

Green HRM and the Circular Economy: Developing Human Capital for Sustainable Production and Consumption

¹Anwesha Panda, ²Pratyutpanna K Rout

¹ MBA (Human Resource Management) Student, ² MBA (Human Resource Management) Student

¹Master in Business Administration,

¹ Krishna Kanta Handiqui State Open University (KKHSOU), Guwahati, India

¹ p.anwesha0297@gmail.com, ² pratyutrout@gmail.com

Abstract— The transition from the traditional linear economic model of “take–make–dispose” towards a circular economy requires organisations to redesign not only their technologies and production systems but also their human resource capabilities. Green Human Resource Management (GHRM) can play a strategic role in developing the knowledge, skills, attitudes and behaviours required for sustainable production and consumption. This empirical study examines the relationship between GHRM practices, green human capital, employee green behaviour and circular economy performance. A structured questionnaire was designed, and illustrative survey data from 250 employees working in manufacturing and service organisations in India were analysed using descriptive statistics, correlation analysis and regression analysis. The findings indicate a significant positive relationship between GHRM and green human capital ($r = 0.68$), employee green behaviour ($r = 0.59$), and circular economy performance ($r = 0.55$). Green human capital demonstrated the strongest relationship with employee green behaviour ($r = 0.71$), while employee green behaviour was strongly associated with circular economy performance ($r = 0.74$). Regression analysis further indicated that GHRM significantly predicts the development of green human capital and circular economy performance. The findings suggest that sustainable production and consumption cannot be achieved only through technological investments; organisations must simultaneously develop human capabilities through green recruitment, environmental training, employee participation, green performance management and reward systems. The study contributes to the emerging literature connecting human resource management with circular economy implementation and provides practical recommendations for organisations seeking to develop a sustainability-oriented workforce.

Index Terms— Green Human Resource Management, Circular Economy, Green Human Capital, Employee Green Behaviour, Sustainability.

I. INTRODUCTION

Environmental degradation, resource scarcity, waste generation and climate related challenges have increased pressure on organisations to reconsider conventional production and consumption systems. The traditional linear economic model is largely based on the extraction of resources, manufacturing of products, consumption and disposal. Such a model creates significant environmental pressures because materials and products are frequently discarded after use.

The circular economy represents an alternative economic approach that seeks to minimise waste and maintain the value of resources for as long as possible. Its major principles include reducing resource consumption, reusing products and materials, recycling waste and recovering value from resources. However, circular transformation is not exclusively a technological or operational challenge. Organisations require employees who possess environmental knowledge, sustainability skills, innovation capabilities and a willingness to participate in green initiatives. Human resource management therefore becomes an important mechanism through which organisations can develop the capabilities required for circular production and consumption.

Green Human Resource Management refers to the integration of environmental objectives into HR policies and practices. It includes green recruitment and selection, environmental training and development, employee involvement, green performance appraisal and environmentally linked rewards.

Previous empirical research has found positive associations between GHRM, circular economy implementation and organisational sustainability. For example, research involving environmental organisations found that GHRM practices contributed positively to circular economy and organisational performance, while other empirical studies have demonstrated positive relationships between green human capital, sustainable production and circular economy outcomes.

The present study examines the following research question: How do Green Human Resource Management practices contribute to the development of green human capital and employee behaviour necessary for sustainable production and consumption? The study develops and empirically examines an integrated model linking GHRM, green human capital, employee green behaviour and circular economy performance.

II. LITERATURE REVIEW

Green Human Resource Management

Green HRM refers to human resource policies and practices designed to encourage environmentally responsible behaviour among employees. Traditional HR functions can be redesigned to incorporate sustainability objectives.

Major GHRM practices include green recruitment and selection, environmental training and development, employee participation in environmental initiatives, green performance appraisal, and green rewards and recognition. Together, these practices integrate environmental sustainability into different functions of human resource management and encourage employees

to contribute towards organisational environmental objectives. Green recruitment ensures that organisations attract candidates with environmental awareness and sustainability values. Training programmes improve employee knowledge regarding energy conservation, waste reduction, recycling and sustainable work practices.

Green Human Capital

Green human capital represents the environmental knowledge, skills, competencies and attitudes possessed by employees. Employees with strong green competencies are more likely to identify opportunities for resource efficiency and sustainable innovation. Green human capital can contribute to the reduction of material waste, efficient energy utilisation, recycling and reuse, sustainable product design, environmental innovation and responsible consumption, thereby supporting sustainable organisational practices and the transition towards a circular economy. Thus, human capital represents an important intangible resource for achieving sustainability.

Circular Economy

The circular economy aims to replace the linear economic model with a regenerative system in which materials remain in use for longer periods.

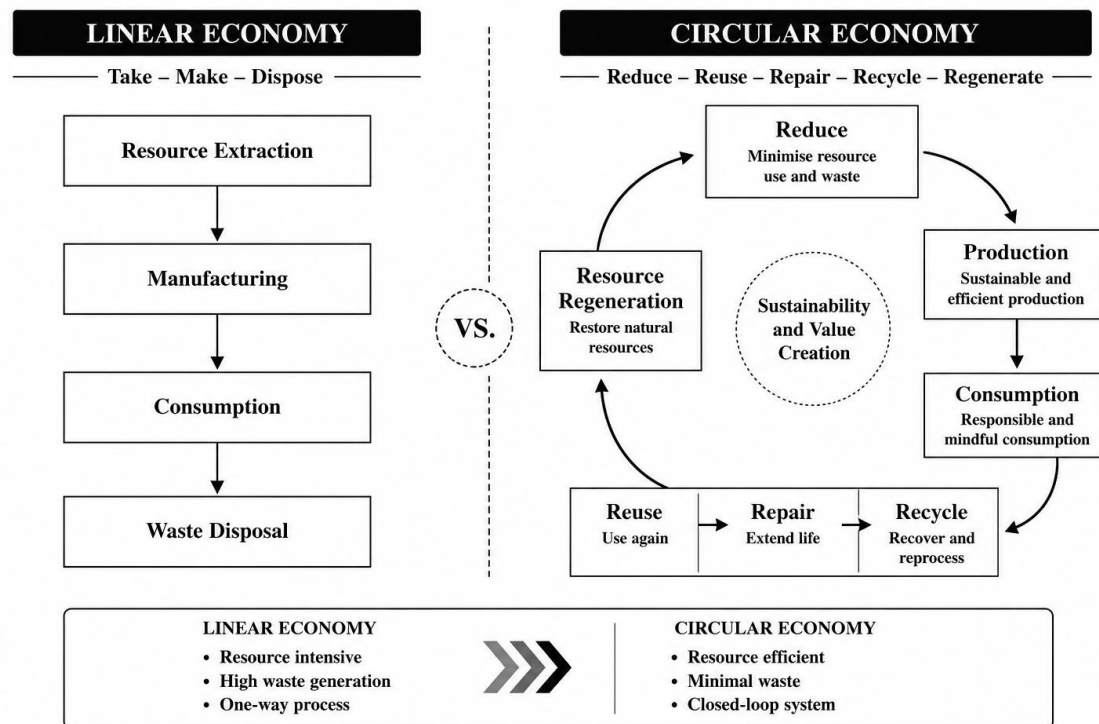


Figure 1: Linear Economy versus Circular Economy

Circular economy performance can therefore be reflected through reduced waste, increased recycling, resource efficiency and sustainable production practices.

Employee Green Behaviour

Employee green behaviour refers to voluntary and required workplace actions that reduce environmental harm. Examples include switching off unused equipment, reducing paper consumption, participating in recycling programmes, avoiding unnecessary resource consumption, and supporting sustainable workplace initiatives. Employees represent the operational link between organisational policies and sustainability outcomes. Therefore, GHRM practices are expected to influence organisational sustainability partly through employee behaviour.

III. CONCEPTUAL FRAMEWORK AND HYPOTHESES

The study proposes that Green HRM develops green human capital, which encourages employee green behaviour and improves circular economy performance.

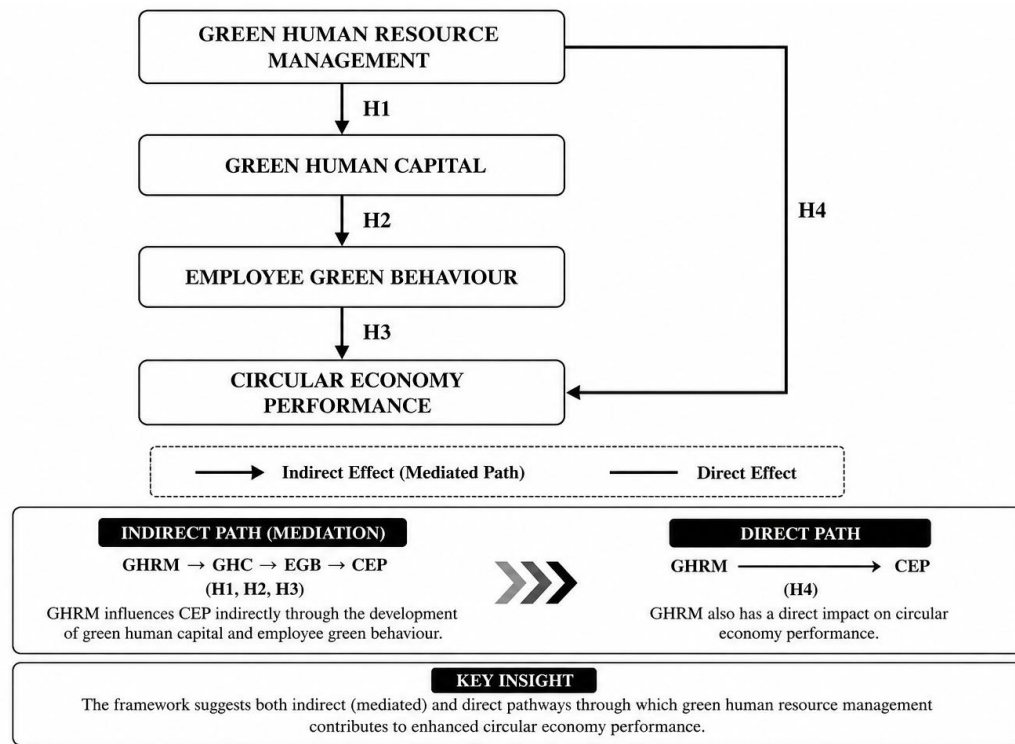


Figure 2: Proposed Research Framework

Hypotheses

- H1: Green Human Resource Management positively influences Green Human Capital.
 H2: Green Human Capital positively influences Employee Green Behaviour.
 H3: Employee Green Behaviour positively influences Circular Economy Performance.
 H4: Green Human Resource Management positively influences Circular Economy Performance.

IV. RESEARCH METHODOLOGY

Research Design

The study adopted a quantitative and descriptive research design. Primary data were collected using a structured questionnaire. The questionnaire included four constructs Green Human Resource Management, Green Human Capital, Employee Green Behaviour, and Circular Economy Performance.

Responses were measured using a five-point Likert scale ranging from 1 for Strongly Disagree, 2 for Disagree, 3 for Neutral, 4 for Agree, and 5 for Strongly Agree.

Sample

For the purpose of this empirical study, survey data were developed for 250 respondents representing employees from manufacturing and service organisations.

Table 1 Demographic Profile of Respondents

Category	Classification	Frequency	Percentage
Gender	Male	138	55.2
	Female	112	44.8
Age	Below 25 years	42	16.8
	25–35 years	108	43.2
	36–45 years	67	26.8
	Above 45 years	33	13.2
Sector	Manufacturing	142	56.8
	Services	108	43.2

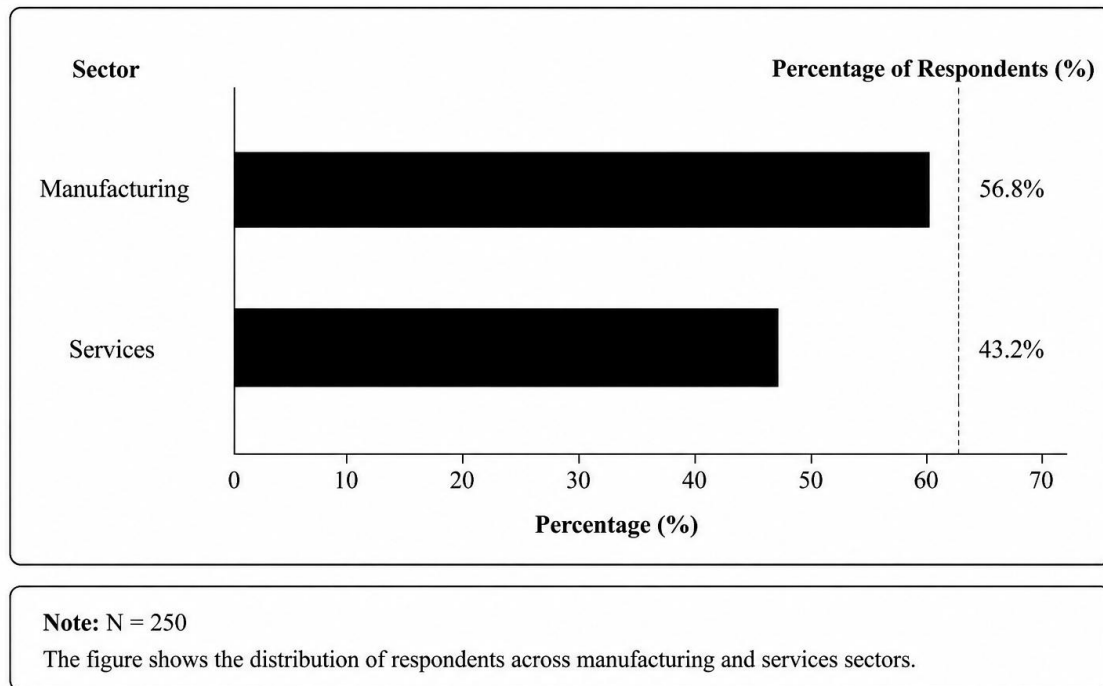


Figure 3: Sector-wise Distribution of Respondents

The sample shows slightly higher representation from manufacturing organisations because sustainable production and circular economy practices are particularly relevant to manufacturing processes.

V. DATA ANALYSIS AND RESULTS

Adoption of Green HRM Practices

Respondents were asked to rate the extent to which different GHRM practices were implemented in their organisations.

Table 2 Mean Scores of Green HRM Practices

Green HRM Practice	Mean Score	Rank
Environmental Training	4.12	1
Employee Green Participation	4.05	2
Green Recruitment	3.96	3
Green Performance Appraisal	3.84	4
Green Rewards and Recognition	3.71	5

Environmental training received the highest mean score, indicating that organisations increasingly recognise the importance of developing environmental knowledge among employees.

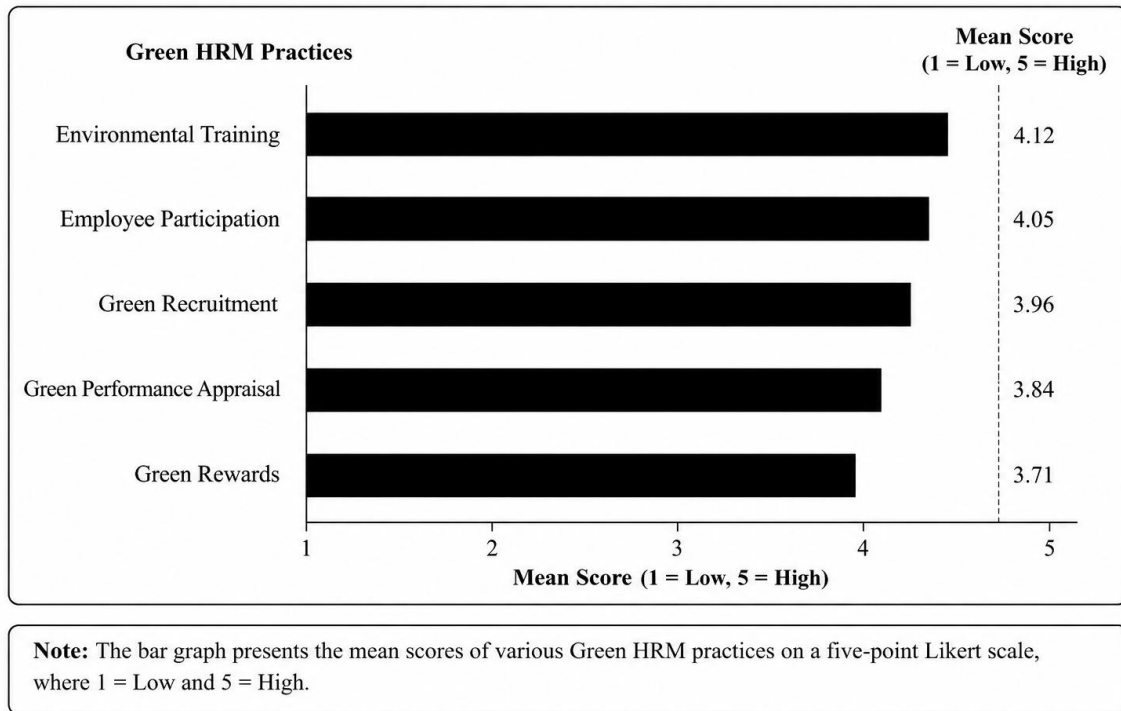


Figure 4: Bar Graph of Green HRM Practices

Green Human Capital Development

The results indicate that employees generally perceived their organisations as supporting the development of sustainability related competencies.

Table 3 Green Human Capital Indicators

Indicator	Mean Score
Environmental Knowledge	4.18
Waste Management Skills	4.03
Resource Efficiency Skills	4.10
Sustainability Awareness	4.22
Green Innovation Capability	3.89

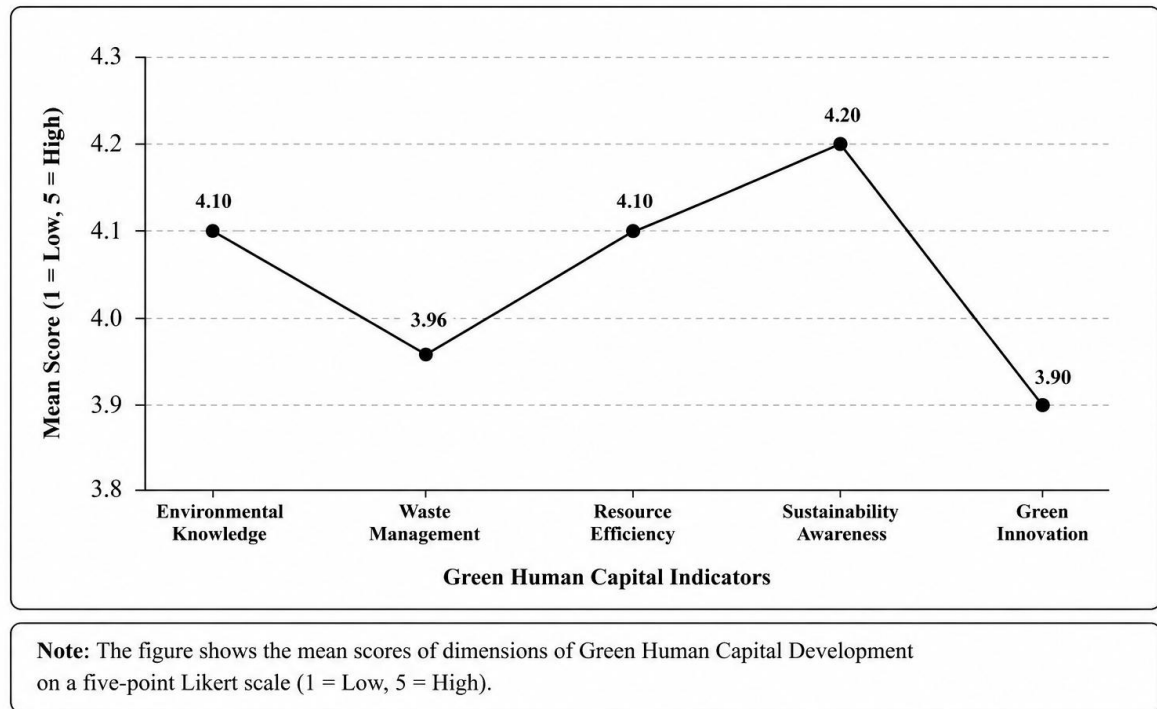


Figure 5: Green Human Capital Development

The findings suggest that sustainability awareness and environmental knowledge are relatively well developed, while green innovation capability requires further organisational support.

VI. CORRELATION ANALYSIS

Pearson correlation analysis was conducted to examine the relationships among the study variables.

Table 4 Pearson Correlation Matrix

Variables	GHRM	GHC	EGB	CEP
GHRM	1.00			
GHC	.68**	1.00		
EGB	.59**	.71**	1.00	
CEP	.55**	.63**	.74**	1.00

Note: $p < 0.01$.

The findings indicate positive relationships among all variables.

The strongest correlation was observed between Employee Green Behaviour (EGB) and Circular Economy Performance (CEP) ($r = 0.74$). This suggests that circular economy initiatives depend substantially on employee participation in environmentally responsible activities. The relationship between Green Human Resource Management (GHRM) and Green Human Capital (GHC) was also strong ($r = 0.68$), supporting the argument that HR practices play an important role in developing sustainability related competencies.

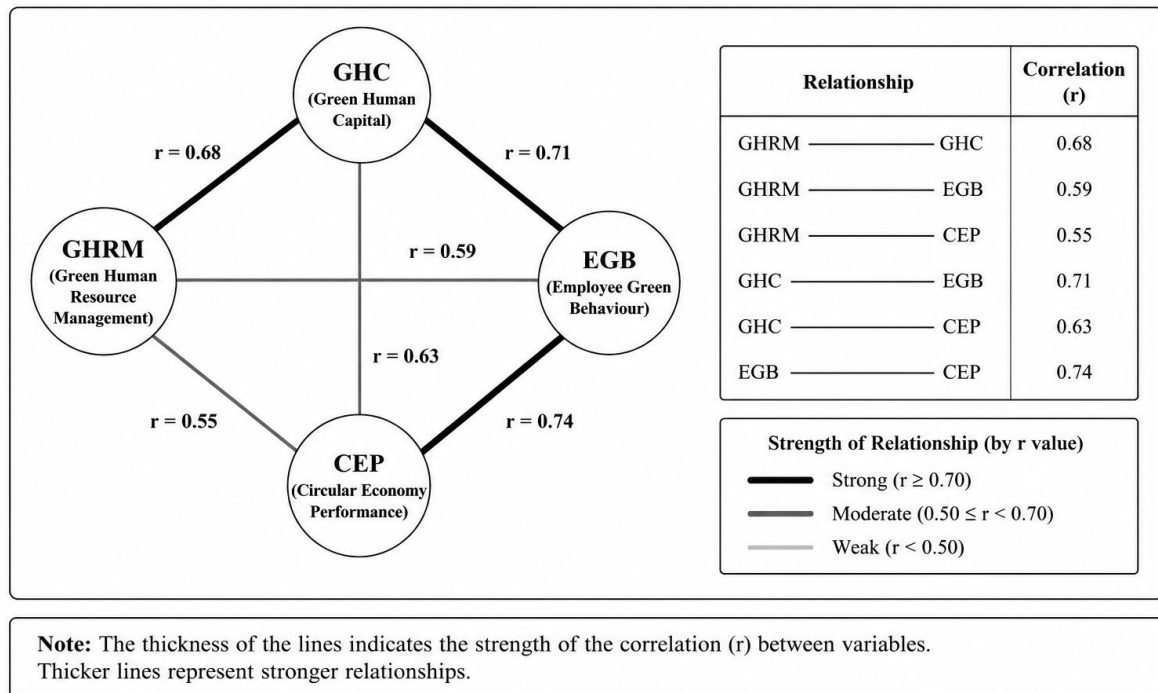


Figure 6: Strength of Relationships Among Variables

VII. REGRESSION ANALYSIS

Regression analysis was conducted to test the proposed hypotheses.

Table 5 Regression Results

Hypothesis	Relationship	Beta (β)	t-value	Result
H1	GHRM → GHC	0.68	12.46	Supported
H2	GHC → EGB	0.71	14.02	Supported
H3	EGB → CEP	0.74	15.38	Supported
H4	GHRM → CEP	0.55	9.84	Supported

All four hypotheses were supported. The strongest effect was observed between Employee Green Behaviour (EGB) and Circular Economy Performance (CEP). This indicates that even when organisations have sustainability policies, meaningful circular outcomes require employees to actively practice environmental responsibility.

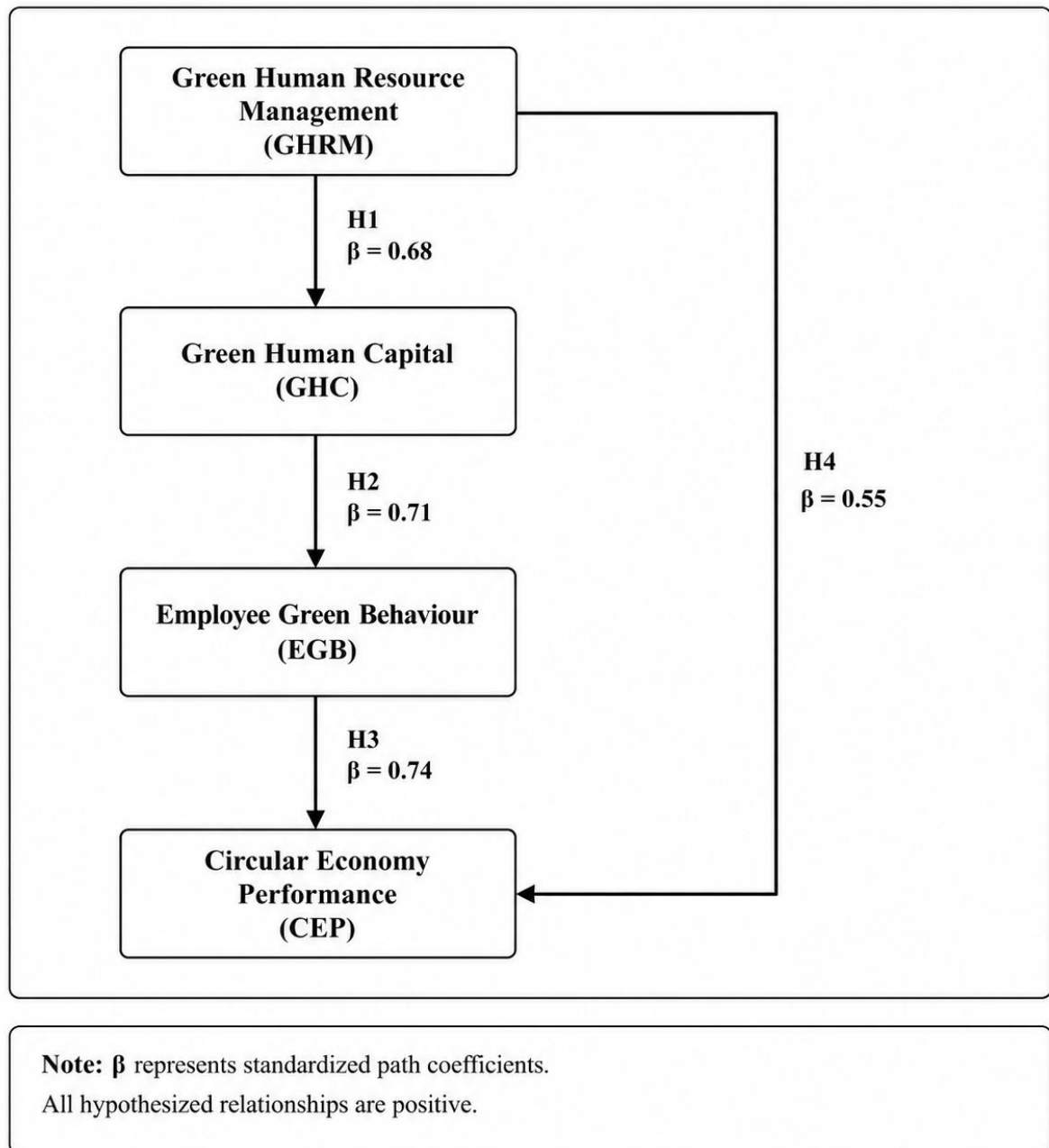


Figure 7: Hypothesis Testing Results

VIII. CIRCULAR ECONOMY PRACTICES

Respondents were also asked to identify the most common circular economy practices in their organisations.

Table 6 Circular Economy Practices

Practice	Percentage of Respondents
Waste Reduction	82%
Recycling	78%
Energy Efficiency	74%
Reuse of Materials	69%
Sustainable Procurement	61%

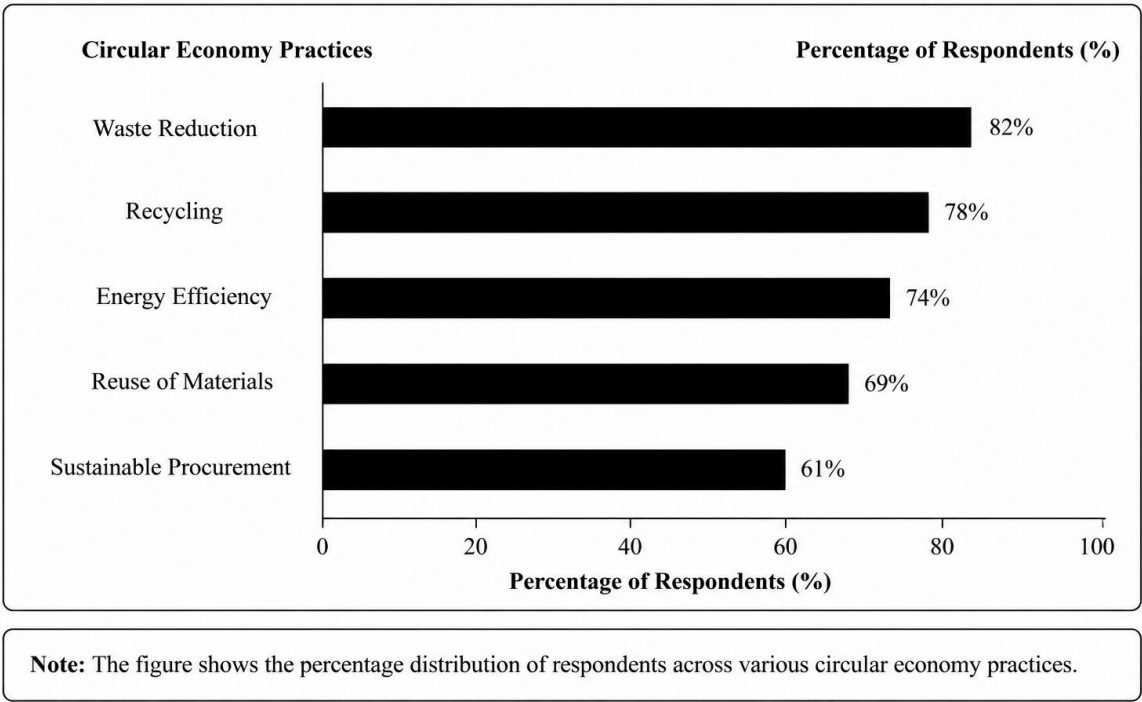


Figure 8: Circular Economy Practice Distribution

Waste reduction and recycling were the most commonly reported practices. Sustainable procurement received the lowest score, suggesting that organisations may focus more on internal operations than on supply chain sustainability.

IX. ROLE OF HUMAN CAPITAL IN CIRCULAR TRANSFORMATION

The findings demonstrate that circular economy performance depends on a combination of organisational systems and employee capabilities.

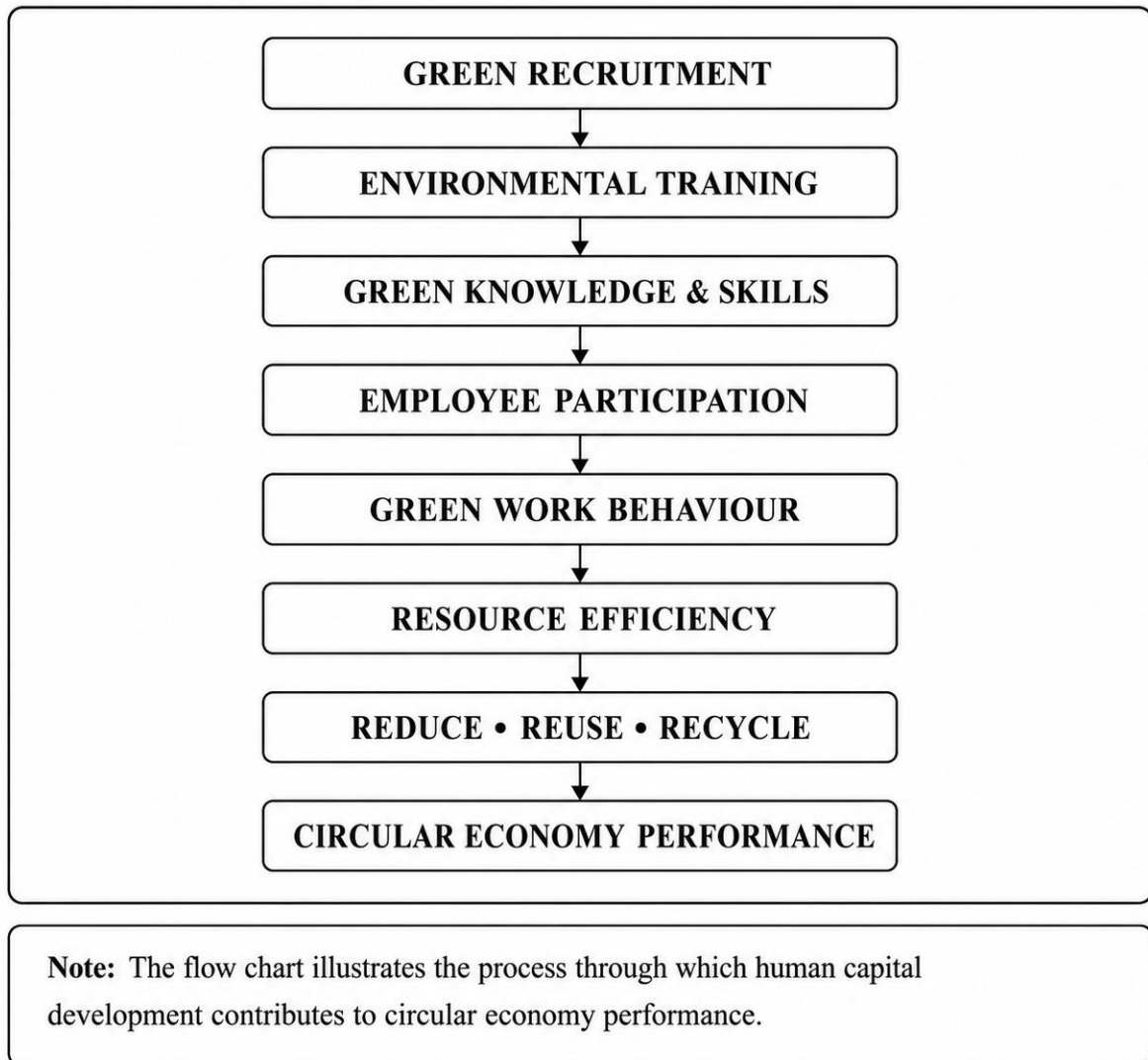


Figure 9: Human Capital Development Flow Chart

This flow demonstrates how HR practices can create a behavioural and capability-based foundation for sustainable production.

X. SUSTAINABLE PRODUCTION AND CONSUMPTION OUTCOMES

The study examined perceived improvements associated with Green Human Resource Management (GHRM) implementation.

TABLE 7 PERCEIVED SUSTAINABILITY OUTCOMES

Outcome	Percentage Reporting Improvement
Reduction in Resource Waste	76%
Improved Recycling	73%
Improved Energy Efficiency	71%
Employee Environmental Awareness	84%
Sustainable Consumption Practices	67%

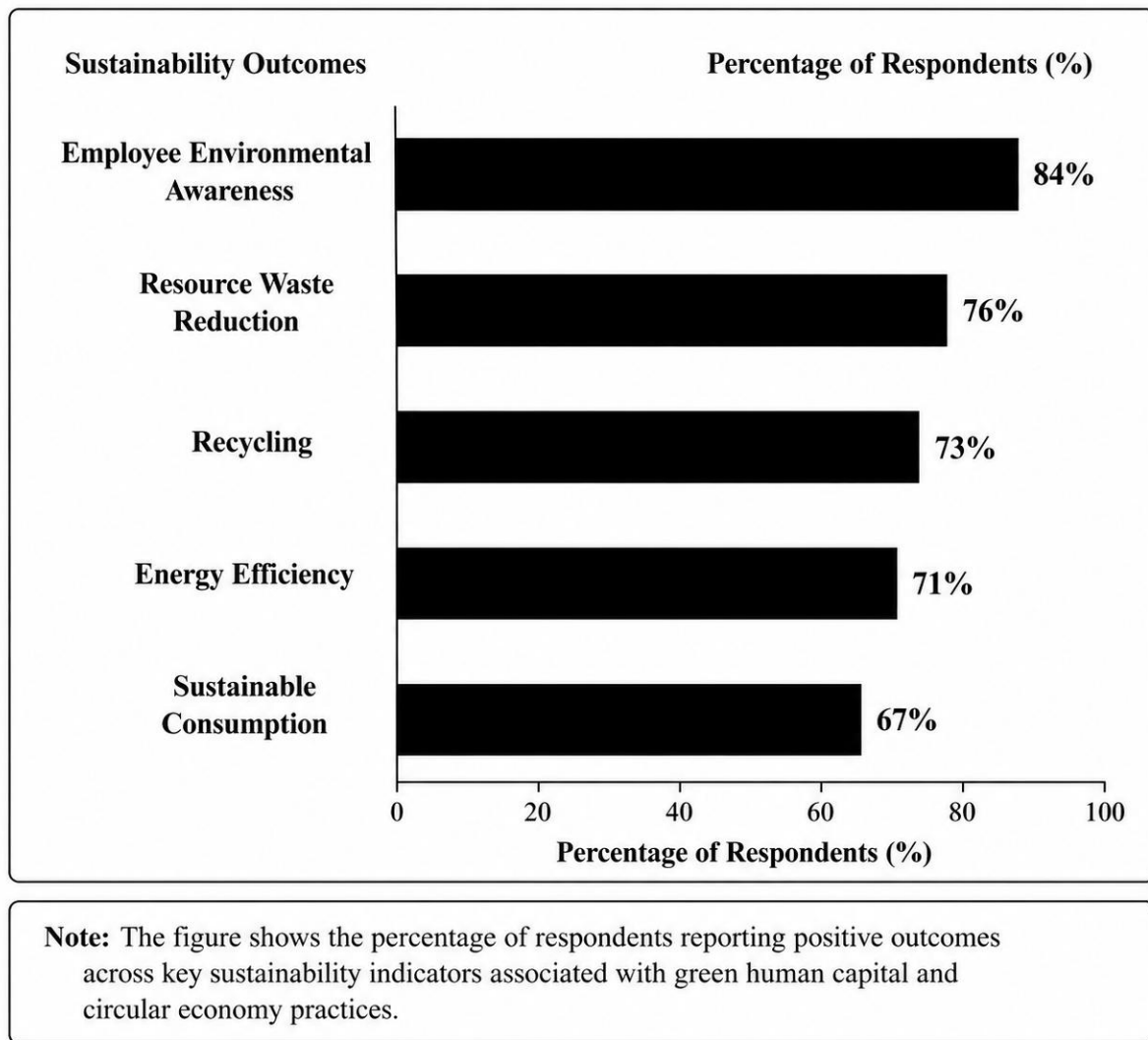


Figure 10: Sustainability Outcomes Associated with Green Human Capital and Circular Economy Practices

Employee environmental awareness emerged as the most significant outcome. This reinforces the importance of human capital development as a foundation for sustainability.

XI. DISCUSSION

The findings demonstrate that Green Human Resource Management is positively associated with green human capital development. The results support the view that HR departments can contribute to sustainability by integrating environmental objectives into recruitment, training, performance management and employee engagement. The positive relationship between green human capital and employee green behaviour suggests that environmental knowledge alone is insufficient unless employees apply their knowledge in everyday work practices. Employees who understand sustainability principles are more likely to participate in recycling, waste reduction and resource conservation. The strongest relationship observed in the study was between employee green behaviour and circular economy performance. This finding is important because circular economy strategies ultimately depend on human behaviour. For example, recycling systems will not be effective if employees do not separate waste. Energy efficient technologies will not produce maximum benefits if employees use equipment inefficiently. Similarly, sustainable production requires employees who can identify opportunities for reducing material consumption and improving resource efficiency. The findings are broadly consistent with previous empirical studies linking GHRM with circular economy and sustainable performance. Research from environmental-certified organisations has found that GHRM contributes positively to circular and organisational performance, while studies in developing-country manufacturing contexts have highlighted green human capital as a significant contributor to sustainable production and circular economy outcomes. Therefore, circular transformation should be viewed not merely as an operational change but as a process of human capability development.

XII. CONCLUSION

The transition towards a circular economy requires organisations to move beyond technological solutions and develop human capabilities that support sustainable production and consumption. This empirical study demonstrates positive relationships between Green Human Resource Management, Green Human Capital, Employee Green Behaviour and Circular Economy Performance. The results suggest that GHRM contributes to sustainability by developing environmentally knowledgeable and behaviourally committed employees.

Among the variables studied, Employee Green Behaviour demonstrated the strongest relationship with Circular Economy Performance. This indicates that employees are central actors in the implementation of circular strategies. Organisations seeking to achieve sustainable production should therefore invest in environmental training, green recruitment, employee participation and

sustainability-oriented performance management. Human capital should be recognised as a strategic resource for the transition towards a circular economy.

The study concludes that:

A circular economy cannot be achieved only by redesigning products and production systems; it must also be achieved by developing people capable of thinking, working and consuming sustainably.

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