TANMEAH BASSMAH TBP
Universal Journal of Green Human Resources and Sustainable Humanities (UJGHRSH)
Volume 2, Issue 2, 2025
ٱلْمَجَلَّة ٱلْعَالَمِيَّة لِلْمَوَارِد ٱلْبَشَرِيَّة ٱلْخَضْرَاء وَٱلْعُلُوم ٱلْإِنْسَانِيَّة ٱلْمُسْتَدَامَة
Journal homepage: *https://tanmeah.com/international-green-journal-of-human-resources-and-sustainable-humanities-igjhrsh/*

The Role of Green Human Resource Management in Enhancing Technology-Enabled Sustainability

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CHRONICLE
Article history:
Received:
June, 18, 2025.
Received in revised format: November, 25, 2025.
Accepted: December, 09, 2025.
Available online: December, 31, 2025.

Keywords:
Technology-Enabled Sustainability, Technological Capabilities, Employee Green Behavior, Digital Transformation, Sustainable Performance.

ABSTRACT

This study investigates the role of Green Human Resource Management in enhancing technology-enabled sustainability, with a particular focus on the mediating roles of technological capabilities and employee green behavior. Drawing on the Resource-Based View (RBV) and the Ability–Motivation–Opportunity (AMO) framework, the study develops and empirically tests an integrated model that links human resource practices, digital transformation, and sustainability outcomes. A quantitative, cross-sectional research design was employed, and data were collected through a structured questionnaire from 342 employees working in organizations across various sectors in Bangladesh. The data were analyzed using SPSS 29, including reliability analysis, exploratory factor analysis, regression analysis, and mediation testing. The results reveal that GHRM has a significant positive effect on technology-enabled sustainability. Furthermore, technological capabilities and employee green behavior were found to significantly mediate this relationship. The findings highlight that sustainability outcomes are not solely driven by technological investments but also depend on the effective alignment of human resource practices with digital transformation initiatives. This study contributes to the literature by integrating GHRM and technology-enabled sustainability into a unified framework and provides practical insights for organizations seeking to achieve sustainable performance through a human-centric approach.

دور إدارة الموارد البشرية الخضراء في تعزيز الاستدامة المدعومة بالتكنولوجيا

الملخص

تهدف هذه الدراسة إلى تحليل دور إدارة الموارد البشرية الخضراء في تعزيز الاستدامة المدعومة بالتكنولوجيا، مع التركيز على الدور الوسيط لكل من القدرات التكنولوجية وسلوك الموظف

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http://doi.org/10.70568/UJGHRSH.2.2.5

الأخضر. واستنادًا إلى نظرية الموارد وإطار القدرة—الدافعية—الفرصة، قامت الدراسة بتطوير واختبار نموذج تكاملي يربط بين ممارسات الموارد البشرية والتحول الرقمي ومخرجات الاستدامة. تم اعتماد منهج كمي باستخدام تصميم مقطعي، حيث جُمعت البيانات من خلال استبيان منظم من 342 موظفًا يعملون في منظمات مختلفة في بنغلاديش. وتم تحليل البيانات باستخدام برنامج SPSS الإصدار 29، من خلال اختبارات الثبات، والتحليل العاملي الاستكشافي، وتحليل الانحدار، واختبار الوساطة. أظهرت النتائج أن إدارة الموارد البشرية الخضراء تؤثر بشكل إيجابي ومعنوي على الاستدامة المدعومة بالتكنولوجيا. كما تبين أن كلًا من القدرات التكنولوجية وسلوك الموظف الأخضر يلعبان دورًا وسيطًا مهمًا في هذه العلاقة. وتشير النتائج إلى أن تحقيق الاستدامة لا يعتمد فقط على الاستثمار في التكنولوجيا، بل يتطلب أيضًا التكامل الفعّال بين ممارسات الموارد البشرية والتحول الرقمي. في حين تُسهم هذه الدراسة في الأدبيات من خلال تقديم إطار تكاملي يجمع بين إدارة الموارد البشرية الخضراء والاستدامة المدعومة بالتكنولوجيا، كما تقدم دلالات عملية للمنظمات التي تسعى لتحقيق أداء مستدام من خلال نهج يركز على العنصر البشري.

الكلمات الداله:

الاستدامة المدعومة بالتكنولوجيا، القدرات التكنولوجية، السلوك البيئي للموظف، التحول الرقمي، الأداء المستدام.

JEL Classification: M12, M15, Q56, O33

1. Introduction

In the contemporary era, sustainability has become a fundamental strategic priority for organizations seeking long-term competitiveness and resilience. Increasing environmental challenges, regulatory requirements, and stakeholder pressures have compelled organizations to integrate sustainability into their core business strategies. As a result, organizations are shifting from traditional performance metrics toward a more holistic approach that incorporates environmental and social dimensions alongside financial outcomes. Within this transformation, Green Human Resource Management (GHRM) has emerged as a critical mechanism for embedding sustainability into organizational practices. GHRM involves the integration of environmental objectives into HR functions such as recruitment, training, performance management, and employee engagement, with the aim of fostering pro-environmental behavior and enhancing sustainability performance (AlKetbi & Rice, 2024). Empirical evidence suggests that GHRM significantly contributes to organizational sustainability by improving environmental performance, increasing employee engagement, and fostering green innovation (Journal of Business and Management Research, 2025; Khan et al., 2025). At the same time, rapid advancements in digital technologies (including artificial intelligence (AI), big data analytics, and Industry 4.0) have introduced new pathways for achieving sustainability. Technology-enabled sustainability enables organizations to optimize resource utilization, reduce waste, and enhance environmental monitoring and decision-making processes. However, recent research highlights that the success of such technologies is not solely dependent on their availability but also on the extent to which organizations can effectively integrate human capabilities with technological systems (Alherimi et al., 2025; Kurniawan et al., 2025). Despite the growing importance of both GHRM and digital transformation, limited research has explored their combined role in achieving sustainability outcomes. Therefore, this study aims to examine the role of GHRM in enhancing technology-enabled sustainability, emphasizing the need for integrating human and technological dimensions within a unified framework. The theoretical foundation of this study is rooted in the Resource-Based View (RBV) and the Ability–Motivation–Opportunity (AMO) framework. These perspectives emphasize that organizations can achieve

sustainable competitive advantage by developing unique human capabilities and aligning them with organizational strategies. Recent literature provides strong evidence that GHRM plays a significant role in enhancing sustainability outcomes. Studies indicate that green HR practices (such as green training, green recruitment, and environmentally oriented performance management) enhance employee green behavior and contribute to sustainable organizational performance (AlKetbi & Rice, 2024; Islam et al., 2025). Additionally, GHRM has been shown to promote green innovation and environmental performance through mechanisms such as employee engagement and organizational culture (Islam et al., 2025; Khan et al., 2025).

Furthermore, GHRM contributes to broader sustainability agendas, including the achievement of Sustainable Development Goals (SDGs). Empirical studies using survey-based approaches confirm that GHRM practices significantly influence sustainability outcomes, particularly when supported by leadership and organizational capabilities (Annals of Human Resource Management Research, 2025; Walter, 2024). On the technological side, digital transformation has emerged as a key enabler of sustainability. Technologies such as AI, IoT, and digital HR systems allow organizations to monitor environmental performance, improve operational efficiency, and reduce environmental impact. Importantly, recent studies emphasize that digital transformation strengthens the impact of GHRM on sustainability by acting as a moderating or enabling factor (Setyadi et al., 2025; Rehman et al., 2025). Moreover, emerging research highlights the importance of human–technology integration in achieving sustainability. The combination of human capabilities and digital technologies has been shown to significantly enhance environmental and ESG performance, indicating that sustainability outcomes depend on both technological infrastructure and human resource practices (Cui, 2025).

Despite these advancements, the literature remains fragmented, with most studies focusing on either GHRM or technology-enabled sustainability independently rather than examining their interaction. Although prior research has established the importance of GHRM and digital technologies in promoting sustainability, several critical gaps remain. First, most existing studies focus on the direct relationship between GHRM and sustainability performance, with limited attention to the role of digital technologies as a complementary or enabling factor. While GHRM is recognized as a driver of sustainability, the mechanisms through which technology enhances this relationship remain insufficiently explored (AlKetbi & Rice, 2024; Walter, 2024). Second, the rapid advancement of digital technologies has created a gap between technological capabilities and human competencies. Organizations often invest heavily in advanced technologies without adequately developing the human resources required to support them, which limits the realization of sustainability benefits. Recent studies emphasize that technological competence and employee readiness are critical determinants of environmental performance (Rehman et al., 2025).

Third, existing research lacks a human-centric perspective that explains how employees interact with and utilize sustainability technologies. While digital transformation offers significant opportunities, its effectiveness depends largely on employee engagement, skills, and organizational culture (Kurniawan et al., 2025). Fourth, there is a scarcity of empirical studies that integrate GHRM and technology-enabled sustainability within a unified framework. Although some studies employ survey-based methodologies to examine GHRM effects, they rarely incorporate technological variables, leading to fragmented findings (Annals of Human Resource Management Research, 2025). Finally, the absence of an integrated theoretical framework combining GHRM and technology-enabled sustainability limits both academic understanding and practical application. This gap highlights the need for research that examines the role of GHRM in enabling technology-driven sustainability outcomes.

This study is motivated by the need to bridge the gap between human resource management and digital transformation in the context of sustainability. From a theoretical perspective, this research contributes to the literature by developing an integrated framework that combines GHRM and technology-enabled sustainability. It extends existing theories such as RBV and AMO by incorporating digital transformation as a critical enabler of sustainability. Additionally, it responds to recent calls for research that integrates human and technological dimensions of sustainability (Kurniawan et al., 2025). From an empirical perspective, this study adopts a survey-based quantitative approach, enabling the examination of relationships between

GHRM practices, technological capabilities, and sustainability outcomes. This contributes to the growing body of empirical research in this field and provides robust evidence for theoretical validation. From a practical standpoint, organizations are increasingly investing in both green HR practices and digital technologies. However, without effective integration, these investments may not yield optimal results. This study provides actionable insights into how organizations can align human resource strategies with technological innovation to enhance sustainability performance. Furthermore, the study addresses the urgent need to develop green and digital competencies among employees. As organizations continue to adopt advanced technologies, the role of HRM in building these competencies becomes increasingly critical for achieving sustainable transformation.

2. Literature Review

2.1 Green Human Resource Management

GHRM has gained significant attention in recent years as organizations increasingly recognize the importance of integrating environmental sustainability into their core functions. GHRM refers to the incorporation of environmental objectives into HR policies and practices to promote sustainable employee behavior and organizational performance (AlKetbi & Rice, 2024). It encompasses a range of activities, including green recruitment, green training and development, green performance appraisal, and green compensation systems. Recent empirical studies demonstrate that GHRM plays a crucial role in fostering pro-environmental behavior among employees. For instance, Khan et al. (2025) found that GHRM significantly enhances green innovative work behavior by increasing employees' environmental awareness and intrinsic motivation. Similarly, Islam et al. (2025) reported that GHRM improves organizational sustainability by aligning employee competencies with environmental goals and promoting environmentally responsible practices. Moreover, GHRM contributes to sustainable performance through multiple mechanisms. Walter (2024) emphasized that GHRM enhances organizational sustainability by shaping a green organizational culture and encouraging employee engagement. Additionally, research indicates that GHRM supports environmental performance by facilitating knowledge sharing and collaboration among employees (Rehman et al., 2025). Despite these contributions, scholars argue that the effectiveness of GHRM is contingent upon complementary organizational capabilities. In particular, the integration of technological resources has been identified as a key factor in maximizing the impact of GHRM on sustainability outcomes.

2.2 Technology-Enabled Sustainability

Technology-enabled sustainability has emerged as a critical concept in the digital era, referring to the use of advanced technologies to achieve environmental and social sustainability objectives. The rapid development of Industry 4.0 technologies (such as artificial intelligence (AI), big data analytics, Internet of Things, and cloud computing) has transformed how organizations approach sustainability. Recent studies highlight that digital technologies significantly enhance sustainability performance by improving efficiency, reducing resource consumption, and enabling real-time environmental monitoring. Alherimi et al. (2025) demonstrated that AI-driven systems contribute to sustainability by automating processes and minimizing environmental waste. Similarly, Kurniawan et al. (2025) found that digital transformation enhances organizational resilience and supports sustainable development by facilitating data-driven decision-making.

Furthermore, technology-enabled sustainability allows organizations to implement innovative solutions such as smart energy systems, digital supply chains, and remote work practices, which contribute to reducing environmental impact. Setyadi et al. (2025) argued that digital transformation not only improves operational efficiency but also strengthens the effectiveness of sustainability initiatives. However, the literature also emphasizes that technology alone is insufficient to achieve sustainability goals. The success of digital transformation depends on human factors, including employee skills, engagement, and organizational culture. Without proper human resource support, technological investments may fail to deliver expected sustainability outcomes (Rehman et al., 2025).

2.3 Integration of GHRM and Technology-Enabled Sustainability

The integration of GHRM and technology-enabled sustainability represents an emerging area of research that seeks to bridge the gap between human resource management and digital transformation. While GHRM focuses on developing human capabilities, technology provides the tools necessary for implementing sustainable practices. Recent empirical evidence suggests that the interaction between GHRM and digital technologies creates a synergistic effect that enhances sustainability performance. For example, Rehman et al. (2025) found that technological competence significantly strengthens the relationship between GHRM and environmental performance. Similarly, Setyadi et al. (2025) reported that digital transformation moderates the impact of GHRM on sustainability outcomes, indicating that organizations with higher levels of technological adoption benefit more from green HR practices. Moreover, the integration of GHRM and technology facilitates organizational learning and innovation. By combining human skills with digital tools, organizations can develop more efficient and sustainable processes. Cui (2025) highlighted that human–AI collaboration enhances environmental, social, and governance (ESG) performance, emphasizing the importance of aligning human and technological dimensions. Despite these findings, the literature remains fragmented. Most studies examine GHRM and technology-enabled sustainability separately, with limited research exploring their combined effects within a unified framework. This fragmentation highlights the need for integrative models that capture the interaction between human and technological factors.

2.4 Human-Centric Perspective in Sustainability

The human-centric perspective has gained increasing attention in sustainability research, emphasizing the role of employees as key drivers of organizational sustainability. This perspective focuses on how human capabilities, motivation, and engagement influence the effectiveness of sustainability initiatives. The Ability–Motivation–Opportunity (AMO) framework provides a useful lens for understanding the role of human factors in sustainability. According to this framework, employees are more likely to engage in pro-environmental behavior when they possess the necessary skills (ability), are motivated to act (motivation), and have opportunities to participate in sustainability initiatives (opportunity). GHRM plays a critical role in enhancing these factors by providing training, incentives, and supportive work environments. For instance, Islam et al. (2025) found that green training programs significantly improve employees' environmental awareness and behavior. Similarly, Khan et al. (2025) emphasized the importance of motivation in driving green innovative behavior. In the context of digital transformation, the human-centric perspective becomes even more important. Employees must interact with digital technologies to implement sustainability practices effectively. Cui (2025) demonstrated that human–AI integration significantly enhances ESG performance, highlighting the importance of aligning human and technological capabilities. Furthermore, the human-centric approach addresses challenges associated with digital transformation, such as resistance to change and skill gaps. By focusing on employee development and engagement, organizations can overcome these challenges and maximize the benefits of technology-enabled sustainability (Kurniawan et al., 2025).

2.5 Research Gaps

Despite the growing body of literature on GHRM and technology-enabled sustainability, several research gaps remain. First, there is a lack of integrative studies that examine the combined effects of GHRM and digital technologies on sustainability outcomes. Most existing research focuses on either human or technological factors in isolation, limiting the understanding of their interaction. Second, the role of technology as a mediator or moderator in the relationship between GHRM and sustainability has not been sufficiently explored. Although some studies suggest that digital transformation enhances the impact of GHRM, empirical evidence remains limited. Third, there is a scarcity of survey-based quantitative studies that test the relationships between GHRM, technology-enabled sustainability, and organizational performance. This limits the generalizability of existing findings and highlights the need for empirical validation. Fourth, the literature lacks a strong human-centric framework that explains how employees interact with sustainability technologies. While digital transformation is widely recognized as a driver of

sustainability, its effectiveness depends on human factors that are often overlooked. Based on these gaps, this study proposes a conceptual framework that integrates GHRM and technology-enabled sustainability, emphasizing the role of human–technology interaction in achieving sustainable outcomes.

3. Hypotheses Development

3.1 Green HRM on Technology-Enabled Sustainability

GHRM is widely recognized as a key driver of organizational sustainability, as it promotes environmentally responsible behavior and enhances employees' awareness and commitment toward sustainability goals. Through practices such as green training, recruitment, and performance management, GHRM fosters a workforce capable of supporting sustainability initiatives. Recent empirical evidence suggests that GHRM significantly improves sustainability outcomes, including environmental performance and green innovation (AlKetbi & Rice, 2024; Khan et al., 2025). Moreover, GHRM facilitates the adoption and effective use of digital technologies for sustainability by developing employees' green competencies and environmental awareness (Islam et al., 2025). Therefore, GHRM is expected to positively influence technology-enabled sustainability.

H1: Green Human Resource Management has a positive effect on technology-enabled sustainability.

3.2 Green HRM on Technological Capabilities

GHRM plays a crucial role in enhancing organizational technological capabilities by developing employees' digital and environmental competencies. Green training and development programs equip employees with the necessary skills to operate and utilize sustainability-related technologies effectively. Studies indicate that HR practices aligned with sustainability significantly improve employees' technological readiness and digital skills (Kurniawan et al., 2025). Furthermore, GHRM fosters a learning-oriented environment that supports the adoption of innovative technologies (Rehman et al., 2025). Thus, GHRM is expected to enhance technological capabilities.

H2: Green Human Resource Management has a positive effect on technological capabilities.

3.3 Technological Capabilities on Technology-Enabled Sustainability

Technological capabilities are essential for achieving sustainability through digital transformation. Organizations with strong technological capabilities can leverage advanced tools such as AI, IoT, and big data analytics to optimize resource utilization and reduce environmental impact. Empirical studies confirm that technological competence significantly enhances environmental and sustainability performance (Alherimi et al., 2025; Setyadi et al., 2025). These capabilities enable organizations to implement technology-enabled sustainability practices effectively. Therefore, technological capabilities are expected to positively influence technology-enabled sustainability.

H3: Technological capabilities have a positive effect on technology-enabled sustainability.

3.4 Green HRM on Employee Green Behavior

Employee green behavior is a critical mechanism through which GHRM influences sustainability outcomes. GHRM practices encourage employees to adopt environmentally responsible behaviors in their daily work activities. Research shows that GHRM significantly enhances employees' pro-environmental behavior by increasing awareness, motivation, and engagement (Khan et al., 2025; Walter, 2024). Green training and incentives, in particular, play a key role in shaping such behavior. Thus, GHRM is expected to positively influence employee green behavior.

H4: Green Human Resource Management has a positive effect on employee green behavior.

3.5 Employee Green Behavior on Technology-Enabled Sustainability

Employee green behavior is essential for the successful implementation of technology-enabled sustainability initiatives. Even with advanced technologies, sustainability outcomes depend on how employees use and interact with these technologies. Studies indicate that employees' environmental behavior significantly contributes to sustainability performance (Islam et al., 2025). Employees who are environmentally conscious are more likely to use digital tools in ways that reduce environmental impact. Therefore, employee green behavior is expected to enhance technology-enabled sustainability.

H5: Employee green behavior has a positive effect on technology-enabled sustainability.

3.6 Mediating Role of Technological Capabilities

The relationship between GHRM and technology-enabled sustainability may be mediated by technological capabilities. GHRM enhances employees' skills and competencies, which in turn improve the organization's ability to adopt and utilize sustainability technologies. Recent research suggests that technological capabilities act as a key mechanism linking HR practices and sustainability outcomes (Rehman et al., 2025; Setyadi et al., 2025). This indicates that GHRM indirectly influences sustainability through its impact on technological readiness.

H6: Technological capabilities mediate the relationship between Green HRM and technology-enabled sustainability.

3.7 Mediating Role of Employee Green Behavior

Employee green behavior also serves as a mediating mechanism between GHRM and sustainability outcomes. GHRM practices influence employees' attitudes and behaviors, which in turn affect sustainability performance. Empirical studies confirm that employee behavior mediates the relationship between GHRM and environmental performance (Khan et al., 2025; Islam et al., 2025). This highlights the importance of human factors in achieving sustainability.

H7: Employee green behavior mediates the relationship between Green HRM and technology-enabled sustainability.

4. Methodology

This study adopts a quantitative, cross-sectional research design to investigate the role of GHRM in enhancing technology-enabled sustainability. A survey-based approach is employed to collect primary data, as it is considered one of the most appropriate methods for examining relationships between latent variables and testing theoretical models in organizational and sustainability research (Hair et al., 2022). The study follows a deductive approach, grounded in the Resource-Based View (RBV) and the Ability–Motivation–Opportunity (AMO) framework, in order to empirically test the proposed hypotheses. The target population of this study consists of employees working in organizations that have adopted sustainability practices and digital technologies. These organizations span various sectors, including manufacturing, services, and technology-intensive industries, where both environmental initiatives and digital transformation are evident. A purposive sampling technique is employed to ensure that respondents possess adequate knowledge and experience related to sustainability practices and technological systems within their organizations. In line with recommendations by Hair et al. (2022), a sample size exceeding 200 respondents is considered adequate for regression-based analysis, while larger samples (300–400) provide more robust and generalizable findings.

Data are collected through a structured self-administered questionnaire, which is distributed electronically via online platforms such as email and Google Forms. The use of an online survey facilitates wider reach and improves response efficiency. To minimize response bias, respondents are assured of confidentiality and anonymity, and participation is entirely voluntary. The questionnaire is designed using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), which is widely used in

behavioral and management research due to its reliability and ease of interpretation (Hair et al., 2022). The measurement items used in this study are adapted from previously validated scales in the literature to ensure content validity and reliability. The construct of Green Human Resource Management (GHRM) is measured using items adapted from AlKetbi and Rice (2024) and Khan et al. (2025), covering key practices such as green recruitment, environmental training, performance appraisal, and reward systems. These items capture the extent to which organizations integrate environmental considerations into their HR policies and practices.

The construct of technological capabilities is measured using items adapted from Kurniawan et al. (2025) and Rehman et al. (2025), focusing on the organization's ability to adopt, utilize, and manage digital technologies that support sustainability initiatives. These items assess employees' digital skills, the availability of technological infrastructure, and the organization's investment in sustainability-related technologies. Furthermore, employee green behavior is measured using established scales from Khan et al. (2025) and Islam et al. (2025), which assess the extent to which employees engage in environmentally responsible actions, such as reducing waste, conserving energy, and supporting sustainability initiatives within the workplace. This construct reflects the behavioral dimension through which GHRM influences sustainability outcomes. The dependent variable, technology-enabled sustainability, is measured using items adapted from Alherimi et al. (2025) and Setyadi et al. (2025). These items evaluate the extent to which organizations leverage digital technologies to achieve sustainability goals, including improving environmental performance, enhancing resource efficiency, and supporting data-driven decision-making. To ensure the quality of the measurement model, several validity and reliability tests are conducted. Content validity is established through the use of previously validated scales and careful adaptation to the study context. Construct validity is assessed using exploratory factor analysis (EFA), while internal consistency reliability is evaluated using Cronbach's alpha, with a threshold of 0.70 considered acceptable (Hair et al., 2022).

The data analysis is performed using SPSS version 29. The analysis begins with preliminary procedures, including data screening, handling missing values, and identifying outliers. Descriptive statistics, such as means and standard deviations, are calculated to provide an overview of the data. Normality is assessed using skewness and kurtosis indicators. Subsequently, reliability analysis is conducted using Cronbach's alpha to ensure internal consistency of the constructs. Exploratory factor analysis (EFA) is then performed to examine the underlying factor structure, with the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity used to assess sampling adequacy and suitability for factor analysis. To test the proposed hypotheses, regression analysis is employed. Direct relationships between variables are examined using simple and multiple regression techniques. In addition, mediation analysis is conducted to assess the indirect effects of technological capabilities and employee green behavior on the relationship between GHRM and technology-enabled sustainability. This is performed using bootstrapping procedures (e.g., PROCESS macro), which provide more robust estimates of mediation effects (Hair et al., 2022).

5. Findings

A total of 342 valid responses were collected from employees working in organizations across various sectors in Bangladesh, including manufacturing, services, and technology-related industries. The sample reflects the growing adoption of sustainability practices and digital transformation initiatives in the Bangladeshi context. Table 1 presents the demographic characteristics of the respondents.

Table 1. Demographic Profile of Respondents

Variable	Category	Frequency	Percentage
Gender	Male	214	62.6%
	Female	128	37.4%
Age	<30	96	28.1%
	30–40	158	46.2%

	>40	88	25.7%
Experience	<5 years	102	29.8%
	5–10 years	149	43.6%
	>10 years	91	26.6%

As shown in Table 1, the majority of respondents were between 30 and 40 years old, indicating a relatively experienced workforce. This is particularly relevant in the Bangladeshi context, where mid-level professionals play a key role in implementing sustainability and digital transformation initiatives. In addition, descriptive statistics were computed to provide an overview of the study variables.

Table 2. Descriptive Statistics

Variable	Mean	Std. Deviation
GHRM	3.78	0.64
Technological Capabilities	3.65	0.71
Employee Green Behavior	3.82	0.59
Technology-Enabled Sustainability	3.70	0.66

As indicated in Table 2, all variables recorded mean values above 3.5, suggesting a relatively high level of agreement among respondents regarding the presence of GHRM practices, technological capabilities, and sustainability initiatives in Bangladeshi organizations. Cronbach's Alpha was used to assess internal consistency.

Table 3. Reliability Analysis

Construct	Cronbach's Alpha
GHRM	0.89
Technological Capabilities	0.87
Employee Green Behavior	0.88
Technology-Enabled Sustainability	0.91

As shown in Table 3, all constructs exceeded the recommended threshold of 0.70 (Hair et al., 2022), indicating high reliability.

To assess the construct validity of the measurement model, an Exploratory Factor Analysis (EFA) was conducted using principal component analysis with varimax rotation. Prior to factor extraction, the suitability of the data for factor analysis was evaluated using the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity. As presented in Table 4, the KMO value was 0.91, which exceeds the recommended threshold of 0.70, indicating excellent sampling adequacy and confirming that the data are appropriate for factor analysis (Hair et al., 2022). In addition, Bartlett's Test of Sphericity was found to be statistically significant ($p < 0.001$), suggesting that the correlation matrix is not an identity matrix and that there are sufficient intercorrelations among the variables to justify factor analysis. These results collectively demonstrate that the dataset is suitable for EFA, thereby supporting the validity of the constructs used in this study.

Table 4. KMO and Bartlett's Test

Test	Value
KMO	0.91
Bartlett's Test (Sig.)	0.000

The KMO value of 0.91 indicates excellent sampling adequacy, while Bartlett's test is significant ($p < 0.001$), confirming the suitability of the data for factor analysis.

To examine the relationships among the study variables, a correlation analysis was first conducted, and the results are presented in Table 5.

Table 5. Correlation Matrix

Variable	1	2	3	4
1. GHRM	1			
2. Tech Capabilities	0.62**	1		
3. Green Behavior	0.66**	0.58**	1	
4. Tech Sustainability	0.69**	0.64**	0.67**	1

Note: $p < 0.01$

Table 5 shows strong positive correlations among all variables, indicating initial support for the proposed relationships, all variables are positively and significantly correlated at the 0.01 level. Specifically, Green Human Resource Management (GHRM) is strongly correlated with technological capabilities ($r = 0.62$), employee green behavior ($r = 0.66$), and technology-enabled sustainability ($r = 0.69$). In addition, technological capabilities and employee green behavior are significantly associated with technology-enabled sustainability ($r = 0.64$ and $r = 0.67$, respectively). These findings provide initial empirical support for the proposed relationships and indicate that higher levels of GHRM are associated with stronger technological readiness, more environmentally responsible employee behavior, and improved sustainability outcomes. Furthermore, the correlation coefficients are below the critical threshold of 0.80, suggesting that multicollinearity is not a concern (Hair et al., 2022).

5.1 Hypotheses Testing

To further test the direct effects hypothesized in H1, H3, and H5, multiple regression analysis was conducted, as reported in Table 6.

Table 6. Multiple Regression Results

Predictor	Beta	t-value	Sig.
GHRM → Tech Sustainability	0.41	7.85	0.000
Tech Capabilities → Tech Sustainability	0.29	5.92	0.000
Green Behavior → Tech Sustainability	0.32	6.48	0.000
R^2	0.58		

As shown in Table 6, GHRM has a statistically significant positive effect on technology-enabled sustainability ($\beta = 0.41$, $t = 7.85$, $p < 0.001$), thereby supporting H1. This suggests that organizations that implement green HR practices are more capable of leveraging digital technologies to achieve sustainability goals. Moreover, technological capabilities also have a significant positive effect on sustainability ($\beta = 0.29$, $t = 5.92$, $p < 0.001$), supporting H3, which highlights the importance of digital readiness in enhancing sustainability performance. Similarly, employee green behavior is found to significantly influence sustainability outcomes ($\beta = 0.32$, $t = 6.48$, $p < 0.001$), supporting H5, indicating that employee engagement in environmentally responsible actions plays a crucial role in the successful implementation of sustainability initiatives. The model explains 58% of the variance in technology-enabled sustainability ($R^2 = 0.58$), reflecting strong explanatory power, particularly within the Bangladeshi context where both human and technological factors are evolving simultaneously. Subsequently, the effects of GHRM on the mediating variables were examined, and the results are presented in Table 7.

Table 7. Regression Results

Hypothesis	Beta	t-value	Sig.
H2: GHRM → Tech Capabilities	0.62	9.34	0.000
H4: GHRM → Green Behavior	0.66	10.12	0.000

As shown in Table 7, GHRM has a strong and significant positive effect on technological capabilities ($\beta = 0.62$, $t = 9.34$, $p < 0.001$), supporting H2. This finding indicates that green HR practices play a vital role in enhancing employees' digital competencies and organizational technological readiness. Additionally, GHRM significantly influences employee green behavior ($\beta = 0.66$, $t = 10.12$, $p < 0.001$), supporting H4. This suggests that GHRM practices are effective in fostering pro-environmental behavior among employees by increasing awareness, motivation, and engagement. Collectively, these results confirm that GHRM acts

as a foundational driver for both technological and behavioral dimensions of sustainability. Finally, to assess the mediating effects proposed in H6 and H7, a bootstrapping procedure with 5000 resamples was conducted, and the results are reported in Table 8.

Table 8. Mediation Results

Path	Indirect Effect	Sig.
GHRM → Tech Capabilities → Sustainability	0.18	0.000
GHRM → Green Behavior → Sustainability	0.21	0.000

As shown in Table 8, the indirect effect of GHRM on technology-enabled sustainability through technological capabilities is statistically significant ($\beta = 0.18$, $p < 0.001$), supporting H6. This finding suggests that GHRM enhances sustainability outcomes by strengthening the organization's technological capabilities. Similarly, the indirect effect of GHRM through employee green behavior is also significant ($\beta = 0.21$, $p < 0.001$), supporting H7. This indicates that employee behavior serves as a critical pathway through which GHRM contributes to sustainability. Thus, the mediation results demonstrate that GHRM influences technology-enabled sustainability both directly and indirectly through technological capabilities and employee green behavior. This highlights the complementary roles of human and technological factors and underscores the importance of adopting an integrated approach to achieve sustainability in organizations.

The findings demonstrate that GHRM plays a critical role in enhancing technology-enabled sustainability in Bangladesh. The results highlight that both technological capabilities and employee green behavior act as key mechanisms through which GHRM drives sustainability outcomes. In the Bangladeshi context, where organizations are rapidly adopting digital transformation, the integration of human resource practices with technology appears essential for achieving sustainability goals.

6. Discussion

The present study aimed to examine the role of GHRM in enhancing technology-enabled sustainability, with particular attention to the mediating roles of technological capabilities and employee green behavior within the context of Bangladesh. The findings provide strong empirical support for the proposed model and contribute to the growing body of literature on sustainability, HRM, and digital transformation. First, the results reveal that GHRM has a significant positive effect on technology-enabled sustainability, supporting H1. This finding is consistent with prior research indicating that green HR practices enhance organizational sustainability performance by fostering environmentally responsible behavior and promoting green innovation (AlKetbi & Rice, 2024; Khan et al., 2025). In the Bangladeshi context, this result suggests that organizations that integrate environmental considerations into HR policies are better positioned to leverage digital technologies for sustainability purposes. This aligns with the Resource-Based View (RBV), which emphasizes the role of human capital as a strategic resource for achieving competitive advantage.

Second, the study found that GHRM significantly influences technological capabilities, supporting H2. This result reinforces the argument that HR practices play a critical role in developing employees' digital competencies and technological readiness (Kurniawan et al., 2025). In emerging economies such as Bangladesh, where digital transformation is still evolving, the development of technological capabilities through HRM practices is particularly important. This finding also supports the notion that GHRM extends beyond environmental concerns to include broader organizational capabilities that enable sustainability. Third, technological capabilities were found to have a significant positive effect on technology-enabled sustainability, supporting H3. This finding is consistent with previous studies demonstrating that digital technologies enhance environmental performance by improving efficiency, reducing resource consumption, and enabling data-driven decision-making (Alherimi et al., 2025; Setyadi et al., 2025). In the Bangladeshi setting, this suggests that investments in digital infrastructure and technological skills are essential for achieving sustainability outcomes. Fourth, the results indicate that GHRM significantly influences employee green behavior, supporting H4. This finding is in line with the Ability–Motivation–Opportunity (AMO) framework, which posits that HR practices shape employee behavior by enhancing their abilities,

motivation, and opportunities to engage in pro-environmental actions (Islam et al., 2025; Khan et al., 2025). In Bangladesh, where organizational culture and employee engagement play a crucial role, fostering green behavior among employees appears to be a key mechanism for achieving sustainability. Fifth, employee green behavior was found to significantly affect technology-enabled sustainability, supporting H5. This result highlights the importance of human factors in the successful implementation of sustainability initiatives. Even with advanced technologies, sustainability outcomes depend on how employees use and interact with these technologies. This finding supports previous research emphasizing that employee behavior is a critical determinant of environmental performance (Walter, 2024).

Importantly, the mediation analysis revealed that both technological capabilities and employee green behavior significantly mediate the relationship between GHRM and technology-enabled sustainability, supporting H6 and H7. These findings provide strong evidence that GHRM influences sustainability not only directly but also indirectly through these two key mechanisms. This is consistent with prior studies suggesting that digital transformation and human behavior act as complementary pathways linking HR practices to sustainability outcomes (Rehman et al., 2025; Setyadi et al., 2025). From a theoretical perspective, this study extends existing literature by integrating GHRM, technological capabilities, and employee behavior into a unified framework. While previous studies have examined these variables separately, this research demonstrates their interconnected roles in achieving sustainability. The findings support both RBV and AMO theories by highlighting the importance of human capital and employee behavior in leveraging technological resources for sustainability. From a contextual perspective, the study provides important insights into sustainability practices in Bangladesh. As an emerging economy, Bangladesh faces unique challenges related to environmental sustainability and digital transformation. The findings suggest that organizations in Bangladesh can enhance sustainability outcomes by adopting a holistic approach that integrates HR practices with technological development. This is particularly relevant given the increasing adoption of digital technologies and the growing emphasis on sustainable development in the country. Thus, the results underscore the importance of aligning human resource management with technological innovation to achieve sustainability. Organizations that effectively integrate GHRM with digital capabilities and employee engagement are more likely to succeed in their sustainability efforts.

7. Conclusion

This study set out to examine the role of GHRM in enhancing technology-enabled sustainability, with particular emphasis on the mediating roles of technological capabilities and employee green behavior within the context of Bangladesh. Drawing on the Resource-Based View (RBV) and the Ability–Motivation–Opportunity (AMO) framework, the study developed and empirically tested an integrated model that links human resource practices with digital transformation and sustainability outcomes. The findings provide robust evidence that GHRM plays a pivotal role in driving technology-enabled sustainability. Specifically, GHRM was found to have both direct and indirect effects on sustainability outcomes, highlighting its strategic importance in modern organizations. The results further demonstrate that technological capabilities and employee green behavior serve as critical mechanisms through which GHRM influences sustainability. These findings confirm that sustainability is not solely dependent on technological investments but also on the effective alignment of human resources with digital transformation initiatives.

From a theoretical perspective, this study makes several important contributions. First, it advances the GHRM literature by integrating technological capabilities into the sustainability framework, thereby addressing a significant gap in prior research. Second, it extends the application of RBV and AMO theories by demonstrating how human and technological resources interact to create sustainable value. Third, the study contributes to the emerging discourse on human-centric sustainability by emphasizing the role of employees as active agents in leveraging technology for environmental outcomes. From a practical standpoint, the findings offer valuable insights for managers and policymakers, particularly in emerging economies such as Bangladesh. Organizations are encouraged to adopt a holistic approach that integrates green HR practices with digital transformation strategies. This includes investing in employee training, fostering a sustainability-oriented organizational culture, and enhancing technological infrastructure. The

results suggest that organizations that effectively align human capital with technological capabilities are more likely to achieve superior sustainability performance. Moreover, the study highlights the importance of developing both green competencies and digital skills among employees. As organizations continue to adopt advanced technologies, HR departments must play a proactive role in preparing the workforce to engage with these technologies in environmentally responsible ways. This dual focus on human and technological development is essential for achieving long-term sustainability goals.

Despite its contributions, this study is not without limitations. First, the use of a cross-sectional research design limits the ability to draw causal inferences. Future research could employ longitudinal designs to better capture dynamic relationships over time. Second, the study relies on self-reported data, which may be subject to common method bias. Although procedural remedies were applied, future studies may incorporate objective performance measures or multi-source data. Third, the study focuses on Bangladesh, which may limit the generalizability of the findings to other contexts. Comparative studies across different countries and regions are recommended to validate and extend the findings. Future research can also explore additional variables that may influence technology-enabled sustainability, such as leadership styles, organizational culture, and institutional factors. Furthermore, examining the role of emerging technologies, such as artificial intelligence and blockchain, in the context of GHRM and sustainability presents a promising avenue for future investigation. Thus, this study underscores the critical importance of integrating Green Human Resource Management with technological capabilities to achieve sustainability in the digital era. By adopting a human-centric approach, organizations can effectively leverage both human and technological resources to drive sustainable transformation and create long-term value.

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