INTERNATIONAL RESEARCH JOURNAL OF MANAGEMENT SOCIOLOGY & HUMANITIES

ISSN 2277 – 9809 (online)
ISSN 2348 - 9359 (Print)

An Internationally Indexed Peer Reviewed & Refereed Journal

www.IRJMSH.com
www.isarasolutions.com

Published by iSaRa Solutions

MEASURING GREEN HUMAN RESOURCE MANAGEMENT PERFORMANCE THROUGH THE BALANCED SCORECARD APPROACH

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Abstract

The growing importance of environmental sustainability and social responsibility has encouraged organizations to integrate sustainable practices into their strategic and operational frameworks. In this context, Green Human Resource Management (GHRM) has emerged as an important approach for promoting environmental sustainability through practices such as green recruitment, green training, and green performance management. However, limited studies have systematically integrated GHRM practices with organizational performance measurement frameworks.

To address this gap, the present study proposes and validates the Green Human Resource Management Balanced Scorecard (GHRM-BSC), an extended version of the traditional Balanced Scorecard (BSC). The model incorporates Environmental Sustainability as a distinct fifth perspective alongside the existing dimensions of Financial, Customer, Internal Business Processes, and Learning and Growth. The study examines how GHRM practices contribute to sustainability performance by improving resource efficiency, customer trust, eco-friendly operations, organizational learning, and environmental stewardship.

The proposed framework was validated using primary data collected from large-scale industries located in Sambalpur and Jharsuguda districts of Western Odisha. The study employed measurement scales adapted from established literature to ensure reliability and contextual relevance. The findings indicate that integrating GHRM practices with the extended BSC framework significantly enhances organizational sustainability performance.

The study contributes to the literature on sustainable strategic management by offering a theoretically grounded and empirically validated performance evaluation framework. The GHRM-BSC model also provides practical implications for managers, policymakers, and organizations seeking to integrate environmental accountability with long-term business sustainability.

Keywords: Green Human Resource Management, Balanced Scorecard, Environmental Sustainability, Sustainable Business Performance, GHRM-BSC, Strategic Management.

Introduction

Over the last few years the vital importance of organizations to align with environmental concerns and social responsibility has escalate the adoption of sustainability as a strategic priority rather than a normal concern. As the organizations worldwide are conscious and embedded with dual pressure of environmental sustainability and competitive advantage, it becomes necessary to align the policies and practices with sustainability initiatives.

However, the increasing demand and recognition of the strategic implementation of GHRM particularly by "green recruitment and selection", "green training and development", "green performance and appraisal" and many more which are already discussed in above chapters (Renwick et al., 2013; Shah, 2019; Yashik & Mathew, 2023), it has been less explored in systematically encapsulate the factors and components of environmental management in HR department and overall organizational strategy. The very well known framework, Balanced Scorecard (BSC)**,** a strategic management approach and performance management, originally developed by Kaplan and Norton (1992) can be used further to establish the sustainability perspective with their existing four important pillars. The framework originally consist of four established perspectives namely "Financial", "Customer", "Internal Business Processes", and "Learning and Growth". However, this model has been criticized for under representing sustainability-related priorities, particularly environmental outcomes (Figge et al., 2002; Hubbard, 2009). In this modern way of running business, environmental sustainability cannot be neglected with any reason, hence researcher may think in this regard to establish a new framework to study or investigate the performance measurement of any organization in the lens of organizational as well as environmental sustainability.

To bridge this critical gap, the present paper proposes and validates an improved performance evaluation model, the Green Human Resource Management Balanced Scorecard (GHRM-BSC)**.** This model expands the conventional BSC structure by integrating Environmental Sustainability as a distinct and standalone fifth construct. This expansion shows the rising necessity for organizations to monitor and manage their environmental performance explicitly rather than treating it as normal measurement criteria. The newly developed GHRM-BSC model envisage GHRM practices as strategic enablers that enhance performance across four interconnected perspectives which altogether enhance Environmental Sustainability Performance. Specifically, it can reflect that green HR practices drive financial resilience through resource efficiency, strengthen customer loyalty through sustainability branding, optimize internal operations via eco-conscious processes, foster innovation and learning through green competency development, and advance environmental stewardship through dedicated environmental initiatives and metrics through Business sustainability construct.

The conceptual model of this approach has been established before in the paper (Sahu, 2024) which aligns the four perspective with environmental concern. Again to check the industrial vibrancy and environmental vulnerability, this model is validated with primary data collection from several large scale industries in the district if Sambalpur and Jharsuguda. The study employed measurement scales adapted from validated instruments ensuring methodological rigor and contextual relevance.

By systematically aligning GHRM practices with the extended Balanced Scorecard framework, this research contributes to the evolving discourse on sustainable strategic management. The "GHRM-BSC" model not only serves as a theoretically robust and empirically tested tool for measuring sustainability performance but also offers actionable insights for HR managers, business leaders, and policymakers seeking to integrate environmental accountability into organizational systems.

The remainder of this chapter outlines the conceptual foundation of the model, details the research design and methodology, presents the empirical findings, and discusses the theoretical and practical implications of adopting the GHRM-BSC framework for promoting sustainable business practices.

Background of the Study

In the evolving landscape of organizational management, the pursuit of sustainability has transitioned from being a peripheral concern to becoming a core strategic imperative. Businesses across industries are increasingly expected to balance financial success with social accountability and ecological stewardship, particularly in industrially active and environmentally sensitive regions such as Western Odisha, India**.** This shift has underscored the necessity for organizations to rethink their performance management frameworks and embed sustainability at the heart of their strategic and operational decisions.

Traditionally, performance in business management has been measured through economic indicators such as profit margins, shareholder returns, and cost efficiency. However, modern management theories emphasize that long-term competitiveness is contingent not only on financial strength but also on an organization's capacity to address broader environmental and social challenges. As a result, Green Human Resource Management (GHRM) has emerged as a significant factor of strategic human resource management, aligning on the HR functions such as recruitment, training, performance evaluation, and rewards, with an organization's environmental objectives (Renwick et al., 2013).

Simultaneously, performance measurement frameworks have evolved to reflect these new priorities. The "Balanced Scorecard (BSC)", developed by Kaplan and Norton (1992), is one of the most influential models in strategic management, enabling organizations to assess their performance across four interconnected dimensions namely "Financial", "Customer", "Internal Business Processes", and **"**Learning and Growth"**.** However, while the BSC broadened managerial focus beyond purely

financial metrics, it does not explicitly integrate sustainability, especially environmental sustainability, as a measurable performance objective (Figge et al., 2002; Hubbard, 2009).

To address this gap, the Green Human Resource Management Balanced Scorecard (GHRM-BSC) was introduced, expanding the traditional model by incorporating environmental and social dimensions into organizational performance evaluation. Building upon this foundation, this study presents the Green Human Resource Management Balanced Scorecard (GHRM-BSC), a model that critically integrates GHRM practices into the Balanced Scorecard framework. Unlike its predecessors, the GHRM-BSC incorporates Environmental Sustainability as a dependent and strategic fifth perspective, highlighting the role of "human resource management" not just as a support function but as a key investigator of environmental performance and environmental sustainability.

This research can be seen as new lens to ascertain sustainability in the field of HRM as well as strategic management. This study is particularly significant for regions like Western Odisha, where industrial growth coexists with acute environmental pressures. The GHRM-BSC model offers a novel and structured approach for organizations to align human capital strategies with sustainability objectives, enabling them to monitor, evaluate, and enhance their environmental performance while safeguarding long-term organizational resilience and competitive advantage.

Integrated model of GHRM and BSC Model

The present study proposes an enhanced model, the Green Human Resource Management Balanced Scorecard (GHRM-BSC), which explicitly incorporates Environmental Sustainability as a distinct and later seen as the dependent variable to obtain the sustainability outcomes. This addition elevates ecological stewardship from a supporting role within operational efficiency to a strategic pillar that shapes both employee behavior and organizational decision-making. However, the alignment of environmental or GGHRM practices are explored, there is a necessity to study the Functions of GHRM Practices in the above discussed five perspectives. The financial perspective can be studied with a viewpoint to develop Energy-efficient project management, sustainability-driven investments, and green accounting. These are the examples of "green human resource management (GHRM)" techniques that help save operating expenses, optimum utilization of resources and finally boost "financial performance". These methods are in line with eco-innovative tactics that promote environmental sustainability and long-term profitability (Yashik & Mathew, 2023). Likewise, the Customer Perspective can be seen and align with GHRM programs which necessarily aims to increase customer happiness and customer loyalty. The company aligns the marketplace by including environmentally conscious staffs which are embedded in green product development, green branding, and raising consumer understanding of environmental issues. By ensuring above strategic focus on

sustainability, brand value is supported and customer relationships are strengthened (Shah, 2019). In the Internal Business Processes, Green procurement approach policies, paperless systems, ISO 14001 compliance, and the 3R (Reduce, Reuse, Recycle) philosophy are the examples of how GHRM, which promotes the incorporation of environmentally friendly practices into internal operations. These initiatives guarantee compliance with environmental rules and increase operating efficiency (Laosirihongthong et al., 2013). The Learning and Development perspective with GHRM helps to improve environmental capabilities in the workforce through continuous green training initiatives, the development of green leadership abilities, and the promotion of an eco-centric corporate culture. This learning and growth perspective promotes creativity, flexibility and a common dedication for achieving sustainability at organizational levels (Renwick et al., 2013).

The additional novel perspective (Environmental Sustainability Perspective) explains the ecological performance of an organization through various organizational GHRM practices. This concept may be displayed in the job descriptions, waste reduction strategies, engaging employees in environmental audits, implementing waste reduction strategies, and pursuing green certifications such as ISO 14001 and LEED. This particular perspective is helpful to measure the environmental concerns of organizations by monitoring carbon footprints. These initiatives and addition will compliance with the organizational environmental stewardship as a strategic objective which encourages organizational commitment to sustainability.

This new approach acknowledges the interdependent relationship among the five perspectives. It can be illustrate by giving some evident statement such as, promoting ecological performance (Environmental Sustainability), enhance employee environmental competencies (Learning and Growth) making operational practices viable and compliance to environment (Internal Business Processes), which automatically improve customer loyalty (Customer Perspective) and organizations finally gains financially (Financial Perspective). This approach can give a synergic effect by integrating the financial strength, market relevance, operational excellence, human capital development, and environmental stewardship which will give balanced long term sustainability to the business appreciating environmental sustainability. As suggested, in this study (Sahu, 2024), the GHRM-BSC model provides organizations with a strong framework for evaluating and managing sustainability performance by aligning the green practices or environmental practices to the conventional BSC model. This particular study will integrate the GHRM with BSC by adding a fifth perspective as environmental sustainability which again form a model called GHRM-BSC model which shows their relationship with the additional factor and helps in measuring the organizational, environmental performance.

GHRM-BSC Perspectives, Strategies, and KPIs

BSC Perspective	Strategic Goal	GHRM Strategies	KPIs / Indicators
Financial Perspective	Profitability, Cost Efficiency	Green Accounting, Green Investment, Green Financial Reporting	Environmental tax benefits, ROI on green projects, Cost savings ratio
Customer Perspective	Customer Satisfaction, Green Brand Loyalty	Green Branding, Eco-Friendly Product Innovation, Customer Green Awareness Programs	Customer retention rate, Green product feedback scores, Brand equity growth
Internal Business Process	Operational Efficiency, Waste Reduction, Regulatory Compliance	Paperless Processes, Green Procurement, 3R (Reduce, Reuse, Recycle) Strategy	Process turnaround time, Resource reuse ratio, ISO 14001 compliance level
Learning and Growth Perspective	Green Culture, Innovation, Environmental Competency	Green Training and Development, Green Leadership Development, Green Rewards System	Employee eco-competency index, Number of green innovation initiatives, Participation rate in sustainability training
Environmental Sustainability	Ecological Footprint Reduction, Compliance, Ecological Stewardship	Environmental audits participation, Carbon footprint monitoring, Green procurement alignment, ISO certification pursuit	Carbon emission reduction percentage, Waste reduction rate, Energy consumption per employee, Environmental certification attainment

(Source: Authors compilation in (Sahu, 2024))

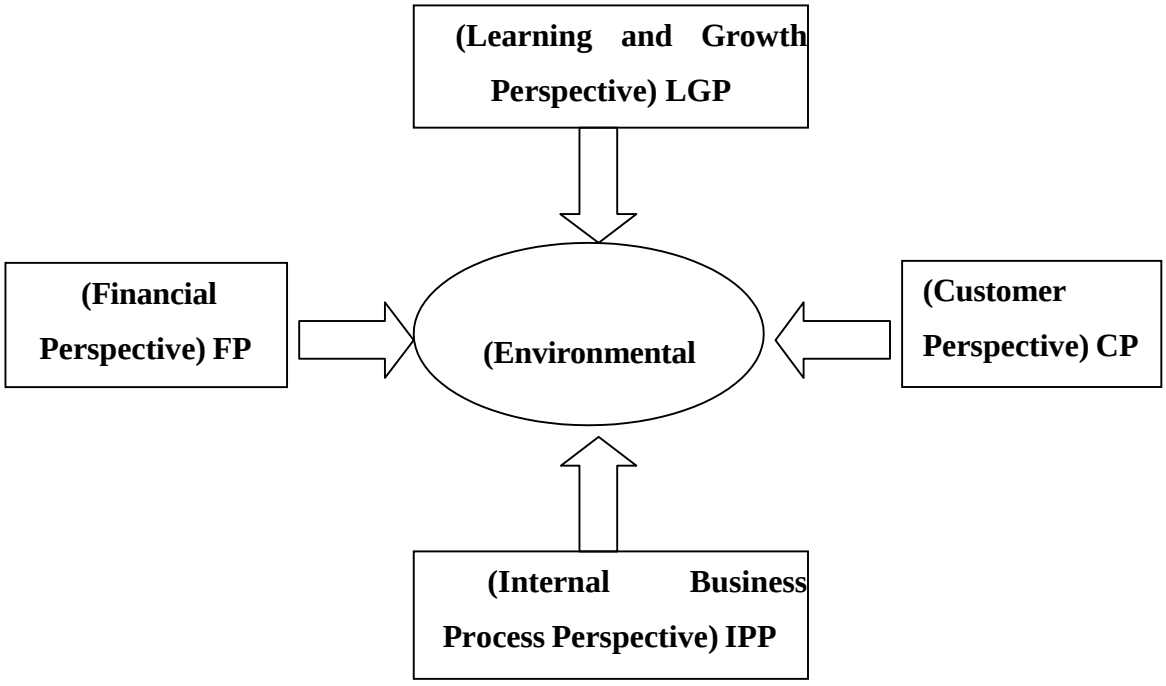
The GHRM-BSC model is shown in Table 8.1 thoroughly depicts the GHRM strategies relating to the strategic objectives and KPIs under each five perspectives of the new Balanced Scorecard. This approach also includes the recently added Environmental Sustainability as a new dimension. This particular table showing GHRM practices directly contribute towards lowering and reducing the carbon footprints. In addition to this, this approach provides a novel framework, improving traditional organizational goals like financial performance, customer satisfaction, process efficiency, and learning and growth as well.

Conceptual Framework

As discussed earlier, the study suggests an integrated framework that strategically connects Balanced Scorecard (BSC) methodology with "Human Resource

Management (GHRM) practices" to improve Business Sustainability. This integrated model, known as the GHRM-BSC Model, provides an organized, method for integrating GHRM practices with sustainability and performance evaluation method. The conventional BSC model has been criticized for its limited ability to directly capture sustainability and environmental performance metrics, despite its demonstrated usefulness (Figge et al., 2002; Hubbard, 2009). The current study fills this gap by explicitly integrating sustainability at the heart of performance management through the integration of GHRM techniques inside each BSC perspective. Sustainability in Business as the Dependent Construct is anticipated with the combination of these interrelated activities will improve Environmental Sustainability (ES), which is the organization's capacity to strike a balance between social responsibility, environmental preservation, and long-term economic development. According to the model, organizational resilience requires integrating sustainability into every BSC facet, particularly in industrially active and environmentally sensitive areas like Western Odisha.

Integrated GHRM-BSC Conceptual Framework for Environmental Sustainability



(Source: Author's compilation)

Hypothesis Development

Hypotheses have been developed to empirically test and examine the impact of integrated GHRM-BSC on environmental sustainability on the basis of the conceptual model discussed above in fig 8.1.

H1 Financial Perspective (FP) has a significant impact on "Environmental Sustainability" (ES).

H2 Customer Perspective (CP) has a significant impact on "Environmental Sustainability" (ES).

H3 Internal Business Process Perspective (IPP) has a significant impact on "Environmental Sustainability" (ES).

H4 Learning and Growth Perspective (LGP) have a significant impact on "Environmental Sustainability" (ES).

Research Methodology

The methodology of the study suggested a quantitative research approach which develops a validated Green Human Resource Management (GHRM) framework integrated within the Balanced Scorecard (BSC) model (Sahu, 2024). The objective of the study is to assess and identify how GHRM policies and practices aligned with BSC model can impact and influence the environmental sustainability performance of an organization. This approach is undertaken by extending the traditional BSC with an additional Environmental Sustainability Perspective as an important dimension in modern business strategy (Kaplan & Norton, 1996; Yashik & Mathew, 2023).

Instrument Development and Data Collection

The study utilized a structured questionnaire for primary data collection, grounded in well-established measurement scales from prior peer-reviewed literature. Questionnaire items were adapted and refined to suit the industrial context of Western Odisha, drawing on the works of Shah (2019), Yashik and Mathew (2023), Schaufeli et al. (2009), Zhu et al. (2008), and Laosirihongthong et al. (2013). This ensured both academic rigor and contextual relevance.

Validation Procedures

To enhance face validity and content validity, the draft questionnaire was reviewed by subject-matter experts, including academic researchers specializing in GHRM and sustainability, as well as industry practitioners from the mining, manufacturing, and energy sectors of Odisha.

Scale and Measurement

All items were measured using a five-point Likert scale, where, 1 denotes Strongly Disagree and 5 denote Strongly Agree.

This facilitated consistency in response interpretation and quantitative analysis. The constructs covered a range of GHRM practices, including but not limited to: green recruitment and selection, green training and development, green performance appraisal, green reward systems, and environmental sustainability practices.

A detailed mapping of constructs, sample items, measurement scales, and their scholarly sources is summarized in the table below.

Constructs, Items, Measurement Scales, and Sources

Construct (Variable)	Item	Measurement Scale	Reference
Financial Perspective (IV)	Our organization has increased its financial performance through the adoption of green HRM practices.	Organizational Performance	Yashik & Mathew (2023)
	Implementing green HRM practices has helped reduce operational costs.	Organizational Performance	Yashik & Mathew (2023)
	The organization regularly conducts green accounting to monitor environmental costs.	EMS Scale	Shah (2019)
	Energy audits are performed to optimize energy consumption and reduce costs.	EMS Scale	Shah (2019)
	Our company's green corporate image has contributed to higher sales and revenue.	Organizational Performance	Yashik & Mathew (2023)
Customer Perspective (IV)	Customers are more satisfied due to our organization's commitment to green practices.	Green Customer Satisfaction Scale	Chen (2010)
	Employees are responsive to environmental issues, positively affecting customer satisfaction.	Green Customer Perception Scale	Rahman, Park, and Chi (2015)
	Green packaging and eco-friendly products have improved customer loyalty.	Green Marketing Orientation Scale	Leonidou, Katsikeas, and Morgan (2013)
	"Zero-emission" concept has enhanced our brand reputation.	Green Brand Image Scale	Chen (2010)
	Employee green engagement enhances customer service.	CSR and Green HRM Engagement	Glavas and Piderit (2009)

		Scale	
Internal Processes Perspective (IV)	Electronic recruitment minimizes paper usage.	Green HRM Scale	Shah (2019)
	Green performance appraisals assess environmental contributions.	Green HRM Scale	Shah (2019)
	Green rewards system motivates sustainable practices.	Green HRM Scale	Shah (2019)
	Implementation of 3R (Reduce, Reuse, Recycle) strategy.	Green HRM Scale	Shah (2019)
	Adherence to ISO 14001 standards.	Green HRM Scale	Shah (2019)
	Eco-friendly transportation reduces carbon footprint.	Green HRM Scale	Shah (2019)
Learning and Growth Perspective (IV)	Employees receive training on green skills.	Green HRM Scale	Shah (2019)
	Sustainability is embedded in the organizational learning	Green HRM Scale	Shah (2019)
	culture.		
	CSR initiatives include environmental training for the community.	Green HRM Scale	Shah (2019)
	Employees are encouraged to participate in environmental activities.	Green HRM Scale	Shah (2019)
	Suggestion scheme allows employees to share ideas on sustainability.	Green HRM Scale	Shah (2019)
Environmenta l Sustainability (DV)	Sustainability strategy aligns with business objectives.	Environmental Sustainability Scale	Zhu et al. (2008)
	Sustainability initiatives have led to long-term cost savings.	Environmental Sustainability Scale	Zhu et al. (2008)
	Active monitoring and reduction of carbon footprint.	Environmental Sustainability Scale	Zhu et al. (2008)
	Green HRM practices have driven sustainable business growth.	Environmental Sustainability Scale	Zhu et al. (2008)

	Stakeholders are engaged in sustainability efforts.	Environmental Sustainability Scale	Laosirihongthong et al. (2013)
	Certifications like LEED and ISO 14001 have been obtained.	Environmental Sustainability Scale	Laosirihongthong et al. (2013)

(Source: Compiled by the Author from existing literature)

Sampling Technique

In this study, Purposive (judgmental) sampling, a type of non-probability sampling, was used to choose companies who actively practice sustainable and environmental management. The research area is known for their high concentration of manufacturing, mining, and energy producing businesses, (districts of Sambalpur and Jharsuguda). These responders were chosen due to their profound understanding of organizational sustainability plans and human resource policies. These target audiences includes senior executives, sustainability officers, and HR managers. This method was appropriate and justified as it is capable of providing insights into the organizational practices and contextual demand of the study (Etikan, Musa & Alkassim, 2016). Total 527 valid responses were obtained from the survey which is more than the minimal sample size needed to do Structural Equation Modeling (SEM), as advised by Hair et al. (2021).

Sample Size Determination

This section follows Cochran's (1977) formula for sample size determination. Similarly, the study involves the respondents from selected large scale industries of western Odisha operating in both Sambalpur and Jharsuguda district. The exact population size is difficult to determine due to several reasons such as, Organizational confidentiality and varying employee records. Hence, to obtain and determine the appropriate sample size, an established statistical formula and methodological guideline is adopted.

Cochran's (1977) formula for sample size calculation for a finite population is given by:

$$n_o = \frac{z^2 \times p \times q}{e^2}$$ Where,

n_o= required sample size

Z= Z-value (1.96 for 95%confidence level)

p= Estimated proportion of population (commonly 0.5 for maximum variability)

q= 1-p

e = margin of error (commonly 0.05)

Since the exact population (N) is unknown, the initial sample size is adjusted for a finite population using:

$$n = \frac{n_o}{1 + \frac{(n_o - 1)}{N}}$$

However, due to unknown N, the infinite population formula is applied as an approximation:

$$n_o = \frac{(1.96)^2 \times (0.5) \times (0.5)}{(0.05)^2} = 384.16$$

Therefore, a minimum sample size of 384 respondents was required to achieve a 95% confidence level and 5% margin of error. This study successfully obtained 527 valid responses, exceeding the minimum required sample, thereby enhancing statistical power and generalizability.

Total 527 valid responses were obtained from the survey which is more than the minimal sample size needed to do Structural Equation Modeling (SEM), as advised by Hair et al. (2022). Therefore, the sample of 527 respondents satisfies both Cochran's formula and SEM recommendations, ensuring robust and reliable results.

Results and Discussion

The data collected is analyzed in SMART PLS 4.0 software to see the relationship between the dependent and independent variable. The entire analysis and their respective interpretation and discussions follows a standard format for interpreting SMART PLS results which includes, measurement model assessment, structural model assessment, path analysis followed by model fit. Each steps are discussed with the results in a systematic order in next subsections.

Measurement Model Assessment

The measurement model of the study is analyzed in the software to obtain the predetermined criteria before structural model evaluation. The systematic procedure involves the reliability and validity test of the constructs.

Reliability Analysis

The table clearly shows the reliability testing of the constructs. Here, analysis of Cronbach's Alpha and Composite reliability were used to obtain the internal consistency. As suggested by (Nunnally & Bernstein, 1994), all the constructs showed Cronbach's Alpha values above the minimal suggested cutoff of 0.70, showing strong internal consistencies. Furthermore, CR value for every construct were significantly

higher than the suggested cutoff of 0.70 (Hair et al., 2019) which further confirmed the reliability.

Reliability Testing Results

Construct	Cronbach's Alpha	Composite Reliability (CR)
Environmental Sustainability (ES)	0.784	0.883
Customer Perspective (CP)	0.812	0.901
Financial Perspective (FP)	0.856	0.911
Internal Process Perspective (IPP)	0.798	0.876
Learning and Growth Perspective (LGP)	0.845	0.918

(Source: SMART PLS Results) Convergent Validity

Convergent validity of the constructs was assessed by evaluating Average Variance Extracted (AVE) values. Table showed, most constructs had AVE values higher than the suggested cutoff of 0.50, suggesting that the indicators account for a sizable amount of variance in relation to measurement error (Fornell & Larcker, 1981). The Composite Reliability (CR) for Environmental Sustainability (ES) was much higher than the recognized benchmark (CR = 0.883), indicating great internal consistency, even if the AVE was just below the threshold at 0.482. According to Hair et al. (2019), when composite reliability is high, a marginally lower AVE can still be deemed acceptable, as the construct demonstrates sufficient reliability and validity for further analysis.

Convergent Validity (AVE) Results

Construct	AVE
Environmental Sustainability (ES)	0.482
Customer Perspective (CP)	0.512
Financial Perspective (FP)	0.537
Internal Process Perspective (IPP)	0.526
Learning and Growth Perspective (LGP)	0.563

(Source: SMART PLS Results) Discriminant Validity

Discriminant validity was tested using the Heterotrait-Monotrait Ratio (HTMT). Below table shows that all "HTMT" values were well below the conservative

threshold of 0.90 (Henseler et al., 2015), confirming the empirical distinctiveness of the constructs.

Discriminant Validity (HTMT Ratio)

Construct	ES	CP	FP	IPP	LGP
ES	1	0.72	0.45	0.56	0.77
CP	0.72	1	0.61	0.67	0.80
FP	0.45	0.61	1	0.55	0.66
IPP	0.56	0.67	0.55	1	0.74
LGP	0.77	0.80	0.66	0.74	1

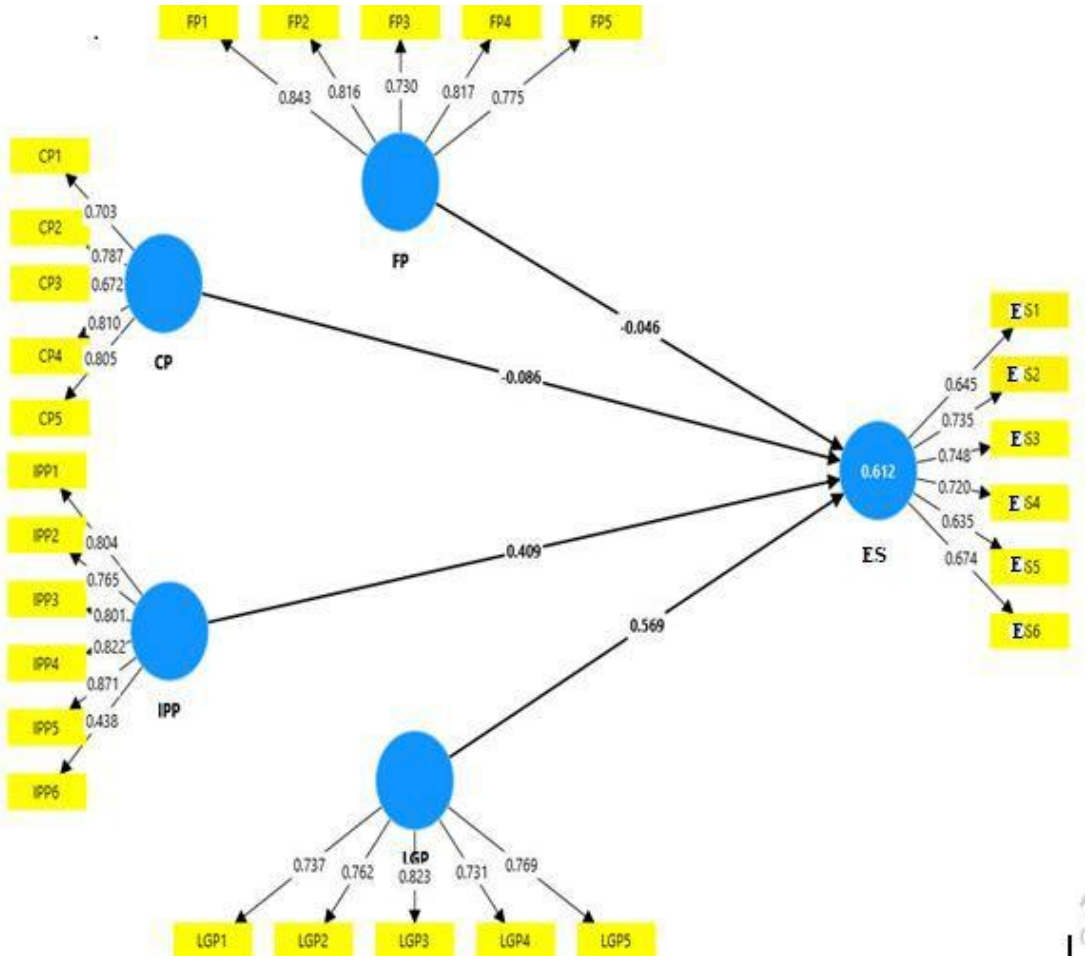
(Source: SMART PLS Results) Indicator Loadings

Indicator loadings were also evaluated to examine the reliability of individual items. The majority of the indicators reported loadings above the acceptable threshold of 0.70, demonstrating strong associations with their respective constructs. However, one indicator, IPP6, reported a relatively low loading of 0.438. Despite its lower value, it was retained due to its theoretical relevance, though its contribution to the construct should be interpreted cautiously.

Structural Model Assessment

Upon validating the measurement model, the structural model was assessed to test the hypothesized relationships among the constructs. The analysis focused on R-Square (R^2)**,** f-Square (f^2), multicollinearity diagnostics, and path coefficients

Structural Model



(Source: SmartPLS Results)

Coefficient of Determination (R^2)

The "R-Square" value provides insight into the explanatory power of the model. As displayed in the Table, the model explains 61.2% of the variance in Environmental Sustainability (ES), indicating substantial predictive capability in accordance with Chin (1998).

R-Square Results

Construct	R^2
Environmental Sustainability (BS)	0.612

(Source: SMART PLS Results) Effect Size (f^2)

The effect size was evaluated to determine the relative contribution of each exogenous construct to Business Sustainability. The table highlights that the Learning and Growth Perspective (LGP) exerted a large effect (f^2 = 0.522), positioning it as the most influential predictor. The Internal Process Perspective (IPP) demonstrated a moderate

effect (f^2 = 0.102), while both the Customer Perspective (CP) and Financial Perspective (FP) exhibited negligible effect sizes.

f-Square Results

Construct	f^2
Learning and Growth Perspective (LGP)	0.522
Internal Process Perspective (IPP)	0.102
Customer Perspective (CP)	0.005
Financial Perspective (FP)	0.002

(Source: SMART PLS Results) Multicollinearity Diagnostics

The "Variance Inflation Factor (VIF)" was calculated to assess potential "multicollinearity" among the predictors. All "VIF" values were below the critical threshold of 3.0, except for IPP4 (VIF = 2.851) and IPP5 (VIF = 2.907). Both values remain within acceptable limits, indicating that "multicollinearity" is not a significant concern in the model.

Path Coefficient Analysis

"Path coefficients" were computed to determine the significance and strength of the relationships among constructs. As indicated in the table, Learning and Growth Perspective (LGP) and Internal Process Perspective (IPP) exhibited statistically significant and positive effects on Environmental Sustainability (ES) ($p < 0.001$). On the contrary, the effects of Customer Perspective (CP) and Financial Perspective (FP) on BS were found to be non-significant.

Path Coefficients

Path	Coefficient	t-Value	p-Value
LGP → ES	0.634	7.48	<0.001
IPP → ES	0.278	3.85	<0.001
CP → ES	0.073	1.32	0.188
FP → ES	0.057	1.12	0.263

(Source: SMART PLS Results)

Model Fit

After assessing all the requirements of structural model assessment, the overall fit of the model was evaluated using several fit indices. As clearly tabulated in the table, the Standardized Root Mean Square Residual (SRMR) was 0.085, indicating a good fit as it falls below the recommended threshold of 0.10 (Hu & Bentler, 1999). The SRMR measures the average discrepancy between the observed and predicted correlations.

The Normed Fit Index (NFI) was 0.714, suggesting a moderate fit. The NFI compares the model to a null model, and while higher values are desirable, a value around 0.70 can be acceptable, especially in exploratory research. The Chi-Square statistic was significant ($\chi^2 = 2562.268$, $p < 0.001$); however, the Chi-Square test is known to be sensitive to sample size, and with a large sample (n = 527), it often yields significant results even if the model fit is reasonable. Therefore, relying solely on Chi-Square is not advisable. Considering the combination of acceptable SRMR and moderate NFI, the model demonstrates an adequate fit to the data

Model Fit Indices – Structural Model Assessment

Fit Index	Value	Threshold / Interpretation	Reference
Standardized Root Mean Square Residual (SRMR)	0.085	< 0.10 indicates a good fit	Hu & Bentler (1999)
Normed Fit Index (NFI)	0.714	≥ 0.70 acceptable for exploratory research; higher values indicate better fit	Bentler & Bonett (1980)
Chi-Square (χ^2)	2562.268 ($p < 0.001$)	Significant; known to be sensitive to large sample sizes, not solely relied upon for fit assessment	Hair et al. (2017)
Sample Size (n)	527	Large sample; increases likelihood of significant χ^2 even with acceptable model fit	Kline (2016)

(Source: SMART PLS Results)

Interpretation of results

Decision Table for Hypothesis Testing

Hypothesis	Path	Coefficient (β)	t-Value	p-Value	Decision
H1	FP → ES	0.057	1.12	0.263	Not Supported
H2	CP → ES	0.073	1.32	0.188	Not Supported
H3	IPP → ES	0.278	3.85	<0.001	Supported
H4	LGP → ES	0.634	7.48	<0.001	Supported

(Source: SMART PLS Results)

The results of the structural model assessment offered valuable insights into the hypothesized relationships between the Balanced Scorecard (BSC) perspectives and Environmental Sustainability (ES). The analysis confirmed that both the Learning and Growth Perspective (LGP) and Internal Process Perspective (IPP) significantly and positively influence Environmental Sustainability, whereas the Customer Perspective (CP) and Financial Perspective (FP) do not exhibit statistically significant effects.

The Learning and Growth Perspective emerged as the most influential predictor, with a path coefficient of 0.634 (t-value = 7.48, $p < 0.001$). This finding emphasizes how important it is to promote an environmentally conscious culture through leadership development, employee training, and knowledge-sharing platforms. Businesses are better equipped to integrate sustainability into their long-term plans and core operations, increasing their environmental accountability and business resilience, when they invest in their employees' acquisition of eco-friendly values and skills. A path coefficient of 0.278 (t-value = 3.85, $p < 0.001$) indicated that the Internal Process Perspective also had a substantial beneficial impact on Environmental Sustainability. This result emphasizes how crucial it is to incorporate green practices, which together support sustainable organizational performance. These activities include pollution prevention strategies, resource-efficient production methods, and environmentally friendly operational standards.

In contrast to the significant effects observed from other perspectives, the Customer Perspective (CP) and Financial Perspective (FP) did not demonstrate statistically significant relationships with Environmental Sustainability in this study. Specifically, the path coefficient for CP was 0.073 (t-value = 1.32, $p = 0.188$), while that for FP was 0.057 (t-value = 1.12, $p = 0.263$), suggesting that their influence on sustainability outcomes is weak and not meaningful within the current industrial context of Western Odisha.

A plausible explanation for the non-significant impact of the Customer Perspective lies in the regional characteristics and market behavior. In industrially dominated regions like Western Odisha, customers may not yet prioritize the green attributes of products and services. This could be due to a variety of factors. Firstly, economic priorities and the focus on fulfilling basic needs might outweigh environmental considerations for many consumers. Secondly, the predominance of business-to-business (B2B) transactions in sectors like mining, manufacturing, and energy may reduce the salience of green credentials in purchasing decisions, which are typically influenced by cost, reliability, and technical specifications rather than sustainability. Moreover, there may be a general lack of awareness among both individual and organizational customers regarding the environmental impact of products and services. Without sufficient information or education, customers are unlikely to actively demand or support green business practices.

The time lag linked to the financial rewards from sustainability initiatives may also be the reason for the Financial Perspective's non-significant contribution. Large upfront expenditures are frequently associated with investments in green HRM practices and other sustainability initiatives, and the benefits, like lower energy costs, lower waste disposal costs, or increased brand value, not be felt for some time. Furthermore, it is difficult to separate the precise financial effects of GHRM practices from other factors that affect financial performance. The immediate financial results of green efforts may be obscured by external variables including market volatility, economic conditions, and competing organizational objectives. Furthermore, some financial benefits, especially those pertaining to intangible assets like business reputation, may be inherently difficult to measure.

Additionally, while under financial strain, organizations could be more concerned with meeting short-term financial goals than making long-term sustainability investments. Last but not least, businesses may be more focused on compliance to avoid fines rather than actively seeking sustainability as a strategic financial lever because Western Odisha is an environmentally sensitive area with strict regulatory scrutiny. This compliance-driven mentality would make short-term financial gains less visible, which would undermine the current study's finding that financial performance and environmental sustainability are related.

In conclusion, the route analysis highlights that the main forces behind environmental sustainability in the context under study are human-centric and process-driven elements of sustainability, namely employee development and environmentally sensitive internal procedures. Before expecting substantial financial returns or customer loyalty associated with sustainability initiatives, these findings recommend a strategic shift in which organizations increase their focus on developing green skills, developing sustainable leadership, and institutionalizing environmentally responsible internal practices.

Conclusion

The primary goal of the current study was to create and validate an integrated model that evaluates and improves “environmental sustainability”, especially in the industrial context of Western Odisha, by combining the Balanced Scorecard (BSC) framework with “Green Human Resource Management (GHRM) practices”. This study sought to offer both theoretical understandings and useful recommendations for integrating sustainability into organizational strategy, given the urgent environmental issues and the increasing demand on enterprises to align their operations with sustainable development goals.

The study's conclusions show that internal organizational capacities and learning systems, rather than short-term financial results or external customer expectations, are the most effective drivers of environmental sustainability. The Learning and Growth Perspective in particular turned out to be the most important factor in determining

environmental sustainability, highlighting the significance of developing eco-friendly skills, encouraging green leadership, and establishing a culture of ongoing environmental practice improvement among staff members. Similarly, it was discovered that the Internal Process Perspective had a significant and favorable impact, emphasizing how important effective, ecologically conscious processes are to attaining long-term corporate success.

On the other hand, the Customer Perspective and Financial Perspective, although fundamental components of the Balanced Scorecard, did not exhibit statistically significant impacts on Environmental Sustainability within the study's context. This outcome suggests that in industrial regions like Western Odisha, sustainability is primarily driven from within the organization through the cultivation of human capital and the optimization of green internal processes, rather than being externally influenced by market or financial pressures. Such insights stress the need for industries to first strengthen their internal green capabilities before expecting sustainable returns in customer engagement or financial performance. Finally the study develops a new idea and validates quantitatively the integrated BSC-GHRM. It significantly gives a roadmap for both academic research and business practices. By combining internal environmental processes and human resources at the centre of strategic management, it provides a thorough and multifaceted method for assessing and improving environmental performance. The study ultimately shifts a paradigm for businesses, moving away from reactive adherence to environmental standards. This study also promotes the green talent development, innovation and investment in internal process which in turn influence long-term sustainability.

It can be concluded as environmentally conscious operations are the keys to sustainability for industrial organizations hoping to prosper in a world economy. The study emphasized on human-centered strategies, learning and growth, innovation, financial growth and sustainable internal process which build an organization more and more environmentally sensitive. The model created in the study acts as a guide for academics research, business processes, and legislators in creating workable plans to incorporate sustainability into organizational structure.

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