

Validation of a Sustainable HRM Practices Scale and Employee Satisfaction in the Automobile Sector: An Empirical Study

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Abstract

This study validates an integrated Sustainable Human Resource Management (HRM) Practices Scale and examines its influence on employee engagement and employee satisfaction in the Indian automobile manufacturing sector. Grounded in sustainable HRM theory and employee-centered strategic management perspectives, the study conceptualizes Sustainable HRM as a multidimensional construct comprising Workplace Wellbeing, Employee Development and Employee Retention.

Data were collected from 523 employees working in automobile manufacturing firms in Haryana, India. Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to assess the measurement and structural models. The measurement model demonstrated strong psychometric properties, with satisfactory indicator reliability, internal consistency reliability (Cronbach's alpha and composite reliability), convergent validity (AVE > 0.50), discriminant validity (HTMT < 0.85) and acceptable model fit (SRMR < 0.08). These findings confirm the robustness and contextual applicability of the scale in an emerging economy manufacturing setting.

Structural results reveal that Sustainable HRM practices significantly enhance employee engagement, which in turn positively influences employee satisfaction. Mediation analysis indicates that employee engagement functions as a critical explanatory mechanism linking sustainability-oriented HR practices to favorable employee outcomes.

The study contributes to the Sustainable HRM literature by offering empirical validation of a multidimensional measurement framework in a non-Western industrial context and by clarifying the mediating role of engagement. Practically, the validated scale provides manufacturing organizations with a diagnostic tool to assess and strengthen sustainability-driven people management systems, thereby supporting long-term employee wellbeing and organizational resilience.

Keywords: Sustainable HRM; Employee Engagement; Employee Satisfaction; Scale Validation; PLS-SEM; Manufacturing Industry.

1. Introduction

In the twenty-first century, organizations are increasingly expected to balance economic growth with social responsibility and environmental protection. This broader responsibility has led to the emergence of Sustainable Human Resource Management (Sustainable HRM) as a strategic approach that integrates traditional HR functions with long-term environmental, social and economic goals. Sustainable HRM goes beyond routine personnel administration; it focuses on managing people in ways that ensure organizational continuity, employee well-being, and environmental stewardship simultaneously. It emphasizes practices such as sustainable recruitment, green training and development, performance appraisal aligned with sustainability goals, employee participation and fair employment relationships (Kramar, 2014; Aust et al., 2020).

Sustainable HRM can be understood as a system of policies and practices designed to develop human capabilities while preserving resources for the future. Unlike conventional HRM, which often prioritizes

short-term productivity, sustainable HRM promotes long-term employee resilience, engagement, and well-being. Research indicates that sustainable HRM practices positively influence employee outcomes through mechanisms such as resilience and work engagement, ultimately improving performance and organizational sustainability (Cooke et al., 2023). This demonstrates that sustainability in HRM is not only ethically desirable but also strategically beneficial.

Closely related to Sustainable HRM is Green Human Resource Management (GHRM), which specifically focuses on aligning HR practices with environmental management goals. GHRM includes green recruitment, eco-friendly training, green performance appraisal and rewards linked to environmental performance. Scholars have shown that green HRM practices significantly influence employee green behavior and help in building a strong green organizational culture (Dumont et al., 2017; Ren et al., 2018). These findings suggest that employees play a central role in achieving environmental sustainability when HR systems actively support green initiatives.

The theoretical foundation of Sustainable HRM is often explained through the Ability–Motivation–Opportunity (AMO) framework, which proposes that employee performance improves when employees possess the necessary abilities, are motivated to perform and are provided with opportunities to contribute effectively (Appelbaum et al., 2000; Aust et al., 2020). Sustainable HRM practices enhance employees' skills through training and development (ability), encourage sustainable and responsible behaviors (motivation) and create participative work environments (opportunity). The interconnected nature of these elements creates a pathway from HR practices to improved employee and organizational performance.

Another important theoretical lens is the Job Demands–Resources (JD-R) model, which explains how organizational resources such as supportive HR practices foster employee engagement and resilience. Empirical evidence suggests that sustainable HRM practices enhance employee resilience, which in turn strengthens engagement and well-being, leading to higher job performance (Cooke et al., 2023). In this way, sustainable HRM functions as a valuable organizational resource that reduces workplace stress and increases positive employee attitudes.

In the context of the automobile sector, sustainability has become particularly critical. The automotive industry significantly affects the environment due to energy-intensive manufacturing processes, complex supply chains and carbon emissions. Therefore, integrating sustainability into HR practices is essential for achieving broader environmental objectives. Studies in the automotive sector have identified green HRM as a critical success factor for sustainable manufacturing and environmental performance (Yusliza et al., 2020). Furthermore, environmental management practices in automotive companies have been linked to improved operational efficiency and competitive advantage (Jabbour et al., 2012).

In emerging economies such as India, the automobile sector is a major contributor to economic growth and employment. However, it also faces increasing pressure to adopt environmentally responsible and socially sustainable practices. Research conducted in Indian automotive manufacturing highlights the growing adoption of sustainable HRM practices and their positive effects on organizational sustainability and employee engagement (Singh & Misra, 2022; Kumar & Prakash, 2023). These studies emphasize that sustainable HRM practices are not merely theoretical constructs but practical strategies for improving sustainability performance in manufacturing organizations.

Employee satisfaction, another key construct in this study, refers to the degree to which employees feel contented, valued, and fulfilled in their jobs. It represents employees' emotional and cognitive evaluation of their work experiences. Satisfied employees are generally more committed, productive, and less likely to leave the organization. Research indicates that green and sustainable HRM practices positively influence job satisfaction by promoting fairness, meaningful work and supportive organizational climates (Pham et al., 2025). Moreover, employee engagement has been found to mediate the relationship between green HRM practices and organizational commitment, particularly in manufacturing and automobile industries (Islam et al., 2021).

Employee satisfaction is often strengthened through perceptions of organizational justice, work-life balance, training opportunities and supportive leadership. Sustainable HRM practices that promote fair appraisal systems, transparent communication, and employee development contribute significantly to these perceptions (Aust et al., 2020). In addition, sustainable HRM training initiatives enhance employability and retention, thereby strengthening overall satisfaction and performance (Ehnert et al., 2023).

Despite the growing body of research on Sustainable and Green HRM, there remains a critical need for validated measurement scales tailored to specific industrial contexts. Scale development and validation are essential to ensure that constructs such as sustainable HRM practices are accurately measured and empirically reliable. Previous research has developed multidimensional sustainable HRM scales comprising factors such as sustainable training, employee relations, working conditions and performance appraisal, validated using confirmatory factor analysis and structural equation modeling techniques (Aust et al., 2024; Guerci & Pedrini, 2014). Similarly, green HRM scales have been validated in manufacturing and automotive contexts, confirming their reliability and construct validity (Yusliza et al., 2020). Most existing scales have been tested either in general organizational settings or in limited manufacturing samples. There is a noticeable gap in comprehensive empirical validation within the Indian automobile sector, where sustainability challenges, workforce diversity and regulatory environments may differ significantly. Additionally, while many studies examine the direct effects of sustainable HRM on performance, resilience or engagement, fewer studies focus specifically on employee satisfaction as a primary outcome variable in automotive organizations.

Given this background, the present study aims to validate a Sustainable HRM Practices Scale in the automobile sector and examine its relationship with employee satisfaction. By applying rigorous statistical techniques such as confirmatory factor analysis, reliability testing and structural equation modeling, this study seeks to establish the scale's construct validity, internal consistency and applicability within the automotive manufacturing context. Establishing a validated scale will not only strengthen academic research but also provide practitioners with a reliable diagnostic tool to assess sustainability-oriented HR practices.

Moreover, understanding the relationship between sustainable HRM practices and employee satisfaction offers valuable managerial implications. When organizations implement sustainable recruitment, green training, fair appraisal systems and participative decision-making processes, employees are more likely to perceive organizational support and justice. These perceptions foster higher satisfaction, stronger commitment and reduced turnover intentions (Cooke et al., 2023; Pham et al., 2025).

Sustainable HRM represents a strategic integration of people management and sustainability principles. Within the automobile sector, where environmental responsibility and operational excellence are critical, validated measurement of sustainable HRM practices becomes essential. By examining the validation of a Sustainable HRM Practices Scale and its relationship with employee satisfaction, this empirical study contributes to the growing literature on sustainable people management and provides meaningful insights for both researchers and industry practitioners.

2. Literature review

The concept of Sustainable Human Resource Management (Sustainable HRM) has evolved as an important extension of traditional strategic HRM, reflecting the growing demand for organizations to integrate economic, social and environmental objectives into people management systems. Early discussions on sustainable HRM emphasized its long-term orientation, focusing on balancing organizational performance with employee well-being and societal responsibility (Kramar, 2014). Unlike conventional HRM models that concentrate primarily on efficiency and short-term productivity, sustainable HRM incorporates ethical employment practices, continuous development, environmental consciousness, and intergenerational equity. This broader perspective positions employees not merely

as resources for immediate output but as stakeholders whose development and satisfaction are essential for long-term sustainability.

Empirical research has progressively strengthened the theoretical foundation of sustainable HRM by linking it with positive employee and organizational outcomes. Drawing on the Ability, Motivation, Opportunity framework, scholars argue that sustainable HRM practices enhance employee competencies through training (ability), encourage pro-sustainability attitudes through rewards and appraisal systems (motivation) and create participatory work environments (opportunity), thereby influencing performance outcomes (Aust et al., 2020). This integrated pathway demonstrates that sustainability-oriented HR systems do not function in isolation; rather, they operate as interconnected mechanisms that shape employee attitudes and behaviors.

The Job Demands–Resources model further explains how sustainable HRM practices function as organizational resources that foster resilience and engagement. Research shows that sustainable HRM practices positively affect employee resilience, which subsequently enhances work engagement and overall well-being (Cooke et al., 2023). Resilience, defined as an employee's capacity to adapt to workplace challenges and recover from stress, becomes particularly important in dynamic sectors such as automobile manufacturing. When organizations invest in supportive HR systems, fair appraisal, and meaningful development opportunities, employees are better equipped to cope with demanding production targets and technological transitions. This ultimately contributes to higher job satisfaction and sustainable performance.

Parallel to sustainable HRM, the literature on Green Human Resource Management (GHRM) has gained significant momentum. GHRM focuses specifically on integrating environmental management into HR functions such as recruitment, training, performance appraisal and compensation. Studies demonstrate that green recruitment and training cultivate environmental awareness among employees, encouraging eco-friendly workplace behaviors (Dumont et al., 2017). Moreover, green HRM practices have been found to influence employee green behavior through psychological mechanisms such as organizational identification and perceived organizational support (Ren et al., 2018). These findings highlight that environmental sustainability is not solely dependent on technology or policy but also on employee participation and behavioral alignment.

In the manufacturing and automotive sectors, GHRM has emerged as a critical success factor for sustainable operations. The automobile industry, characterized by high energy consumption and environmental impact, requires strong internal systems to ensure compliance with environmental standards and stakeholder expectations. Empirical studies in automotive firms reveal that green HRM practices significantly contribute to sustainable manufacturing outcomes and environmental performance (Yusliza et al., 2020). Environmental management systems in automotive companies have also been linked with improved operational performance and cost efficiency, demonstrating that environmental responsibility can coexist with profitability (Jabbour et al., 2012). These findings underscore the importance of embedding sustainability principles within HR frameworks in industrial contexts.

Within the Indian context, the relevance of sustainable HRM in the automobile sector has grown considerably. India's automotive industry plays a crucial role in economic development and employment generation, yet it faces mounting environmental and regulatory pressures. Research conducted in Indian automotive manufacturing organizations indicates that sustainable HRM practices positively influence organizational sustainability and employee engagement (Singh & Misra, 2022). Similarly, studies focusing on automobile firms in Chennai highlight both the challenges and opportunities associated with implementing green HRM practices, emphasizing the need for structured measurement and evaluation mechanisms (Kumar & Prakash, 2023). These findings suggest that while organizations recognize the importance of sustainability, consistent implementation and assessment remain areas requiring further scholarly attention.

Employee satisfaction has been widely examined as a key outcome variable in HRM research. It refers to the overall positive emotional state resulting from an employee's appraisal of their job experiences. Sustainable HRM practices contribute to satisfaction by promoting fairness, development opportunities, work-life balance, and supportive leadership. Evidence suggests that green HRM initiatives enhance job satisfaction by fostering a sense of purpose and alignment with organizational values (Pham et al., 2025). When employees perceive that their organization is genuinely committed to environmental and social responsibility, they tend to develop stronger emotional attachment and pride in their workplace.

Engagement has frequently been identified as a mediating mechanism between sustainable HRM and employee satisfaction. Studies demonstrate that green HRM practices improve engagement levels, which in turn strengthen organizational commitment and reduce turnover intentions (Islam et al., 2021). Engaged employees exhibit higher levels of vigor, dedication, and absorption in their work, which positively influences satisfaction and retention. Furthermore, sustainable HRM practices that emphasize training and employability development contribute to long-term career growth, thereby enhancing both satisfaction and organizational loyalty (Ehnert et al., 2023).

A growing stream of literature also emphasizes the importance of organizational justice and ethical climate in shaping employee responses to sustainable HRM practices. When appraisal systems are transparent and rewards are aligned with sustainability goals, employees perceive fairness and procedural justice, leading to improved attitudes and satisfaction (Aust et al., 2020). In manufacturing settings, where hierarchical structures are common, transparent HR policies play a vital role in maintaining morale and trust.

Despite extensive research on sustainable and green HRM, scholars have identified limitations in measurement and scale validation. Reliable measurement instruments are essential for ensuring the accuracy and consistency of empirical findings. Initial attempts at developing sustainable HRM scales focused on multidimensional constructs such as sustainable training, employee relations, working conditions, and performance management (Guerci & Pedrini, 2014). More recent studies have applied confirmatory factor analysis and structural equation modeling to validate comprehensive sustainable HRM practice scales, confirming their reliability and construct validity (Aust et al., 2024). In the automotive sector, validated GHRM scales have been used to identify critical factors influencing sustainability performance (Yusliza et al., 2020).

However, much of the existing validation research has been conducted in Western or generalized organizational contexts. Sector-specific validation, particularly in the Indian automobile industry, remains limited. Given the unique operational pressures, technological transitions, and environmental challenges within this sector, context-sensitive measurement tools are necessary. Furthermore, while many studies link sustainable HRM with performance and engagement, fewer investigations focus explicitly on employee satisfaction as a central outcome variable within automotive firms.

Overall, the literature suggests a strong conceptual and empirical linkage between sustainable HRM practices and positive employee outcomes, including resilience, engagement, commitment and satisfaction. Sustainable and green HRM systems contribute to environmental performance and operational effectiveness while simultaneously enhancing employee well-being. Nevertheless, the need for validated measurement scales tailored to the automobile sector remains evident. A comprehensive validation of a Sustainable HRM Practices Scale, combined with an examination of its impact on employee satisfaction, would address this gap and contribute meaningfully to both theory and practice. By grounding empirical analysis in established theoretical frameworks and sector-specific realities, such research can advance understanding of how sustainable people management fosters satisfaction and long-term organizational sustainability.

3. Conceptual Framework

The present conceptual framework is developed to examine the relationship between selected Sustainable HRM practices Workplace Wellbeing, Employee Development, and Employee Retention

and Employee Satisfaction, with Employee Engagement acting as a mediating variable. The framework is grounded in Sustainable Human Resource Management theory and supported by the Ability, Motivation, Opportunity (AMO) framework and the Job Demands–Resources (JD-R) model (Aust et al., 2020; Cooke et al., 2023).

3.1 Sustainable HRM Practices

Sustainable HRM practices refer to organizational policies and activities that promote long-term employee growth, fairness, and environmental and social responsibility (Kramar, 2014). In this model, three key dimensions are considered.

3.2 Workplace Wellbeing refers to practices that ensure a healthy, safe and supportive work environment. It includes work-life balance initiatives, occupational safety, psychological support and fair treatment. According to the JD-R model, such organizational resources reduce stress and enhance positive work attitudes (Cooke et al., 2023). When employees perceive concern for their wellbeing, they are more likely to respond positively toward the organization.

3.3 Employee Development involves continuous learning, training, skill enhancement, and career growth opportunities. Sustainable HRM emphasizes investment in employee capabilities to ensure both organizational continuity and individual employability (Ehnert et al., 2023). Development-oriented HR practices enhance employees' abilities under the AMO framework and strengthen engagement levels.

3.4 Employee Retention Practices include fair compensation, recognition, participative decision-making, and career stability measures. Retention-focused practices reflect organizational commitment to long-term employment relationships, which foster trust and organizational justice (Aust et al., 2020). Such practices reduce turnover intentions and strengthen emotional attachment.

3.5 Employee Engagement as a Mediator

Employee engagement refers to a positive, fulfilling, work-related psychological state characterized by vigor, dedication and absorption. Research indicates that sustainable and green HRM practices significantly influence engagement levels (Islam et al., 2021). Engaged employees demonstrate higher motivation, stronger organizational commitment and better job performance.

Within this framework, engagement mediates the relationship between Sustainable HRM practices and Employee Satisfaction. Workplace wellbeing, development opportunities, and retention practices act as organizational resources that increase engagement (Cooke et al., 2023). In turn, higher engagement enhances satisfaction because employees feel valued, motivated, and connected to organizational goals.

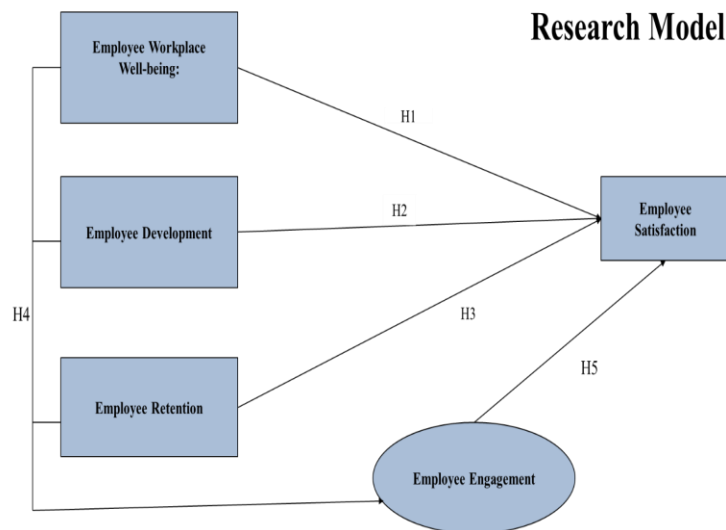
3.6 Employee Satisfaction

Employee satisfaction represents employees' overall positive evaluation of their job experiences. It reflects emotional fulfillment, fairness perceptions, and alignment with organizational values. Green and sustainable HRM practices have been shown to positively affect job satisfaction through supportive climates and meaningful work (Pham et al., 2025).

In this framework, Sustainable HRM practices have both direct and indirect effects on satisfaction. Directly, supportive practices create favorable work conditions. Indirectly, these practices increase engagement, which subsequently enhances satisfaction. This mediating relationship is supported by empirical evidence linking HR practices, engagement, and positive employee outcomes (Cooke et al., 2023; Islam et al., 2021).

4. Conceptual Model Diagram

Figure 1. Conceptual Model.



5. Rationale of the Study

Sustainable Human Resource Management (Sustainable HRM) has emerged as an important approach for organizations seeking long-term success by balancing economic performance with social responsibility and employee wellbeing. Sustainable HRM refers to HR policies and practices that promote the efficient utilization of human resources while ensuring their long-term development, health and satisfaction (Ehnert, 2009). It integrates practices such as workplace wellbeing, employee development and employee retention to create a supportive and growth-oriented work environment. Prior research indicates that these practices significantly influence employee engagement and satisfaction, which ultimately contribute to organizational sustainability (Kramar, 2014).

Workplace wellbeing is a critical component of sustainable HRM. It includes physical safety, psychological health, worklife balance, supportive supervision, and stress management initiatives. Studies suggest that organizations investing in employee wellbeing create a positive work environment that enhances morale and emotional attachment to the organization (Guest, 2017). In labor-intensive industries such as the automobile sector, where employees often face long working hours, production pressure, and physically demanding tasks, wellbeing becomes particularly significant.

Employee development is another key dimension highlighted in the literature. It involves training, skill development, career growth opportunities and continuous learning. In rapidly evolving industries like automobile manufacturing, where technological advancements such as automation and electric vehicle production are transforming operations, continuous skill enhancement is essential. Research shows that employees who perceive opportunities for growth are more engaged and satisfied with their jobs (Jabbour & Santos, 2008). Thus, development initiatives contribute not only to individual competence but also to long-term organizational sustainability.

Employee retention, defined as the organization's ability to retain talented and skilled employees, is also central to sustainable HRM. High turnover leads to increased recruitment and training costs and disrupts productivity. Sustainable HRM practices foster employee loyalty and organizational commitment, thereby reducing attrition (De Prins et al., 2014). In industrial hubs such as Gurugram and Manesar in Haryana, where employment opportunities are abundant, effective retention strategies are particularly important.

Employee engagement plays a mediating role between HR practices and employee satisfaction. Engagement refers to the emotional, cognitive and behavioral involvement employees demonstrate toward their work (Schaufeli et al., 2002). Engaged employees show higher dedication, enthusiasm, and discretionary effort, which positively affects satisfaction levels. Employee satisfaction, in turn, reflects employees' overall contentment and positive evaluation of their job and organizational environment (Judge et al., 2001). Satisfied employees contribute to higher productivity, reduced absenteeism and long-term organizational success.

Despite extensive research on sustainable HRM globally, limited empirical studies focus on the automobile sector in Haryana, India. The region is one of India's largest automobile manufacturing hubs, contributing significantly to employment and economic growth. However, the sector is characterized by competitive pressures, technological transformation, and demanding work conditions. Therefore, understanding how sustainable HRM practices influence engagement and satisfaction in this specific industrial context is essential.

Additionally, there is a need to validate sustainable HRM measurement scales within the regional and industrial context to ensure reliability and cultural relevance. Findings from Western or service-sector studies may not fully apply to manufacturing settings in Haryana. This study addresses these gaps by examining the relationships among workplace wellbeing, employee development, retention, engagement and satisfaction in the automobile sector. It contributes both theoretically and practically by providing evidence-based insights for HR managers and policymakers aiming to enhance employee-centered sustainability.

6. Research Method

6.1 Target Population and Sample

The primary objective of the present study is to validate the Sustainable HRM Practices Scale and examine its relationship with employee engagement and employee satisfaction in the automobile sector of Haryana, India. The target population comprises employees working in automobile manufacturing companies and ancillary units located in major industrial clusters such as Gurugram, Manesar, Faridabad, and Panipat. These regions represent major automobile production hubs and employ a diverse workforce across managerial, technical, supervisory and operational levels.

The automobile sector in Haryana is highly knowledge-intensive and technology-driven. Employees in this industry are required to possess specialized technical skills, adaptability to automation and digital manufacturing systems and strong problem-solving capabilities. Similar to knowledge workers described by Massaro (2012), many professionals in the automobile sector are self-directed learners who value challenging assignments, opportunities for innovation, continuous improvement, and constructive performance feedback. Their specialized expertise and experience form a critical asset for organizational sustainability and competitiveness.

Data for the study were collected from employees of five leading automobile manufacturing companies operating in Haryana. The structured questionnaire was distributed electronically through Google Forms with the support of the HR departments of the selected companies. The data collection process was conducted over a four-month period.

A total of 630 responses were received. After careful screening for incomplete, inconsistent, and inappropriate responses, 107 responses were discarded. Finally, 523 valid and usable responses were retained for statistical analysis. The final sample size of 523 respondents was considered adequate for scale validation, confirmatory factor analysis (CFA), and structural equation modeling (SEM).

To ensure representation across hierarchical levels, respondents were bifurcated according to their job positions within the automobile sector as follows:

6.2 Measurement Scales

The measurement instrument for the present study was developed using previously validated scales drawn from established literature. In line with the conceptual framework, five major constructs were measured: Employee Wellbeing, Employee Development, Employee Retention, Employee Engagement, and Employee Satisfaction. All items were adapted to suit the context of the automobile sector in Haryana, India.

The details of the measurement scales are presented below:

6.2.1 Employee workplace Wellbeing was measured using a 9-item scale developed by Pradhan and Hati (2019). This scale captures multiple dimensions of workplace wellbeing, including psychological wellbeing, social wellbeing, and workplace support. The items assess employees' perceptions of their physical safety, emotional health, work-life balance, and organizational care practices within the workplace.

6.2.2 Employee Development was measured using a 5-item scale adopted from Rehman and Nas (2013). This scale evaluates employees' perceptions regarding training opportunities, skill enhancement programs, career growth prospects, and learning support provided by the organization. In the automobile sector, employee development is particularly important due to rapid technological changes and automation.

6.2.3 Employee Retention was measured using a 5-item scale developed by Eva et al. (2019). This scale assesses the organization's ability to retain talented employees by examining aspects such as job security, organizational support, career continuity, and employees' intention to remain with the organization.

6.2.4 Employee Engagement was measured using the 16-item Utrecht Work Engagement Scale developed by Schaufeli and Bakker (2003). The scale captures three key dimensions of engagement: vigor (energy and resilience at work), dedication (enthusiasm and sense of significance) and absorption (deep involvement in work activities).

6.2.5 Employee Satisfaction was measured using a 5-item scale adopted from Berube et al. (2007, 2016). This scale measures overall job satisfaction, satisfaction with supervision, work environment, and organizational policies.

All items were measured using a **7-point Likert scale**, ranging from 1 = *Strongly Disagree* to 7 = *Strongly Agree*. The use of a 7-point scale enhances response sensitivity and allows respondents to express more precise levels of agreement, thereby improving reliability and construct validity.

Prior to full data collection, the instrument was pilot-tested with a small group of automobile sector employees to ensure clarity, contextual suitability, and content validity. Reliability and validity were assessed using Cronbach's alpha, composite reliability, average variance extracted (AVE), confirmatory factor analysis (CFA), and structural equation modeling (SEM)

7. Data Analysis

7.1 Indicator Reliability (Outer loading)

Indicator reliability was assessed by examining the outer loadings of each measurement item using PLS-SEM in SmartPLS. Indicator reliability evaluates how well each observed variable represents its corresponding latent construct. According to Hair et al. (2017, 2019), outer loadings of **0.70 or higher** indicate that the construct explains at least 50% of the indicator's variance, which reflects satisfactory reliability.

The results show that the majority of items achieved loadings above the recommended threshold of 0.70. A few items with loadings between 0.60 and 0.70 were retained as their inclusion did not adversely affect composite reliability and AVE values, consistent with established recommendations (Chin, 1998; Hair et al., 2019). Furthermore, bootstrapping results confirmed that all outer loadings were statistically significant ($p < 0.05$), indicating stable and reliable measurement indicators. Overall, these findings confirm that the indicators demonstrate adequate reliability and appropriately represent their respective constructs.

Dimensions	Employee Wellbeing	Employee Development	Employee Retention	Employee Engagement	Employee Satisfaction
EW1	0.766				
EW2	0.814				
EW3	0.883				
EW4	0.814				
EW5	0.758				
EW6	0.819				
EW7	0.761				
ED1		0.871			
ED2		0.844			
ED3		0.855			
ED4		0.877			
ED5		0.756			
ER1			0.871		
ER2			0.868		
ER3			0.756		
ER4			0.849		
ER5			0.764		
ER6			0.822		
EE1				0.840	
EE2				0.881	
EE3				0.751	
EE4				0.676	
EE5				0.792	

EE6				0.780	
EE7				0.808	
EE8				0.847	
EE9				0.746	
EE10				0.842	
EE11				0.847	
EE12				0.858	
ES1					0.822
ES2					0.816
ES3					0.944
ES4					0.846
ES5					0.939

Table 1. Indicator Reliability

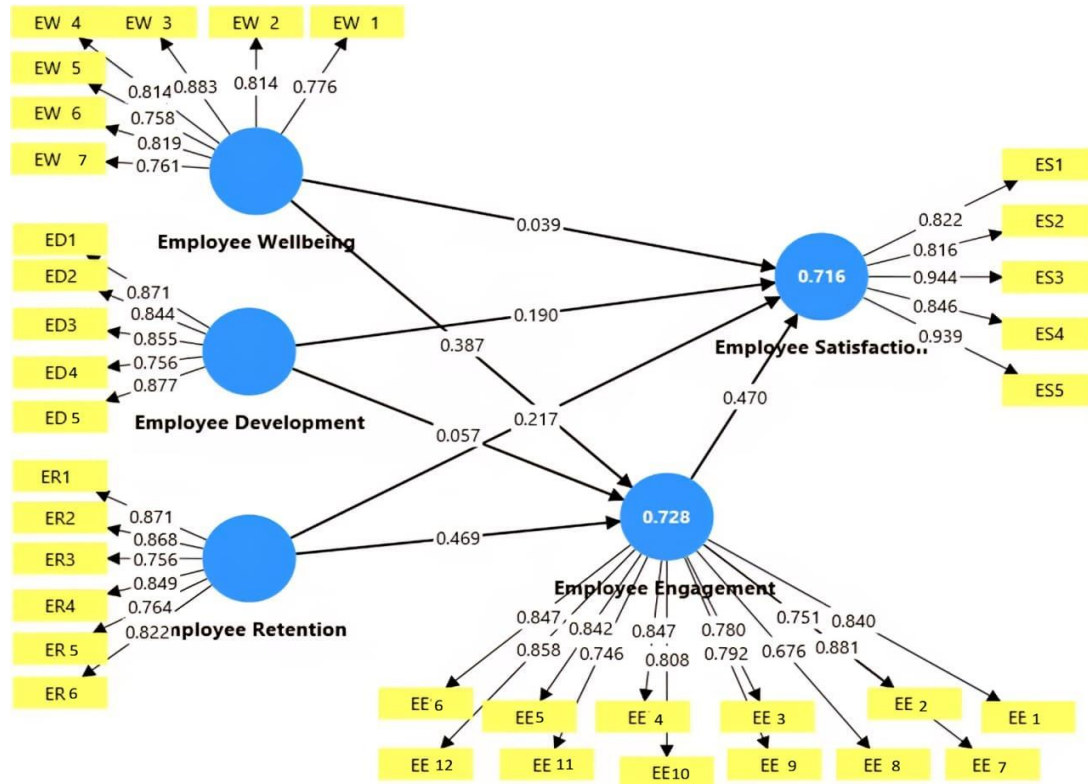
7.2 Item Analysis

Constructs	EW	ED	ER	EE	ES
Total Items	9	5	11	17	5
Items Dropped	2	0	5	5	0
Item Retained	7	5	6	12	5

Table. 2 Item analysis

7.3 Indicator Reliability (Outer loading Graphical output)

Figure. 2 Graphical Output.



7.4 Construct Reliability and Validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Employee Development	0.897	0.903	0.924	0.709
Employee Engagement	0.951	0.955	0.957	0.652
Employee Retention	0.904	0.910	0.926	0.677
Employee Satisfaction	0.922	0.927	0.942	0.766
Employee Wellbeing	0.909	0.910	0.928	0.648

Table 3. Construct Reliability and Validity

Construct reliability and validity were evaluated to ensure the adequacy of the measurement model using PLS-SEM in SmartPLS. Internal consistency reliability was assessed through Cronbach’s alpha and Composite Reliability (CR). As recommended by Hair et al. (2017, 2019), values above 0.70 indicate satisfactory reliability. The results demonstrate that all constructs exceeded the acceptable threshold, confirming strong internal consistency among the measurement items.

Convergent validity was examined using Average Variance Extracted (AVE). According to Fornell and Larcker (1981), an AVE value of 0.50 or higher indicates that the construct explains more than half of the variance of its indicators. In the present study, all constructs reported AVE values above the recommended level, thereby establishing adequate convergent validity. Overall findings confirm that the measurement model demonstrates satisfactory construct reliability and validity, indicating that the adopted scales are appropriate for assessing the constructs within the manufacturing sector context.

7.5 Discriminant Validity

Discriminant validity was assessed to ensure that the constructs are empirically distinct and measure different theoretical concepts. In line with contemporary PLS-SEM guidelines, the Heterotrait–Monotrait (HTMT) ratio was examined using SmartPLS. HTMT values below the recommended threshold of 0.85 indicate adequate discriminant validity (Henseler et al., 2015; Hair et al., 2019).

The results show that all HTMT values were below the acceptable cut-off, confirming that the constructs are statistically distinct and free from conceptual overlap. Establishing discriminant validity is essential to avoid multicollinearity issues and to ensure theoretical clarity within the measurement model (Fornell & Larcker, 1981; Kline, 2016). Thus, discriminant validity of the measurement model is satisfactorily established

	Employee Development	Employee Engagement	Employee Retention	Employee Satisfaction	Employee Wellbeing
Employee Development					
Employee Engagement	0.771				
Employee Retention	0.844	0.861			
Employee Satisfaction	0.793	0.865	0.841		
Employee Wellbeing	0.863	0.847	0.841	0.793	

Table 4. Discriminant Validity

7.6 SRMR

Model fit was assessed using the Standardized Root Mean Square Residual (SRMR) in SmartPLS. SRMR represents the standardized difference between the observed and predicted correlations and is considered an appropriate goodness-of-fit measure in PLS-SEM (Hu & Bentler, 1999; Hair et al., 2019).

According to established guidelines, an SRMR value below 0.08 indicates an acceptable model fit. The obtained SRMR value falls within the recommended threshold, thereby confirming that the measurement model demonstrates a satisfactory fit to the data.

	Original sample (O)	Sample mean (M)	95%	99%
Saturated model	0.059	0.032	0.035	0.037
Estimated model	0.059	0.032	0.035	0.037

Table 5. SRMR

The assessment of the measurement model confirms its robustness and adequacy. Indicator reliability was established as the majority of outer loadings exceeded the recommended threshold of 0.70 (Hair et al., 2017). Internal consistency reliability was supported through satisfactory Cronbach's alpha and Composite Reliability values above 0.70 (Hair et al., 2019). Convergent validity was demonstrated as all Average Variance Extracted (AVE) values surpassed the 0.50 criterion (Fornell & Larcker, 1981). Discriminant validity was confirmed using the HTMT ratio, with all values below the conservative threshold of 0.85 (Henseler et al., 2015). Furthermore, the SRMR value indicated an acceptable model fit (Hu & Bentler, 1999). Findings provide strong empirical support for the reliability and validity of the measurement model, confirming that the adopted scales are appropriate for assessing the constructs within the manufacturing sector context.

8. Discussion and Conclusion

8.1 Discussion

The present study validated the Sustainable HRM Practices Scale and examined its relationship with employee engagement and satisfaction in the automobile sector of Haryana. The measurement model demonstrated strong psychometric properties, including satisfactory indicator reliability, internal consistency, convergent validity, discriminant validity and model fit (SRMR) using SmartPLS. These findings align with recommended PLS-SEM validation standards (Hair et al., 2019; Henseler et al., 2015) and confirm the scale's reliability and contextual suitability for the Indian manufacturing sector.

The results reinforce Sustainable HRM as a long-term, employee-centered strategic approach (Kramar, 2014; Ehnert, 2009). Workplace Wellbeing, Employee Development and Employee Retention emerged as critical organizational resources that enhance engagement and satisfaction. This is consistent with the AMO framework (Appelbaum et al., 2000; Aust et al., 2020), which explains how development enhances ability, retention strengthens motivation and wellbeing provides supportive opportunities for contribution.

The findings are supported by the Job Demands–Resources model, which posits that organizational resources such as sustainable HR practices foster engagement and reduce strain (Cooke et al., 2023; Guest, 2017). In environmentally intensive industries such as automobile manufacturing, embedding

sustainability within HR systems strengthens both operational performance and human outcomes (Jabbour et al., 2012; Yusliza et al., 2020).

Importantly, Employee Engagement was found to mediate the relationship between Sustainable HRM practices and Employee Satisfaction. This indicates that sustainability-oriented HR initiatives enhance satisfaction primarily through increased psychological involvement and work dedication. The result is consistent with prior empirical research linking green and sustainable HRM practices with engagement driven positive employee outcomes (Islam et al., 2021; Pham et al., 2025; Ren et al., 2018).

8.2 Conclusion

This study contributes to Sustainable HRM literature by validating a five-factor Sustainable HRM Practices Scale within the Indian automobile sector. The measurement model exhibited strong reliability and validity, extending prior scale validation efforts conducted in international contexts (Aust et al., 2024; Guerci & Pedrini, 2014).

The findings conclude that Workplace Wellbeing, Employee Development, and Employee Retention positively influence Employee Engagement, which in turn enhances Employee Satisfaction. Engagement operates as a crucial psychological mechanism translating sustainability-oriented HR systems into favorable employee attitudes. These results support sustainable HRM theory (Kramar, 2014) and resource-based perspectives emphasizing the strategic value of human capital (Cooke et al., 2023; Ehnert et al., 2023).

From a managerial standpoint, automobile manufacturing firms should integrate employee centered sustainability initiatives—such as continuous technical training, participative practices, and retention-focused policies to enhance workforce stability and long-term competitiveness. The study provides empirically validated evidence that Sustainable HRM is not merely normative but strategically beneficial for fostering employee satisfaction and organizational resilience in manufacturing contexts.

9. Limitations and Scope for Future Research

9.1 Limitations

Despite its contributions, this study has certain limitations. First, the research adopted a cross sectional design, which restricts the ability to establish strong causal inferences among Sustainable HRM practices, employee engagement, and employee satisfaction. Although PLS-SEM provides robust analytical capability, longitudinal designs would offer stronger temporal validation of causal relationships (Hair et al., 2019; Cooke et al., 2023).

Second, the sample was confined to automobile manufacturing firms located in Haryana, India. While this enhances contextual relevance, it may limit the generalizability of findings to other regions, industries, or cultural settings (Kramar, 2014). Sustainable HRM implementation may vary across institutional and regulatory environments, particularly between emerging and developed economies.

Third, the study relied on self-reported survey data, which may introduce common method bias and social desirability bias (Podsakoff et al., 2003). Although statistical validation procedures were conducted, future research incorporating multi-source or objective performance data would strengthen empirical rigor.

Finally, the conceptual framework focused on three key Sustainable HRM dimensions Workplace Wellbeing, Employee Development, and Employee Retention. Other relevant sustainability-oriented HR practices, such as green recruitment, environmental performance appraisal, and ethical leadership, were not included (Ren et al., 2018; Yusliza et al., 2020). Including these dimensions could provide a more comprehensive assessment of Sustainable HRM systems.

9.2 Scope for Future Research

Future research may extend this study in several meaningful directions. First, longitudinal research designs would allow scholars to examine how Sustainable HRM practices influence engagement and satisfaction over time, particularly in industries undergoing digital and green transformation (Jabbour et al., 2012; Cooke et al., 2023).

Second, comparative studies across different Indian states, sectors (manufacturing vs. services), or countries would enhance the external validity and cross-cultural applicability of the Sustainable HRM Practices Scale (Aust et al., 2024). Multi-group SEM analysis could examine whether relationships differ across hierarchical levels, gender, or organizational size.

Third, future models may incorporate additional mediators and moderators such as organizational justice, ethical climate, leadership style, resilience or environmental commitment to deepen theoretical understanding (Ehnert et al., 2023; Guest, 2017). Expanding outcome variables to include turnover intention, innovation capability, environmental performance or employer branding would also enrich the literature.

Finally, integrating objective organizational metrics (e.g., productivity data, environmental compliance indicators) alongside perceptual measures could provide stronger triangulation and practical relevance.

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