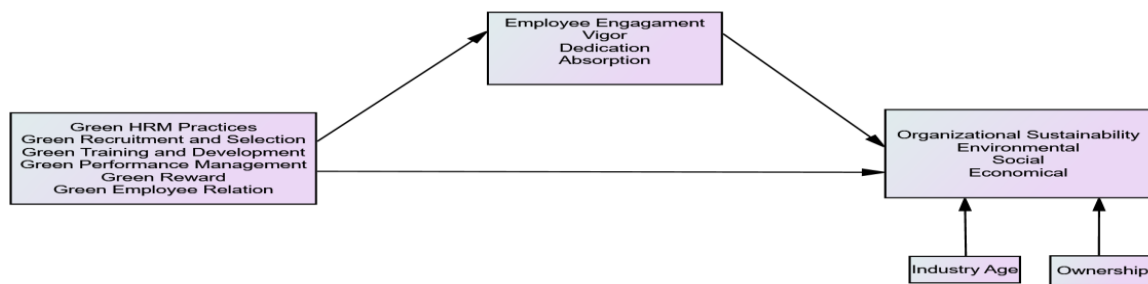
Method

Research Philosophy

A research philosophy reveals important assumptions about the way in which researchers view the world. In line with this philosophical standpoint, this research is guided by positivism in order to explore, validate or foresee behavioral patterns and is frequently employed in testing hypotheses and/or theories (Taylor & Medina, 2013). This paradigm is associated with a research method that is quantitative in nature. The study used an explanatory research design to estimate the relationship between green HRM bundle practices, employee engagement, and organizational sustainability in the context of Ethiopian manufacturing industries.

Population and Data Collection

The study population consists of cement, textile, and leather manufacturing industries operating in Ethiopia. The target population includes all permanent employees working in these factories, totaling 8,294 employees. For this study, we distributed a total of 382 self-administered questionnaires to sample employees using convenience sampling techniques. Out of the total, we received 355 valid responses eligible for final data analysis after excluding outliers and incomplete responses, achieving a response rate of 92.9%. Out of the 355 valid questionnaires, 74.9% were completed by males and 25.1% by females. In terms of age distribution, the majority (58%) fell between the ages of 26-35, approximately 16.9% were in the 18-25 age range, and 11.8% were between 36 and 45. When it came to educational qualification, the majority of respondents (70.4%) had a bachelor's degree, 15.7% had a diploma, and 13.5% had a master's degree. In relation to tenure, most (83.7%) had five or more years of working experience, while 16.3% had less than five years.

Measurement Development

The study utilized items from previous research to validate their reliability and validity. To assess GHRM, 25 items from Renwick et al. (2013) were adopted. Employee engagement was measured using fifteen items developed by Schaufeli et al. (2006), and organizational sustainability was evaluated with thirteen items from Longoni et al. (2018) and Rawashdeh

(2018). All items were evaluated through a five-point Likert-type scale ranging from 1 strongly disagree to 5, which strongly agree. Additionally, industry ownership and age were included as control variables to account for the variation that could impact organizational sustainability, following previous studies (Lei et al., 2021; Le & Lei, 2019). Industry age was defined as the number of years since a company's establishment, while ownership was categorized as domestic, joint venture, and Multinational Companies (MNCs).

Data Analysis Techniques

The covariance-based structural equation modeling technique is used for data analysis because this model helps to reduce bias and volatility in the results obtained from the parametric estimated using the maximum likelihood estimator to evaluate the common factor model tested in this study (Hoyle, 2023). Besides, to account for measurement error, this technique is suitable for theory-driven explanatory research.

Results

Multicollinearity and Common Method Bias (CMB)

To check for Multicollinearity, VIF values relating to each and every construct were computed. If the VIF values obtained are below 5, then (Hair et al., 2018) the data set is not affected by Multicollinearity. As shown in Table 1, the VIP value ranged between 1.30 and 2.65, as captured in Table 1. This indicates that there was no Multicollinearity in the data. To test a common method bias, the study applied the Harman single-factor test. The outcome revealed that a single-factor test accounts for 26.3 % of the variance. According to Podsakoff et al. (2003), the explained factor variances were lower than the 50% cutoff point. Hence, this indicates that common method bias did not affect the data.

Table 1
Multicollinearity Issues

	Coefficients	
Model	Collinearity Statistics	
	Tolerance	VIF
GRS	.49	2.03
GTD	.56	1.76
GPM	.37	2.64
GR	.42	2.37
GER	.37	2.63
EE	.76	1.30

Note. a. Dependent Variable: Organizational Sustainability

Sample Size Adequacy

Data for variables measured using several indicators was subjected to Keiser-Meyer Olkin's sample adequacy measure and Bartlett's sphericity test. According to Malhotra and Dash (2011), a KMO of .50 and above is recommended. The test indicated that all the variables had a KMO above .50, which was an indication of sample adequacy. In this study, the KMO score is .92, higher than the threshold of .50, as illustrated in Table 2.

Table 2

Sample Size Adequacy

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.92
Bartlett's Test of Sphericity	Approx. Chi-Square	17269.12
	Df	2926
	Sig.	.000

Measurement Model Assessment

The study utilized confirmatory factor analyses to test convergent and discriminant validity. Convergence was assessed through factor loading, average extracted variance, and composite reliability techniques. As shown in Table 3, all items except Dedication 1 had factor loadings above the threshold value of .50. Dedication 1 had a factor loading of .33 and was therefore removed. The composite reliability values exceeded the suggested threshold of .70, and the average variance extracted values also met the minimum requirement of .50 (Hair et al., 2018). Discriminant validity was evaluated by comparing the square root of each latent variable's average extracted value to its correlation with other components, following the approach by Fornell and Larcker (1981). As recorded in Table 4, the data show that the average variance extracted is higher than the correlation between the constructs. The results confirm that the model meets the requirements for both convergent and discriminant validity.

In this research, four indicators were used to evaluate the fit indices of the measurement model. These indicators are CMIN/DF, GFI, CFI, and RMSEA indices. The goodness of fit is assessed using recommended fit indices for structural equation modeling when both measurement and structural fit are considered in the general model. Table 5 shows that all computed metrics fall within acceptable limits. The CMIN/DF value is 1.70, lower than the cut-off point of 3.0. The GFI value is .81, above .80 (Nunnally, 1978), and the CFI is .92, above .90. The RMSEA is .04, below the stipulated .08 cut-off (Xia & Yang, 2019), and the RMR is .04, below the recommended ceiling of .05.

Table 3

Measurement Scales (Factor loading, Alpha, CR, and AVE)

Constructs	Item code	Loading	CR	AVE
Green recruitment and Selection (GRS)	GRS1	.59	.85	.50
	GRS2	.74		
	GRS3	.80		
	GRS4	.78		
	GRS5	.75		
	GRS6	.56		
Green Training and Development	GTD 1	.72	.84	.51
	GTD 2	.74		
	GTD 3	.73		
	GTD 4	.61		
	GTD 5	.75		
Green performance management (GPM)	GPM 1	.81	.91	.68
	GPM 2	.83		
	GPM3	.83		
	GPM 4	.84		
	GPM5	.79		
Green reward (GR)	GR1	.81	.90	. 65
	GR2	.85		
	GR3	.87		
	GR4	.78		

	GR5	.69		
Green employee relation (GER)	GER1	.71		
	GER2	.79	.90	. 66
	GER3	.85		
	GER4	.85		
	GER5	.85		
Vigor (VIG)	Vigor1	.65		
	Vigor 2	.68		
	Vigor3	.77	. 83	.51
	Vigor4	.78		
	Vigor 5	.67		
Dedication (DEDIC)	Dedic 2	.83		
	Dedic3	.80		
	Dedic 4	.80	.86	. 61
	Dedic 5	.69		
Absorption (ABSOR)	Absorp 1	.64		
	Absorp 2	.65	. 83	. 51
	Absorp 3	.75		
	Absorp 4	.78		
	Absorp 5	.71		
Environmental sustainability (ENSUS)	ENSUS1	.69		
	ENSUS2	.80	.86	.55
	ENSUS3	.82		
	ENSUS4	.73		
	ENSUS5	.67		
Social sustainability (SOSUS)	SOSUS1	.77		
	SOSUS2	.82	.89	. 67
	SOSUS3	.85		
	SOSUS4	.82		
Economic sustainability (ECOSUS)	ECOSUS1	.83		
	ECOSUS2	.90	. 87	. 63
	ECOSUS3	.77		
	ECOSUS4	.65		

Table 4
Discriminate Validity

	1	2	3	4	5	6	7	8	9	10	11
1. Grs	**.71**										
2. Gtd	.65***	**.71**									
3. SoSus	.50***	.41***	**.82**								
4. Vig	.46***	.33***	.56***	**.71**							
5. Gpm	.69***	.65***	.48***	.50***	**.82**						
6. Ger	.68***	.65***	.40***	.47***	.74***	**.81**					
7. Dedic	.46***	.33***	.54***	.63***	.38***	.33***	**.78**				
8. Gr	.58***	.61***	.39***	.34***	.75***	.72***	.22***	**.80**			
9. Absor	.32***	.18**	.47***	.61***	.25***	.30***	.58***	.20**	**.71**		
10.EnSus	.49***	.41***	.62***	.40***	.45***	.45***	.45***	.35***	.32***	**.74**	
11.EcoSus	.20**	.26***	.44***	.30***	.22***	.18**	.30***	.12*	.29***	.51***	**.79**

Note. * Significant at 0.05 level; ** Significant at 0.01 level; *** Significant at 0.001 level

Table 5
Model Fit Indices

Indicators	CMIN/DF	GFI	CFI	RMR	RMSEA
Threshold	<3	>.80	<.90	<50	<.08
Observed value	1.70	.81	.92	.04	.04

Structural Model

The structural model was evaluated using the p values, path coefficients, and coefficients of determination (R2 values) as the main evaluation criteria. Bootstrapping with 5000 resampling was used to test the hypotheses. Figure 2 illustrates that the R-squared value for organizational sustainability .59. This result indicates that all exogenous constructs account for 59% of the changes in the respective constructs, and it was found to be significant. The path coefficients, direct and indirect effects, and corresponding significance levels are illustrated in Table 6 and Figure 2. The research findings confirmed that there exists a positive direct influence of GHRM bundle practices towards organizational sustainability with a beta value of .32, p-value .000. The hypothesis H1 is thus verified. The study also verified Hypothesis H2 to have a direct impact of Green HRM practices on employee engagement, with a beta value of .53 and a p-value of .000. To test the third hypothesis, we examined the causal relationship between employee engagement and organizational sustainability. It was discovered that there is a positively significant relationship, with a beta value of .53 and a p-value of .000. Therefore, hypothesis H3 is also accepted.
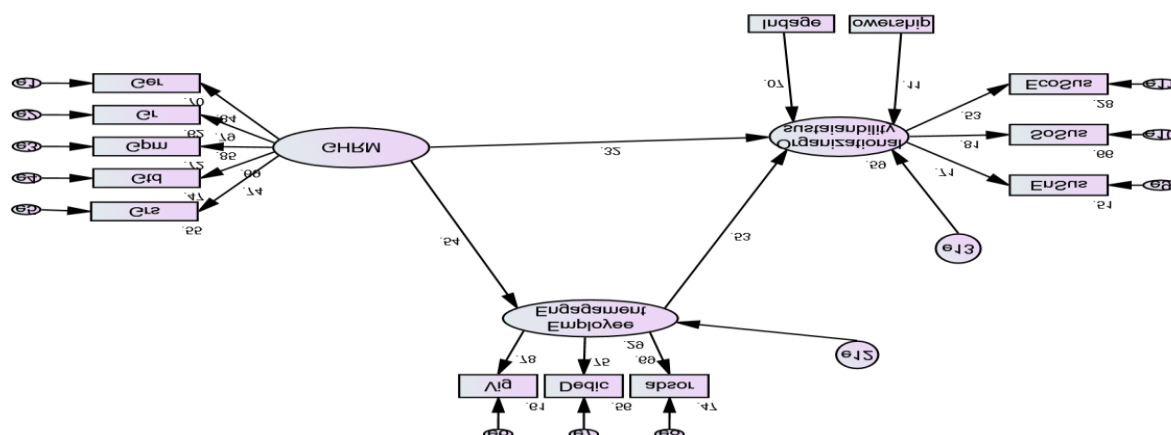
The findings of the mediation analysis indicate that employee engagement serves as a mediating factor in the association between GHRM bundle practices and organizational sustainability, with a beta value of .28, p-value = .000, as presented in Table 6. Therefore, H4 is approved, which indicates that the adoption of GHRM practices will foster employee engagement in an organization, which, in turn, will ensure organizational sustainability.

Table 6

Hypothesis Testing

	Beta V	S.E	T –Value	P Value	LLCI	ULC	Decision
Direct effect							
E.E ← GHRM	.53	.04	8.46	***			H1 Supported
ORGSUS ←GHRM	.32	.04	4.78	***			H2 Supported
ORGSUS ← E.E.	.53	.07	6.80	***			H3 Supported
Mediating Effect							
GHRM – E.E- ORGSUS	.28	-	-	.000	.39	.20	H4 Supported

Note: GHRM = Green HRM bundle Practices; E.E= Employee Engagement; ORGSUS = organizational Sustainability

Figure 2

Structural Model

Discussion

The main objective of the study was to examine the effect of green HRM bundle practices on organizational sustainability. Additionally, the study aimed to determine if employee engagement serves as a mediator between GHRM bundle practices and organizational sustainability within Ethiopia's manufacturing industry. The research findings showed that the adoption of Green HRM bundle practices significantly influenced the organization's sustainability. These results support a previous study by Mousa and Othman (2019), who found a strong correlation between green HRM and sustainable performance in the industry. Similarly, Yong et al. (2020) discovered a positive correlation between the organization's sustainability and Green HRM practices. These results also align with an earlier study by Saeed et al. (2019), indicating that adopting green HRM bundle practices would lead to improved corporate social sustainability, cost-effectiveness, and environmental sustainability. This, in turn, helps the organization enhance its reputation and promote community health. These findings suggest that an organization can cultivate a socially responsible, cost-effective and environmentally friendly culture by implementing green practices such as recruiting green employees, green training, performance management, and reward systems aligned with green goals.

The research has established a beneficial relationship between the implementation of Green Human Resource Management (GHRM) bundle practices and employee engagement levels. This result aligns with the findings of Krishna and Pandey (2020) and Dutta (2012), who revealed that employee engagement, can be predicted to a significant extent by the adoption of a set of green HRM practices. Deshwal (2015) further confirmed that implementing green HR practices can increase organizational productivity and employee engagement. Additionally, Wang et al. (2023) supported this finding by showing a positive association between green HRM practices and employee engagement. This suggests that employees are more likely to engage in their work when they perceive that their organization is committed to green HRM practices (Aboramadan et al., 2022).

Further analysis of the results revealed a positive and significant relationship between employee engagement and organizational sustainability. This finding reinforces the evidence provided by Rupp et al. (2018) and Lestari and Nawangsari (2022), all of which found that employee engagement has a positive and significant effect on the sustainability of the organization. Similarly, Tiwari et al. (2024) pointed out that employee engagement is an essential factor that contributes to organizational sustainability by increasing productivity, retention, and psychological safety, all culminating in enhanced business performance and fostering a high-performance and growth-oriented culture. This indicates that employees who are engaged in their work usually have a positive attitude toward their work and are often energetic and enthusiastic. This can lead to improved performance for individuals and groups and establish a strong foundation for organizational sustainability (Kim et al., 2016).

The study further confirmed that employee engagement significantly mediates the influence of Green HRM bundle practices on organizational sustainability. This finding is conceded with the results of Khan and Muktar (2023), who found that integrating employee engagement into green HRM frameworks, can improve sustainable performance. This suggests that engaged employees are more likely to participate in sustainability initiatives.

The result also aligns with a prior study conducted by Jnaneswar (2024), who discovered that Green HRM practices enhance employee environmental awareness and motivate them to work with more energy and enthusiasm, ultimately help to enhance the environmental performance of the organization. This suggests that engaged employees are key factors in an organization's sustainability, and the success of an organization in all aspects relies on employees actively collaborating to establish sustainable practices.

Finally, this research analyzed the age and ownership of industries as control variables to evaluate their impact on organizational sustainability outcomes in the manufacturing sector of Ethiopia. The findings revealed that industry ownership confounded the relationships in the proposed model ($p < .001$). However, the age of the industry has no contextual effect on organizational sustainability.

Conclusion

This research has helped expand the understanding of GHRM, a relatively new field within human resource management. Even though GHRM, employee engagement, and organizational sustainability have all been discussed in the literature, the relationships between the areas remain underexplored in research. The results have shown that green HRM bundle practices have a significant effect on organizational sustainability. It also confirms the indirect effect of Green HRM bundle practices on organizational sustainability through employee engagement in the Ethiopian manufacturing industries. The findings suggest that manufacturing industries should successfully implement green HRM bundle practices and promote employee engagement to improve organizational sustainability. The adoption of such practices would help balance the disparities in social, economic, and environmental performance.

Theoretical Implication

The current research has important implications for the existing body of knowledge as it sought to cover an empirical research gap in a core sector such as manufacturing and in underdeveloped Sub-Saharan countries. Due to the rising awareness, the integration of social, economic, and environmental performance has become a major research subject. Nonetheless, it is not clear how green human resource management bundle practices and employee engagement assist in the process of sustainability of the organization. This study aims to address existing research gaps by examining the relationships between various constructs within the integrated theoretical frameworks of the Triple Bottom Line approach within the manufacturing industries of Ethiopia. First, this paper builds upon the Triple Bottom Line (TBL) theory by highlighting the importance of integrating human resource management practices to achieve an organization's sustainability goals. The significant impact of Green HRM on employee engagement and organizational sustainability involves aligning the economic, social, and environmental aspects of the TBL. Second, previous research has discussed the connection between organizational sustainability and green HRM but has not delved into how various HRM practices collectively contribute to organizational sustainability, particularly in terms of the potential mediating role of employee engagement. Therefore, this study aims to fill this gap in existing research.

Practical Implication

From a practical point of view, the present study seeks to link Green Human Resource Management (GHRM) with organizational sustainability, which is crucial in achieving the triple bottom line within the Ethiopian manufacturing sector. The top management and the HR managers are responsible for instilling green practices through the adoption of GHRM in the mission and vision of the company. For that reason, senior managers have to incorporate the concept of GHRM into the company's perspective and develop its strategic plan by incorporating environmental concerns. This can help create an environment where employees are encouraged to actively participate in the adoption of environmentally friendly practices within the manufacturing sectors.

The findings of the study propose that human resource managers should be encouraged to engage in environmentally friendly practices, set up jobs that are "green" in design, recruit employees who are oriented towards sustainably and train them to acquire the awareness that will help facilitate the sustainable performance of the organization. Moreover, in order to evaluate an employee's contribution to the achievement of environmental goals, HR managers might consider including green performance indicators in job descriptions. This appraisal strategy should be communicated to staff, and suitable incentives should be provided for achieving environmental objectives so as to realize the desired outcomes. By demonstrating dedication towards these initiatives, the manufacturing sectors can motivate the workforce to carry out green activities with motivation and zeal. When developing environmental conservation policies, it is recommended to include employee input. This will encourage them to contribute more towards their industries by practicing ecologically friendly methods, which improve organizational sustainability.

The study provides an overview of a research topic that is highly relevant to integrating GHRM practices with organizational sustainability. It also suggests ways in which managers can incorporate sustainability into their daily business operations, and researchers are encouraged to conduct additional studies to test, modify, and enhance this area.

Limitations of the Study and Future Research Directions

Although the study makes significant theoretical and practical contributions, it has certain limitations that open new research avenues. First, this study's use of cross-sectional data makes it more difficult to track changes and trends in green HRM practices and their effect on organizational sustainability over time. Thus, it is recommended that future researchers should use longitudinal data to investigate the causal relationship in the model over time.

Secondly, structures and practices of management vary among organizations, industries, and even countries, which can result in differences in Green Human Resource Management (GHRM) practices among firms and countries (Umrani et al., 2020). Therefore, this study's applicability is limited to other sectors as it solely focuses on Ethiopian manufacturing sectors. The model should be tested in various manufacturing sectors across different nations and cultures to improve generalizability. This approach would enhance understanding of the connections among variables in diverse organizational contexts.

Thirdly, this research used self-administered questionnaires filled by respondents drawn from employees of Ethiopian manufacturing industries. However, this approach is subject to biases in how the respondents understand and answer the survey questions. To enhance the

validity and reliability of the findings, future research could integrate additional data sources, including secondary and qualitative data, and involve a broader range of stakeholders, such as community members and regulatory bodies, to facilitate triangulation. Finally, this study examined the mediating role of employee engagement that connected the linkages under investigation. In future research, it will be possible to broaden the understanding of the effects of the current model by including other moderators such as green leadership and mediators within the research model, for instance, green perceived organizational support and green innovation in relation to green HRM bundle practices and the sustainability of the organization.

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