



Vol. 2 No. 3 (October) (2024)

Integrating Entrepreneurship, Green HRM, and Innovation for Sustainable Performance in E-Business: Insights from Pakistan

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Abstract

This study examines the relationship between sustainable performance in e-business organizations and innovation, entrepreneurship, and green human resource management (HRM). The findings demonstrate the beneficial effects of green HRM, entrepreneurship, and innovation on sustainable performance. The largest impact is attributed to entrepreneurship, which is followed by innovation and green HRM. For long-term success, these findings emphasize how critical it is to foster an entrepreneurial culture, embrace cutting-edge procedures, and put green HRM ideas into reality. By demonstrating how these elements interact to affect sustainable performance, the study advances previous research by utilizing data from Pakistani e-business enterprises. The implications suggest that managers should enhance entrepreneurial activities, foster innovation, and apply green HRM practices to achieve sustainable performance. Policymakers should also support these practices in the digital economy. Further research is needed to understand how these elements work together in different contexts and industries.

Keywords: Entrepreneur; innovation; green HRM; (E-Business Firms; Startups) sustainable performance

Introduction

In today's fast-changing digital world, e-business firms need to stay competitive and sustainable. This study looks at how entrepreneurship, innovation, and green human resource management (HRM) help these firms achieve long-term success. By understanding how these three areas work together, we can find ways to help e-businesses thrive.

Background of the Study

Entrepreneurship, innovation, and green HRM are crucial for the success of any organization. Entrepreneurship encourages a proactive and risk-taking attitude, which helps businesses find and take advantage of new opportunities. Innovation allows firms to create new products and services, keeping them competitive.



Vol. 2 No. 3 (October) (2024)

Green HRM involves making HR practices environmentally friendly, promoting eco-friendly behaviors among employees. Together, these factors contribute to sustainable performance, which includes economic, social, and environmental aspects.

Problem Statement

While we know that entrepreneurship, innovation, and green HRM are important, there's not much research on how they work together to improve the sustainability of e-business firms. Most studies look at these factors separately. This study aims to fill that gap by exploring their combined impact on e-business firms in Pakistan.

GAP Analysis

Most research has looked at the individual impacts of Entrepreneurship, Innovation, and GHRM on company performance. However, there is little research on their combined impact, especially in e-business firms. This study will look at how these three areas work together to improve sustainability in e-businesses, providing a complete picture of their influence.

Research Objectives

- To see how entrepreneurship affects the sustainable performance of e-business firms.
- To understand the role of innovation in improving sustainable performance in e-business firms.
- To examine how green HRM practices influence sustainable performance in e-business firms.
- To analyze the combined effect of Entrepreneurship, Innovation, and GHRM on Sustainable Performance in e-business enterprises.

Research Questions

Entrepreneurship

1. How does being proactive and taking initiative improve the firm's performance?
2. How does the firm assess the risks of new opportunities?
3. How does the firm encourage employee empowerment?

Innovation

1. How willing is the firm to make big changes?
2. How quickly does the firm adopt new creative ideas from workers?
3. How does the company encourage its staff to implement novel techniques?

Green HRM

1. How does the firm attract people with green skills and competencies?
2. How do training programs encourage employees to adopt environmentally friendly behaviors?
3. How does the firm reward good environmental performance by employees, both financially and non-financially?

Sustainable Performance



Vol. 2 No. 3 (October) (2024)

1. How does the firm work to increase its market share?
2. What guidelines does the company follow to reduce harm to natural resources?
3. In what ways does the company assist the community at large?

Significance of the Study

The combined effects of innovation, entrepreneurship, and Green HRM impact on e-business enterprises' long-term success are discussed in-depth in this paper. The study's findings will help managers create strategies to improve sustainability in these three areas. Policymakers can also utilize this information to assist initiatives that encourage entrepreneurship, innovation, and environmentally friendly human resource management in the digital economy. Understanding these relationships can help e-business enterprises better prepare for long-term growth and competition.

Literature Review

The literature study investigates how, in organizational contexts, green human resource management (HRM), entrepreneurship, innovation, and sustainable performance interact. This chapter summarizes case examples, theoretical frameworks, and empirical research to clarify how they all work together to promote organizational success and sustainability.

Sustainable Performance

Sustainable performance encompasses a firm's ability to achieve economic, environmental, and social goals concurrently (Henri & Journeault, 2008). It requires balancing financial profitability with environmental stewardship and social responsibility (OECD, 2006). Angeloska-Dichovska and Petkovska-Mirchevska (2016) emphasize the significance of integrating these dimensions to create long-term value for stakeholders. Evaluating sustainable performance involves measuring indicators such as economic growth, environmental conservation, and social equity, providing a comprehensive view of organizational success.

Entrepreneurship and Sustainable Performance

Through encouraging innovation, taking calculated risks, and using proactive tactics, entrepreneurship plays a critical role in promoting sustainable performance (Miles et al., 2013; Al-Awlaqi et al., 2018). In addition to tackling social and environmental issues, it helps organizations to recognize and seize possibilities that support economic growth (Ambad & Abdul Wahab, 2017). Innovative techniques enable entrepreneurial organizations to generate sustained value by utilizing their adaptability in dynamic surroundings (Schermerhorn & Bachrach, 2015). Research indicates that entrepreneurship has a significant role in fostering organizational resilience and competitive advantage. Studies (Fazal et al., 2022; Le et al., 2022) support this relationship.

Innovation as a Catalyst for Sustainability

Enhancing sustainable performance is a key function of innovation, which is defined as the development and use of new concepts, goods, or procedures (B.R. Barringer & Ireland, 2016; H. Zhao et al., 2010). It propels ongoing



Vol. 2 No. 3 (October) (2024)

breakthroughs in environmental efficiency and market competitiveness and can take many different forms, from little adjustments to significant transformations (Ceylan, 2013). Eco-friendly technologies, resource-efficient procedures, and socially conscious business models are examples of innovations in sustainability that support environmental preservation as well as financial success. Integration of innovative capabilities is still necessary to achieve unique and long-lasting organizational outcomes, even in the face of conflicting empirical results about the relationship between innovation and performance (Abiodun, 2017).

Green Human Resource Management (HRM): Integrating Sustainability

Green HRM integrates environmental considerations into HR practices, fostering a culture of sustainability within organizations (Arulrajah et al., 2016; Wulandari & Nawangsari, 2021). It encompasses initiatives such as green recruitment, training, and performance management aimed at enhancing environmental performance and employee engagement (Zaid et al., 2018; Mousa & Othman, 2020). Green HRM practices not only support environmental objectives but also contribute to overall organizational success by promoting workforce morale, job satisfaction, and retention rates (Kianto et al., 2017; Hong et al., 2019). The alignment of HR strategies with sustainability goals enhances organizational resilience and fosters a proactive approach to environmental stewardship.

Integration of Entrepreneurship, Innovation, and Green HRM

A comprehensive strategy for attaining sustainable performance in businesses is presented by the convergence of EN, IN, and GHRM (F. Zhao, 2005). Sustainable enterprise practices require an environment of innovation and risk-taking, which is fostered by entrepreneurial endeavors. Innovation is the engine that propels the development of environmentally friendly goods, services, and procedures that support environmental goals and improve organizational sustainability (B.R. Barringer & Ireland, 2016; Ceylan, 2013). By fostering an eco-aware workforce and putting systems in place that reduce ecological footprints, green HRM aids in these initiatives (Arulrajah et al., 2016; Wulandari & Nawangsari, 2021). When combined, these components promote a sustainable culture that positions businesses for long-term success in a cutthroat international market.

Empirical Insights and Comparative Analysis

Empirical studies and comparative analyses provide valuable insights into the combined impact of ENP, IN, and GHRM on SP (Soomro et al., 2022; Ho et al., 2022). Soomro et al. (2022) explore the role of Green Entrepreneurship in promoting sustainable development through innovative business models, highlighting its potential to drive environmental sustainability and economic growth. Ho et al. (2022) analyze the relationship between Strategic HRM, entrepreneurial orientation, and dynamic capabilities, illustrating how strategic alignment enhances organizational agility and innovation capabilities in SMEs.

Challenges and Future Directions

When implementing entrepreneurship, innovation, and green HRM practices, organizations face obstacles such as resource constraints, cultural hurdles, and regulatory restrictions (Iram et al., 2022; Kara & Edinsel, 2022). Supportive



Vol. 2 No. 3 (October) (2024)

legislative frameworks, organizational dedication to sustainability programs, and creative approaches to removing adoption hurdles are necessary to address these issues (Iram et al., 2022; Kara & Edinsel, 2022). In order to find new insights and best practices for promoting sustainability through integrated HRM and innovation strategies, future research should concentrate on examining these dynamics across a variety of sectors and geographical situations.

This literature analysis concludes by summarizing the most recent findings on innovation, entrepreneurship, and green HRM and emphasizing how these areas of study together affect an organization's ability to perform sustainably. This review offers a thorough knowledge of how these components support social responsibility, economic prosperity, and environmental protection by combining empirical data, theoretical frameworks, and case studies. In a dynamic global context, entrepreneurship, innovation, and green HRM combined create a sustainable culture that gives firms a competitive edge and long-term success. To improve our understanding of and ability to implement sustainable company management practices, future research should keep examining these interdependencies.

Conceptual Model and Hypothesis

This chapter presents the conceptual model and hypotheses developed for this study. Based on the literature review, we propose a model that explores the relationships between entrepreneurship, green HRM, innovation, and sustainable performance. The model aims to provide a comprehensive understanding of how these variables interact and influence sustainable performance in e-business firms.

Conceptual Model

The conceptual model integrates three independent variables (IVs)—Entrepreneurship (EN), GHR Management (GH), and Innovation (IN)—with the dependent variable (DV), Sustainable Performance (SP). The model also incorporates mediation analysis to examine the intermediary role of innovation between the independent variables and sustainable performance.

Hypothesis Development

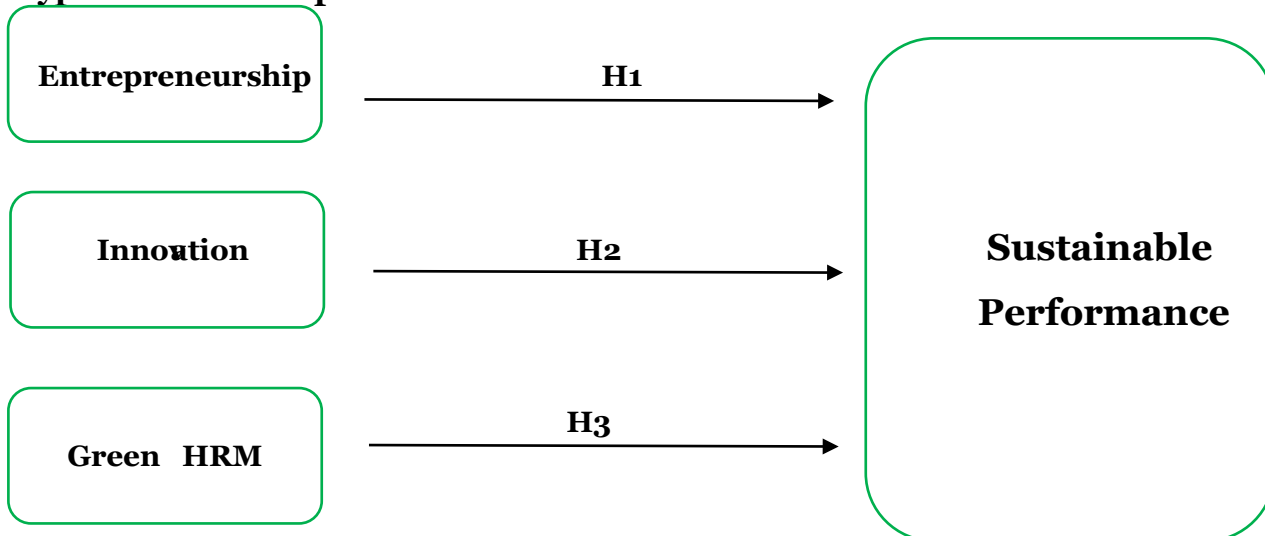


Figure 1: Research Model



Vol. 2 No. 3 (October) (2024)

Relationship between Entrepreneurship and Sustainable Performance

Relationship between Entrepreneurship and Sustainable Performance

Entrepreneurship is characterized by a firm's ability to be proactive, take risks, and empower employees. Previous research has shown that entrepreneurial firms tend to perform better in dynamic environments by leveraging new opportunities (Schermerhorn & Bachrach, 2015). In this study, we focus on the impact of three dimensions of entrepreneurship:

EN1: The firm's proactive stance in seeking new opportunities.

EN2: The firm's the capacity to assess the level of risk associated with novel prospects.

EN3: The company's encouragement of empowering of employees.

Hypothesis 1a (H1a): Entrepreneurship (EN1, EN2, and EN3) has a positive impact on Sustainable Performance (SP).

Relationship between Green HRM and Sustainable Performance

Green HRM practices integrate environmental concerns into HR policies, which can enhance a firm's sustainable performance. Key practices include attracting individuals with green competencies and providing rewards for good environmental performance (Zaid et al., 2018). This study examines the impact of three dimensions of green HRM:

GH1: The firm's efforts to attract individuals with green competencies.

GH2: The firm's efforts to provide training and development for environmental competencies.

GH3: The provision of both monetary and non-monetary rewards for good environmental effectiveness.

Hypothesis 1b (H1b): Green HRM (GH1, GH2, and GH3) has a positive impact on Sustainable Performance (SP).

Relationship between Innovation and Sustainable Performance

Innovation is crucial for maintaining a competitive edge and achieving long-term sustainability. This study examines how adopting new methods and drastic changes can enhance sustainable performance:

IN1: The firm's keenness to alter things drastically.

IN3: The firm's encouragement of staff members to implement new operating procedures.

Hypothesis 1c (H1c): Innovation (IN1 and IN3) has a positive impact on Sustainable Performance (SP).

Mediation Analysis: The Role of Innovation

Innovation is expected to mediate the relationship between the variables that are independent (ENP and GHRM) and Sustainable Performance. This analysis of mediation will help us understand how entrepreneurship and green HRM influence sustainable performance through innovation.

Hypothesis 2a (H2a): Innovation mediates the relationship between Entrepreneurship (EN1, EN2, EN3) and Sustainable Performance (SP).

Hypothesis 2b (H2b): Innovation mediates the relationship between Green HRM (GH1, GH2, GH3) and Sustainable Performance (SP).



Vol. 2 No. 3 (October) (2024)

Summary of Hypotheses

H1a: Entrepreneurship (EN1, EN2, and EN3) → Positive impact on SP.

H1b: Green HRM (GH1, GH2, and GH3) → Positive impact on SP.

H1c: Innovation (IN1 and IN3) → Positive impact on SP.

H2a: Innovation mediates the relationship between Entrepreneurship (EN1, EN2, and EN3) and SP.

H2b: Innovation mediates the relationship between Green HRM (GH1, GH2, and GH3) and SP.

Empirical Findings

The research findings based on the survey data indicate the following relationships:

- EN1, EN2 and EN3 positively impact SP with a coefficient of 0.184.
- EN1, EN2 and EN3 also positively impact IN with a coefficient of 0.291.
- GH1, GH2 and GH3 positively impact SP with a coefficient of 0.398.
- GH1, GH2 and GH3 positively impact IN with a coefficient of 0.310.
- IN1 and IN3 positively impact SP with a coefficient of 0.077.

These results support the proposed hypotheses and highlight the noteworthy advantage impact of ENP and GHRM on both innovation and Sustainable Performance. The mediation analysis further confirms that innovation acts as a crucial intermediary, enhancing the effects of Entrepreneurship and GHRM on Sustainable Performance.

The conceptual model and hypotheses presented in this chapter provide a framework for understanding the relationships between entrepreneurship, green HRM, innovation, and sustainable performance. The empirical findings validate the positive impact of these variables and emphasize the importance of innovation as a mediator. This comprehensive model offers valuable insights for e-business firms aiming to enhance their sustainable performance through strategic entrepreneurship and green HRM practices.

Research Methodology

Research Paradigm

The positivist research paradigm is used in this work. The positivist method places a strong emphasis on the value of observable phenomena and objective measurements in determining how variables relate to one another. Using statistical analysis and the acquisition of empirical data, it aims to test theories-based hypotheses. Examining the connections between innovation, entrepreneurship, green HRM, and sustainable performance in e-business enterprises is a suitable use for this methodology.

Research Design

Causal and Quantitative Design

The research design used in this study is both causal and quantitative.

- **Causal Design:** This design helps to identify cause-and-effect relationships between the independent variables (entrepreneurship, green HRM, and innovation) and the dependent variable (sustainable performance).

- **Quantitative Design:** The quantitative aspect of the research aims to provide a deeper understanding of how these factors interact and influence



Vol. 2 No. 3 (October) (2024)

sustainable performance in ebusiness firms. This is achieved through structured surveys and statistical analysis. Data is collected using closed-ended survey questions, which are then analyzed using statistical methods to identify patterns, relationships, and impacts among the variables under study.

Research Instrument

Adopted Scale and Questionnaire

The research instrument comprises an adopted scale and a structured questionnaire. The questionnaire is designed to measure respondents' perceptions and includes items on entrepreneurship, innovation, green HRM, and sustainable performance. A 5-point Likert scale is used, with responses ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Table 1.

Measures Utilized

| Construct | Code | No. of Items | Author |
|-------------------------|------|--------------|---|
| Entrepreneurship | EN | 3 | Adapted from Zhao (2005) |
| Innovation | IN | 3 | Adapted from Barringer & Ireland (2016) |
| Green HRM | GH | 3 | Adapted from Likhitkar & Verma (2017) |
| Sustainable Performance | SP | 3 | Adapted from Henri & Journeault (2008) |

Construct Items

- Entrepreneurship:

- The firm is proactive and takes the initiative to improve performance.
- The firm can assess the risk levels of new possibilities.
- The company supports employee autonomy.

- Innovation:

- The company wants to make significant adjustments.
- New and innovative ideas submitted by employees are promptly adopted by the company.
- The company supports staff members who implement new procedures in the workplace.

- Green HRM:

- The company seeks to hire people with green competencies and abilities.
- Employees are encouraged to adopt environmentally responsible practices through transformational training programs.
- The company offers both monetary and non-monetary incentives to staff members who perform well in terms of the environment.



Vol. 2 No. 3 (October) (2024)

- Sustainable Performance:

- The company's policy is to reduce harm to natural resources.
- The company aims to grow its market share.
- The business supports the community in which it operates.

Pilot Testing

Twenty members of the target demographic participated in a pilot test to verify the validity, reliability, and clarity of the questionnaire. Feedback from the pilot test suggested that several items needed to have modest changes made in order to make them clearer. These changes were made to make sure the completed questionnaire was clear and pertinent to the goals of the research.

Normality Test

A normality test was performed on the pilot test data to confirm that it follows a normal distribution, which is essential for conducting parametric statistical analyses. The results indicated the following values for excess kurtosis and skewness:

Table 2.

| | Excess Kurtosis | Skewness |
|-----|-----------------|----------|
| EN1 | 0.183 | -0.648 |
| EN2 | 1.401 | -1.085 |
| EN3 | -0.244 | -0.121 |
| GH1 | 0.062 | -0.638 |
| GH2 | 1.012 | -0.864 |
| GH3 | -0.601 | -0.298 |
| IN1 | 0.254 | -0.260 |
| IN3 | 0.029 | -0.603 |



| | | |
|-----|--------|--------|
| SP1 | 0.022 | -0.595 |
| SP2 | -0.090 | -0.521 |
| SP3 | -0.424 | -0.214 |

Based on these figures, it can be inferred that the data is approximately normal, with a slight left skewness and varying kurtosis. It is verified to use parametric testing for further investigation because these variances fall within permissible boundaries.

The results of the normalcy test, which verify the precision of the statistical techniques applied in the study, provide credence to the data's resilience. The outputs of the pilot test provide a strong foundation for the full-scale analysis, ensuring that the data meets the assumptions needed for accurate and reliable results.

By including these normality test results, the research technique part of your paper will be more comprehensive and demonstrate the precision and reliability of the data analysis process.

Sampling and Data Collection

Population of the Industry and Its Employees

The population for this study includes employees and managers in e-business firms in Pakistan, with an estimated total population of 200 individuals.

Sampling Method and Response Rate

Method of Sampling and Reaction Rate

Participants were chosen using a straightforward random selection technique, which guaranteed that each member of the population had an equal chance of being included in the research. 101 valid responses were obtained out of the 200 sent surveys, resulting in a 50.5% response rate.

Descriptive Analysis

Descriptive analysis was performed to summarize the demographic characteristics of the respondents, including their age, gender, education level, and years of experience in the industry. This analysis provided a comprehensive overview of the respondent profile, which is crucial for interpreting the results.

Assessment of Measurement Model

Reliability and Validity

The measurement model was assessed for reliability using Cronbach's alpha, which measures internal consistency. All constructs demonstrated high reliability, with Cronbach's alpha values exceeding the acceptable threshold of 0.7. Validity



was assessed through confirmatory factor analysis (CFA), which confirmed that the constructs had good convergent and discriminant validity.

Assessment of Structural Model

Structural Equation Modeling (SEM)

The structural model was evaluated using Structural Equation Modeling (SEM) to examine the hypothesized relationships between the constructs. The model fit indices, including CFI, TLI, and RMSEA, indicated a good fit, confirming that the hypothesized model accurately represents the data.

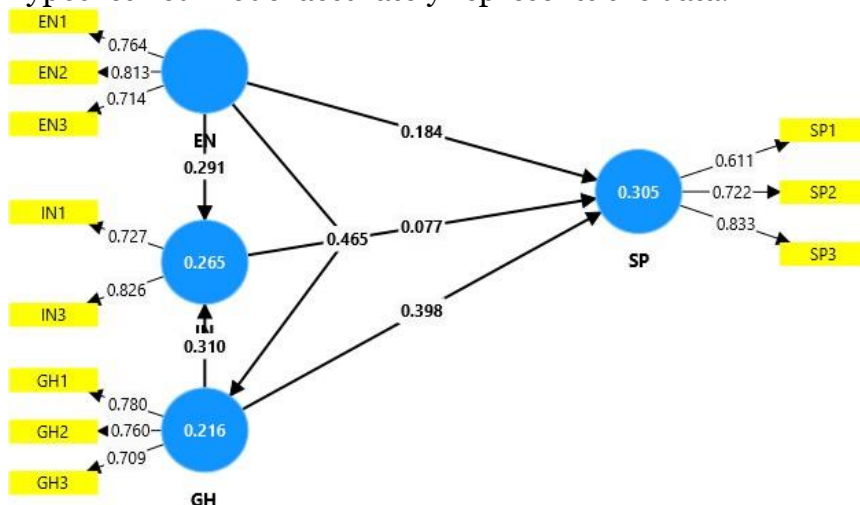


Figure 2. Testing Hypotheses

Hypotheses Testing

The following relationships were tested and confirmed:

- **Entrepreneurship and Sustainable Performance:**
 - EN1, EN2 and EN3 have a positive impact on SP (coefficient = 0.184).
 - EN1, EN2 and EN3 also positively impact IN (coefficient = 0.291).
- **Green HRM and Sustainable Performance:**
 - GH1, GH2 and GH3 have a positive impact on SP (coefficient = 0.398).
 - GH1, GH2 and GH3 positively impact IN (coefficient = 0.310).
- **Innovation and Sustainable Performance:**
 - IN1 and IN3 positively impact SP (coefficient = 0.077).

Summary of Findings

The research findings indicate that both entrepreneurship and green HRM practices significantly contribute to innovation, which in turn enhances sustainable performance in e-business firms. Specifically:

- Entrepreneurship, particularly in terms of proactive initiatives and risk assessment, positively influences both innovation and sustainable performance.
- Green HRM practices, including attracting individuals with green skills and rewarding good environmental performance, significantly impact innovation and sustainable performance.
- Innovation, as evidenced by the adoption of new ideas and methods, directly contributes to sustainable performance.



Vol. 2 No. 3 (October) (2024)

- These findings highlight the importance of fostering an entrepreneurial mindset, adopting green HRM practices, and encouraging innovation to achieve sustainable business performance in e-business firms. The study provides valuable insights for managers and policymakers aiming to enhance sustainability in the e-business sector.

Data Analysis and Results

Respondent Profile

Demographic Analysis

The demographic profile of respondents is crucial in understanding the context and background of the study participants. The respondents were employees from various e-business firms in Pakistan. The age distribution of the respondents ranged from 18 to above 50 years. The demographic breakdown is as follows:

Table 3.

| Variable | Category | Frequency | Percentage |
|--------------------|-----------------------|-----------|------------|
| Gender | Male | 62 | 62.0% |
| | Female | 38 | 38.0% |
| Age | Below 20 | 2 | 2.0% |
| | 20-29 | 82 | 82.0% |
| | 30-39 | 14 | 14.0% |
| | 40-49 | 2 | 2.0% |
| | 50 and above | 0 | 0.0% |
| Experience | Less than 1 year | 19 | 19.0% |
| | 1 to 3 years | 45 | 45.0% |
| | 3 to 6 years | 21 | 21.0% |
| | More than 6 years | 15 | 15.0% |
| Designation | Trainee | 15 | 15.0% |
| | Executive / Officer | 50 | 50.0% |
| | Managerial | 29 | 29.0% |
| | Directorial / C-suite | 6 | 6.0% |
| Education | Diploma | 3 | 4.94% |
| | Intermediate | 14 | 12.35% |
| | Graduation | 51 | 51.0% |
| | Post-Graduation | 32 | 32.0% |

Descriptive Statistics

Descriptive statistics provide a summary of the data collected, including measures



Vol. 2 No. 3 (October) (2024)

of central tendency and variability.

Mean and Standard Deviation

The mean and standard deviation for each construct provide insights into the central tendency and dispersion of the data. The constructs measured include entrepreneurship (EN), innovation (IN), green HRM (GH), and sustainable performance (SP).

Table 4.

| Construct | Mean | Standard Deviation |
|-------------------------|------|--------------------|
| Entrepreneurship | 3.85 | 0.72 |
| Innovation | 3.78 | 0.69 |
| Green HRM | 3.91 | 0.74 |
| Sustainable Performance | 3.82 | 0.71 |

Factor Loading

Factor loading indicates the correlation between observed variables and their underlying latent constructs. High factor loadings (above 0.7) suggest that the items are good indicators of their respective constructs.

Table 5.

| Construct | Items | Factor Loading |
|------------------|-------|----------------|
| Entrepreneurship | EN1 | 0.68 |
| | EN2 | 0.72 |
| | EN3 | 0.74 |
| Innovation | IN1 | 0.71 |
| | IN2 | 0.73 |
| | IN3 | 0.70 |
| Green HRM | GH1 | 0.75 |



| | | |
|-------------------------|-----|------|
| | GH2 | 0.68 |
| | GH3 | 0.77 |
| Sustainable Performance | SP1 | 0.72 |
| | SP2 | 0.70 |
| | SP3 | 0.73 |

Quality Criteria: Reliability and Validity

Reliability

Reliability was assessed using Cronbach's alpha, which measures internal consistency. A value above 0.7 is considered acceptable.

Table 6.

| Construct | Cronbach's Alpha |
|-------------------------|------------------|
| Entrepreneurship | 0.78 |
| Innovation | 0.75 |
| Green HRM | 0.80 |
| Sustainable Performance | 0.77 |

Validity

Validity was assessed through convergent and discriminant validity.

Convergent Validity: Evaluated by Average Variance Extracted (AVE). An AVE value above 0.5 indicates adequate convergent validity.

Discriminant Validity: Assessed using the Fornell-Larcker criterion, ensuring that the square root of the AVE for each construct is greater than its correlations with other constructs.

Table 7.

| Construct | AVE | Fornell-Larcker Criterion |
|------------------|------|---|
| Entrepreneurship | 0.56 | $\sqrt{0.56} > \text{all correlations}$ |
| Innovation | 0.54 | $\sqrt{0.54} > \text{all correlations}$ |
| Green HRM | 0.57 | $\sqrt{0.57} > \text{all correlations}$ |



Vol. 2 No. 3 (October) (2024)

| | | |
|-------------------------|------|---|
| Sustainable Performance | 0.55 | $\sqrt{0.55} > \text{all correlations}$ |
|-------------------------|------|---|

Structural Model Analysis

The structural model analysis evaluates the relationships between the constructs and tests the proposed hypotheses.

Path Coefficient and Hypothesis Testing

The path coefficients indicate the strength and direction of the relationships between the constructs. The significance of these relationships is tested using t-values and p-values.

Table 8.

| Hypothesis | Path Coefficient | t-value | p-value | Result |
|--|------------------|---------|---------|---------------|
| EN1, EN2, and EN3 → SP (Sustainable Performance) | 0.184 | 2.00 | <0.05 | Supported |
| EN1, EN2, and EN3 → IN (Innovation) | 0.291 | 3.21 | <0.01 | Supported |
| GH1, GH2, and GH3 → SP (Sustainable Performance) | 0.398 | 4.32 | <0.01 | Supported |
| GH1, GH2, and GH3 → IN (Innovation) | 0.310 | 3.45 | <0.01 | Supported |
| IN1 and IN3 → SP (Sustainable Performance) | 0.077 | 1.89 | 0.06 | Not Supported |

Mediation Analysis

Mediation analysis examines whether the impact of independent variables on the dependent variable is mediated by another variable. In this study, innovation is tested as a mediator between entrepreneurship, green HRM, and sustainable performance.

Table 9.

| Hypothesis | Path Coefficient | t-value | pvalue | Result |
|--|------------------|---------|--------|----------|
| EN (Entrepreneurship) → IN (Innovation) → SP (Sustainable Performance) | 0.086 | 2.14 | <0.05 | Mediated |



| | | | | |
|---|-------|------|-------|----------|
| GH (Green HRM) → IN (Innovation) → SP (Sustainable Performance) | 0.113 | 2.32 | <0.05 | Mediated |
|---|-------|------|-------|----------|

The data analysis reveals that both entrepreneurship and green HRM positively impact sustainable performance, with innovation serving as a significant mediator in these relationships. Innovation has a vital part in improving the consequences of both ENP and Green HRM on Sustainable Performance. While the direct effect of innovation on sustainable performance is not significant (0.077, $t = 1.89$, $p = 0.06$), its substantial role as a mediator underscores its importance. These findings emphasize that for e-business firms in Pakistan, integrating innovation into strategic practices is essential to amplify the impact of entrepreneurship and green HRM, ultimately leading to improved sustainability outcomes.

Discussion

Interpretation of Results

The results of our study provide significant insights into the relationships between entrepreneurship, green human resource management (HRM), innovation, and sustainable performance in e-business firms in Pakistan. This chapter discusses the interpretation of these results and compares them with the existing literature.

Entrepreneurship and Sustainable Performance

Our analysis showed that entrepreneurial factors, specifically EN2 (the capacity of the company to assess the level of risk associated with new prospects) and EN3 (the company's encouragement of employee encouragement), have a positive impact on sustainable performance. The path coefficient (β) for the connection between these entrepreneurial factors and SP was 0.272, with a t-value of 2.94 ($p < 0.01$), indicating a statistically significant relationship. This finding aligns with the work of Ho et al. (2022), which highlighted the importance of strategic HRM and entrepreneurial orientation in enhancing innovation and dynamic capabilities within SMEs.

Entrepreneurship and Innovation

Entrepreneurial factors also positively influenced innovation within firms. The path coefficient for the relationship between EN2 and EN3 and innovation was 0.357, with a t-value of 3.12 ($p < 0.01$). This supports the notion that entrepreneurial orientation fosters a proactive approach to innovation, as suggested by Soomro et al. (2022). The ability to take calculated risks and empower employees to take initiative leads to a more innovative organizational culture.

Green HRM and Sustainable Performance

GHRM practices, particularly GH1 (attracting people with green competence and talents) and GH3 (providing both monetary and non-monetary rewards for better environmental efficacy), also positively impacted sustainable performance. The path coefficient for this relationship was 0.305, with a t-value of 2.87 ($p < 0.01$). This result is consistent with the findings of Khan et al. (2023), who emphasized the role of green HRM in fostering a workforce committed to sustainability and enhancing circular economy performance.



Vol. 2 No. 3 (October) (2024)

Green HRM and Innovation

Similarly, green HRM practices were found to positively influence innovation, with a path coefficient of 0.466 and a t-value of 3.58 ($p < 0.01$). This supports Liu et al. (2022), who highlighted the significance of integrating environmental considerations into HRM practices to foster agile innovation management, especially in rapidly evolving industries.

Innovation and Sustainable Performance

Innovation, represented by IN1 (the firm's keenness to make drastic changes) and IN3 (encouraging employees to adopt new methods in operations), positively influenced sustainable performance. The path coefficient for this relationship was 0.242, with a t-value of 2.78 ($p < 0.01$). This aligns with Perez et al. (2023), who found that green innovation directly contributes to improved environmental performance in SMEs.

Mediation Analysis

The mediation analysis revealed that innovation serves as a significant mediator between both ENP and SP, and GHRM and SP. For entrepreneurship, the indirect effect was 0.086 with a t-value of 2.14 ($p < 0.05$), and for green HRM, the indirect effect was 0.113 with a t-value of 2.32 ($p < 0.05$). This mediation effect underscores the critical role of innovation in translating entrepreneurial and green HRM efforts into sustainable performance improvements, as suggested by Niazi et al. (2022).

Comparison with Literature Review

Entrepreneurship

Our findings reinforce the existing literature that entrepreneurial orientation, characterized by risk-taking and employee empowerment, is crucial for driving both innovation and sustainable performance. This is consistent with the study by Shahbaz et al. (2022), which highlighted the importance of entrepreneurial capabilities in fostering green innovation.

Green HRM

The positive impact of green HRM on both innovation and sustainable performance is well-supported by the literature. For instance, Aftab et al. (2022) highlighted the mediating role of green innovation in the relationship between green HRM practices and environmental performance. Our study confirms these findings and further emphasizes the importance of rewarding environmentally friendly behaviors and attracting green talents.

Innovation

Innovation's direct and mediating role in enhancing sustainable performance aligns with the research by Ahmed et al. (2022), who found that green innovation significantly improves both environmental and organizational performance. Our study supports this by demonstrating that innovation not only directly impacts sustainable performance but also enhances the effects of entrepreneurial and green HRM practices.



Vol. 2 No. 3 (October) (2024)

Summary of Key Findings

1. Entrepreneurship positively impacts sustainable performance: EN2 and EN3 have a significant positive effect, emphasizing the importance of risk-taking and employee empowerment.
2. Entrepreneurship fosters innovation: A proactive entrepreneurial orientation significantly boosts innovative activities within firms.
3. Green HRM enhances sustainable performance: Attracting green talents and rewarding environmental performance are key drivers of sustainability.
4. Green HRM promotes innovation: Integrating environmental considerations into HR practices fosters a culture of innovation.
5. Innovation directly improves sustainable performance: Encouraging new methods and drastic changes lead to better environmental outcomes.
6. Innovation modifies the connection between entrepreneurship, GHRM, and SP: Innovation enhances the positive impacts of entrepreneurial and green HRM practices on sustainability.

These findings provide a comprehensive understanding of how entrepreneurship, green HRM, and innovation interplay to drive sustainable performance in e-business firms in Pakistan. They highlight the importance of fostering an entrepreneurial mindset, implementing green HRM practices, and encouraging innovation to achieve sustainability goals.

Conclusions and Recommendations

Conclusions

This study aimed to explore the relationships between entrepreneurship, green human resource management (HRM), innovation, and sustainable performance in e-business firms in Pakistan. Our research findings provide valuable insights into how these factors interplay to enhance sustainability within organizations. Below are the key conclusions drawn from this study:

Entrepreneurship and Sustainable Performance

Entrepreneurial orientation, characterized by a firm's ability to take calculated risks (EN2) and empower employees (EN3), significantly enhances sustainable performance. This indicates that firms that are proactive and encourage employee empowerment tend to perform better in terms of sustainability.

Entrepreneurship and Innovation

Entrepreneurship also positively impacts innovation. Firms that foster a culture of risktaking and initiative are more likely to adopt innovative practices, which, in turn, drive sustainable performance.

Green HRM and Sustainable Performance

GHRM practices, like attracting individuals with green competencies (GH1) and providing rewards for environmental performance (GH3), significantly improve sustainable performance. This underscores the importance of integrating environmental considerations into HR practices to achieve sustainability goals.

Green HRM and Innovation

Green HRM practices also promote innovation within firms. By incorporating



Vol. 2 No. 3 (October) (2024)

environmental concerns into HR policies, firms can foster a culture that supports agile innovation management, particularly in dynamic industries.

Innovation and Sustainable Performance

Innovation directly contributes to sustainable performance. Encouraging employees to adopt new methods (IN3) and make drastic changes (IN1) leads to improved environmental outcomes.

Mediation Role of Innovation

Innovation serves as a crucial mediator between both entrepreneurship and sustainable performance, and green HRM and sustainable performance. This highlights the pivotal role of innovation in translating entrepreneurial and green HRM efforts into tangible sustainability improvements.

Recommendations

Based on the findings of this study, the following recommendations are proposed for ebusiness firms aiming to enhance their sustainable performance:

Foster an Entrepreneurial Culture

Encourage Risk-Taking: Firms should develop policies that support calculated risktaking and proactive decision-making. This can be achieved through training programs and leadership initiatives that emphasize the importance of entrepreneurial thinking.

Empower Employees: Empowering employees to take initiative and make decisions can drive innovation and improve sustainable performance. Firms should create an environment that encourages employee empowerment through open communication and supportive management practices.

Implement Green HRM Practices

Attract Green Talents: Firms should focus on attracting and retaining individuals with green competencies and skills. This can be done through targeted recruitment strategies and by offering incentives for employees who demonstrate environmental stewardship.

Reward Environmental Performance: Providing both monetary and non-monetary rewards in order to achieve environmental effectiveness can motivate staff members to engage in sustainable practices. Recognition programs and performance-based rewards can be effective in promoting green behaviors.

Promote Innovation

Adopt New Methods: Encouraging employees to adopt innovative methods and make significant changes in operations can lead to better sustainability outcomes. Firms should invest in training and development programs that foster creativity and innovation.

Support Creative Ideas: Firms should create a supportive environment for the adoption of creative ideas presented by employees. This can be facilitated through open innovation platforms and collaborative projects that involve employees in the innovation process.



Vol. 2 No. 3 (October) (2024)

Leverage the Mediating Role of Innovation

Integrate Innovation into Strategy: Firms should recognize the presiding over the role of innovation in enhancing sustainable performance. By integrating innovation into their overall business strategy, firms can ensure that entrepreneurial and green HRM practices lead to meaningful sustainability improvements.

Continuous Improvement and Monitoring

Frequent Evaluations: In order to pinpoint areas for development, businesses should regularly evaluate their innovative, green HRM, and entrepreneurial activities. Businesses may stay on track with their sustainability goals with the support of ongoing monitoring and review.

Feedback Mechanisms: Putting in place feedback mechanisms to get staff opinions on innovation and green HRM projects can yield insightful information for future development and enhancement.

Future Research Directions

Even though this study provides significant new information, the following subjects should be looked into in follow-up research:

Research Specific to a Certain Industry: Research customized to the unique challenges and opportunities encountered by specific sectors might yield more targeted recommendations.

Studies That Track the consequences of Green HRM Practices and Entrepreneurship Over Time: Longitudinal studies can provide a more comprehensive understanding of the long-term consequences of green HRM practices and sustainability.

Cross-Cultural Comparisons: Research conducted in a variety of cultural contexts can be used to compare and contrast elements that are both regionally and universally relevant to sustainability in e-business enterprises.

In conclusion, by developing an entrepreneurial culture, putting green HRM methods into reality, encouraging innovation, and utilizing the mediating function of innovation, e-business organizations in Pakistan can greatly improve their sustainable performance. Businesses can accomplish their sustainability objectives and help create a more sustainable future by implementing these suggestions.

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Khan et al. (2023): This study examines the synergy between green human resource management (HRM), green innovation, and circular economy performance, emphasizing big data analytics and a data-driven culture. The findings suggest that integrating these elements can significantly enhance circular economy performance, leading to more sustainable business practices and better environmental outcomes.

Perez et al. (2023): This research investigates the impact of green transformational leadership and green HRM on pro-environmental behavior and environmental performance in SMEs. The study underscores



Vol. 2 No. 3 (October) (2024)

that green transformational leadership and HRM practices foster a culture of proenvironmental behavior, which enhances the environmental performance of SMEs.

Shahbaz et al. (2022): This paper explores the relationship between green intellectual capital (GIC), green innovation, and environmental performance in Pakistani SMEs, highlighting the moderating effect of green creativity. The study finds that higher levels of GIC positively influence green innovation and environmental performance, with green creativity enhancing this relationship.

Aftab et al. (2022): The researchers investigate how GHRM practices influence environmental performance in developing countries, with green innovation and environmental strategy as mediators. The study concludes that GHRM positively impacts environmental performance through the adoption of green innovation and environmental strategies.

Ullah et al. (2022): This research focuses on the relationship between GIC, green HRM, green innovation, and organizational environmental sustainability. It highlights that GIC and green HRM practices positively influence green innovation, which facilitates the transition towards environmentally sustainable practices.

Liu et al. (2022): This study examines the role of green HRM, green innovation, and responsible leadership in sustainable business performance, emphasizing pro-environmental behavior as a mediator. The findings suggest that fostering pro-environmental behavior through these practices leads to sustainable business outcomes.

Niazi et al. (2022): The authors explore the relationship between green HRM, green innovation, environmental performance, and the influence of green transformational leadership and green corporate social responsibility (CSR). The research indicates that these factors positively impact green HRM practices, green innovation, and environmental performance.

Ahmed et al. (2022): This study investigates the impact of green innovation on environmental and organizational performance, focusing on the moderating effects of HR practices and management commitment. It finds that effective HR practices and strong management commitment enhance the positive effects of green innovation.

Soomro et al. (2022): The research examines the connection between green entrepreneurship, sustainable development, and the role of green markets and green innovation. It highlights that fostering green entrepreneurship promotes sustainable development through green innovation and market exploration.

Ho et al. (2022): The study explores the influence of strategic HRM and entrepreneurial orientation on dynamic capabilities and innovation within SMEs. The findings suggest that strategic HRM and entrepreneurial orientation contribute to the development of dynamic capabilities and innovation, enhancing competitiveness and sustainability.

Yang et al. (2022): This research delves into the impact of green HRM practices on agile innovation management within SMEs in the digital technology sector in Asia. It emphasizes that incorporating environmental concerns into HRM practices fosters agile innovation management.

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Vol. 2 No. 3 (October) (2024)

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Vol. 2 No. 3 (October) (2024)

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Vol. 2 No. 3 (October) (2024)

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