Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Green Human Resource Management and Emotional Wage as Predictors of Employee Well-Being in Dark-Store Supply Chains

Hitesh Bhoi

hmgmt72@gmail.com

Lovely Professional Universit

Pretty Bhalla

Lovely Professional Universit

Rita Kumari

Kalasalingam Academy of Research and Education, Krishnankoil 626126, Tamil Nadu, India

Mridul M

Amity Centre of Behavioural Sciences, Amity University, Uttar Pradesh, Noida

Syeda Zehra

Indira Gandhi National Open University

D. Sivakumar

Kalasalingam Academy of Research and Education, Krishnankoil 626126, Tamil Nadu, India

Research Article

Keywords: Dark-Store Supply Chains, Emotional Wage, Employee Well-Being, Green Human Resource Management, Structural Equation Modeling, Sustainable Human Resource Management

Posted Date: June 26th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10019114/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Version of Record: A version of this preprint was published at Discover Sustainability on September 19th, 2026. See the published version at https://doi.org/10.1007/s43621-026-04741-1.

Abstract

This study examines the influence of Green Human Resource Management (GHRM) strategies on emotional wage and employee well-being within dark-store supply chains across multiple operational roles. Data were collected from 400 employees representing Blinkit, BigBasket, Swiggy Instamart, DMart Ready, and Zepto. Descriptive statistics, Pearson correlation, multiple regression, Hayes' PROCESS Macro (Model 4), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM) supported hypothesis testing and model validation. Findings indicate positive employee perceptions regarding GHRM practices, particularly Green Sustainable Culture (mean = 4.02–4.08), while emotional wage dimensions demonstrated strong agreement levels (mean = 3.88–4.18). CFA results confirmed satisfactory psychometric adequacy, construct reliability, and convergent validity (CR = 0.90–0.94; AVE = 0.59–0.64), alongside strong model fit (CFI = 0.93; RMSEA = 0.056). Correlation analysis revealed significant positive relationships among GHRM, emotional wage, and employee well-being. Regression findings confirmed significant predictive effects of GHRM on emotional wage (β = 0.470) and employee well-being (β = 0.333), whereas emotional wage significantly influenced employee well-being (β = 0.472). SEM and mediation results further established emotional wage as a significant partial mediating mechanism within the GHRM–well-being relationship (indirect effect β = 0.41). The findings suggest that sustainability-oriented HR systems combined with psychosocial reward mechanisms strengthen employee well-being, engagement, and organizational effectiveness within high-intensity fulfillment environments. Nevertheless, cross-sectional design and context-specific focus may limit broader generalizability across sectors and geographical settings.

1. INTRODUCTION

Global concern for environmental sustainability has encouraged organizations to integrate ecological responsibility into strategic and operational functions, emphasizing sustainable value creation, social accountability, and long-term organizational resilience (Khan, 2024). Human Resource Management has become a key driver of sustainability through Green Human Resource Management (GHRM) practices, including green recruitment, eco-focused training, sustainable performance evaluation, employee participation, communication, and culture-building initiatives that align employee behavior with environmental goals (Deshwal, 2015; Muisyo et al., 2022; Miah et al., 2024; Efranto et al., 2026). In labor-intensive dark-store supply chains, characterized by rapid operations, digital coordination, and continuous fulfillment activities, GHRM can significantly influence employee perceptions, engagement, and workplace experiences (Paché, 2022; Chavhan and Dutta, 2025; Guimarães and Rodrigues, 2026). As dark stores operate under high-pressure and time-sensitive conditions, employee well-being is critical for productivity, service quality, and organizational performance (Mpunga, 2025).

Employee well-being is shaped not only by financial compensation but also by socio-emotional and psychological rewards within the workplace. Emotional wage, including recognition, supportive culture, career growth, work-life balance, and meaningful work experiences, has emerged as an important determinant of employee satisfaction, motivation, and commitment (Martínez-Falcó et al., 2025). In

sustainability-oriented organizations, GHRM practices can strengthen emotional wage by fostering environmental purpose, belongingness, and organizational support among employees (Faeni et al., 2025). Employees perceiving environmentally responsible and supportive workplaces are more likely to experience improved psychological, social, and workplace well-being (Gyensare et al., 2024). Recent evidence further suggests that employee well-being functions as a critical mechanism through which sustainability-oriented HR strategies contribute to broader organizational sustainability and governance outcomes (Al-Jaber et al., 2025). However, existing studies largely examine GHRM from operational or performance perspectives, with limited focus on its role in generating emotional and psychological value. Likewise, emotional wage has often been studied separately from sustainability-oriented HR systems, limiting understanding of their combined influence on employee well-being.

From a theoretical perspective, this study draws upon Social Exchange Theory (SET) and Ability–Motivation–Opportunity (AMO) theory to explain the relationships among GHRM, emotional wage, and employee well-being. According to Social Exchange Theory (SET), employees reciprocate favorable organizational practices with positive psychological and behavioral outcomes when they perceive organizational support and care. Simultaneously, Ability–Motivation–Opportunity (AMO) theory explains that GHRM enhances employee abilities through green training, strengthens motivation through recognition and rewards, and creates opportunities for participation through supportive culture and involvement mechanisms. Within this framework, GHRM and emotional wage act as important predictors of employee well-being by shaping perceptions of organizational commitment, fairness, and support. Studies grounded in affective and sustainability perspectives have also demonstrated that GHRM practices stimulate positive employee attitudes and environmental outcomes by influencing workplace experiences and emotional responses (Iqbal et al., 2024; Martínez Falcó et al., 2025). Nevertheless, empirical evidence in dark-store supply chains remains limited, as previous studies have primarily focused on manufacturing, hospitality, retail, and information technology sectors (Wang et al., 2025; Mpunga, 2025; Benevene and Buonomo, 2020). Furthermore, the algorithm-driven and high-intensity nature of dark-store environments has received limited scholarly attention, creating a significant research gap regarding the effectiveness of sustainability-oriented HR practices and emotional rewards in enhancing employee well-being.

2. LITERATURE REVIEW

Green Human Resource Management (GHRM) integrates environmental sustainability into HR practices to enhance organizational performance and employee-related outcomes (Deshwal, 2015). It encompasses green recruitment, training, performance management, rewards, communication, and organizational culture, thereby encouraging environmentally responsible behavior and supporting organizational sustainability objectives (Muisyo et al., 2022). Recent literature further identifies green recruitment as a foundational element of GHRM that contributes directly to organizational sustainability by attracting environmentally conscious employees and reinforcing sustainability-oriented organizational values (Jamil et al., 2023). Conceptually, GHRM operates as a comprehensive HR system rather than a set of isolated practices, aligning environmental strategies with employee behavioral and attitudinal

outcomes. It also strengthens emotional wage through recognition, supportive culture, and work-life balance, thereby improving employee motivation and commitment, while contributing to psychological, social, workplace, and subjective well-being when sustainability principles are embedded within HR systems (Martínez-Falcó et al., 2025; Faeni et al., 2025; Gyensare et al., 2024). Systematic reviews have highlighted the growing strategic importance of GHRM in achieving organizational sustainability, emphasizing its multidimensional influence on employee behavior, environmental performance, and long-term competitiveness (Miah et al., 2024; Efranto et al., 2026). Nevertheless, the existing literature remains largely descriptive and fragmented, as most studies emphasize positive associations without sufficiently examining the psychological mechanisms and contextual conditions through which GHRM shapes employee outcomes, limiting theoretical integration, particularly regarding the linkage between sustainability-oriented HR systems and socio-emotional constructs such as emotional wage.

Despite these advantages, significant research gaps remain within dark-store supply chains characterized by operational intensity, rapid order fulfillment, and workforce diversity, all of which influence employee motivation and engagement (Paché, 2022; Mpunga, 2025; Guimarães and Rodrigues, 2026). From a theoretical integration standpoint, prior studies have inadequately differentiated GHRM as a system-level input, emotional wage as a mediating psychological mechanism, and employee well-being as an outcome construct, thereby reducing conceptual clarity and limiting causal interpretation. Furthermore, contextual variations and role-based differences among operational, managerial, and HR employees remain insufficiently explored (Benevene and Buonomo, 2020; Kamboj and Anthonysamy, 2024; Schorung, 2024). Additionally, the lack of integrative theoretical models connecting GHRM, emotional wage, and employee well-being has resulted in a predominantly variable-oriented rather than mechanism-oriented research approach, constraining theoretical advancement in sustainability-oriented HRM literature (Das and Singh, 2016). In this context, Social Exchange Theory (SET) explains employee reciprocity toward perceived organizational sustainability practices, whereas the Ability–Motivation–Opportunity (AMO) framework clarifies how GHRM systems enhance employee capabilities, motivation, and participation opportunities; however, earlier studies have not jointly applied these frameworks to explain the development of emotional wage in high-intensity digital supply chain environments. Moreover, emerging evidence indicates that employee well-being mediates the relationship between sustainability-oriented HR practices and organizational sustainability outcomes, while resource commitment and organizational support may strengthen these relationships (Al-Jaber et al., 2025; Gyensare et al., 2024), highlighting the need for integrative mechanism-based models within dark-store settings.

Accordingly, this study develops a mechanism-based framework integrating Green Human Resource Management (GHRM), emotional wage, and employee well-being in dark-store supply chains, where emotional wage acts as a mediating psychological resource linking sustainability-oriented HR practices with employee outcomes. Grounded in Social Exchange Theory (SET) and Ability–Motivation–Opportunity (AMO) theory, the study aims to (i) examine the implementation and influence of GHRM practices on emotional wage and employee well-being in dark-store operations; (ii) evaluate the mediating role of emotional wage in the relationship between GHRM and employee well-being; and (iii)

identify implications of sustainability-oriented HR practices for improving employee engagement, organizational performance, and sustainability in high-intensity dark-store environments.

3. RESEARCH DESIGN AND METHODS

This chapter outlines the systematic study approach, covering research design, study area, population and sampling, and data collection procedures. It details construct measurement, reliability and validity assessments, and ethical considerations. Finally, it describes analytical techniques and statistical methods used to test hypotheses and interpret findings.

3.1 Research Design

This study employed a quantitative cross-sectional design to examine the influence of Green Human Resource Management (GHRM) practices on employee well-being, with emotional wage as a mediating factor in dark-store supply chains. Data were collected through structured questionnaires, enabling standardized measurement, hypothesis testing, and mediation analysis across diverse operational settings.

3.2 Study Area and Context: Dark Stores, Telangana

The study was conducted across dark stores in eight Telangana districts: Hyderabad (17.366° N, 78.476° E), Medchal–Malkajgiri (17.630° N, 78.484° E), Rangareddy (17.389° N, 77.837° E), Warangal Urban (17.967° N, 79.589° E), Nizamabad (18.750° N, 78.250° E), Karimnagar (18.338° N, 79.229° E), Sangareddy (17.612° N, 78.082° E), and Medak (18.046° N, 78.263° E). Major quick-commerce firms including Swiggy Instamart, Blinkit, Zepto, BigBasket, and DMart Ready were selected to ensure geographical and operational diversity for examining GHRM practices and employee well-being.

3.3 Population and Sample

The target population comprised 400 employees working in dark stores across Telangana, including operational, supervisory, managerial, and HR-related positions such as Picker/Packer, Store Manager, Operation Lead, Delivery Executive, and HR Executive/Manager. To ensure balanced representation, respondents were selected across multiple districts, organizations, and job categories, thereby improving the reliability, representativeness, and generalizability of the study findings and supporting advanced multivariate analyses.

3.3.1 Distribution of Employee Responses across Districts and Organizations

Responses were collected from employees across eight districts of Telangana to ensure broad geographical and operational representation (Fig. 1). Hyderabad contributed the highest number of respondents, followed by Medchal–Malkajgiri, Rangareddy, and Warangal Urban. Employee participation from Blinkit, BigBasket, DMart Ready, Swiggy Instamart, and Zepto remained relatively balanced, thereby

minimizing organization-specific bias and strengthening the external validity of sustainability-oriented HRM assessment.

3.3.2 Demographic and Employment Profile of Respondents

Demographic and employment characteristics contextualize perceptions of Green HRM strategies, emotional wage, and employee well-being. Key variables (age, gender, job role, experience, organization, location, employment type) enabled subgroup analysis and robustness across Telangana dark stores (Fig. 2). The workforce is predominantly young (25–35 years), with 1–3 years' experience, reflecting high turnover; full-time employees dominate, males predominate per operational demands. This profile underscores emotional wage and Green HRM's role in sustaining well-being in fast-paced supply chains.

3.3.3 Sampling Technique and Sample Size Determination

Convenience sampling was employed considering practical limitations such as varying work shifts, demanding operational schedules, and accessibility challenges across geographically dispersed dark-store locations in Telangana. Nevertheless, efforts were made to maintain diversity among respondents in terms of district coverage, organizational affiliation, and job roles. A pilot study with 40 participants was initially conducted to evaluate the clarity, consistency, and reliability of the questionnaire, leading to minor modifications for better comprehension. The finalized sample size of 400 respondents was deemed sufficient for conducting correlation, regression, mediation, and Structural Equation Modeling (SEM) analyses, ensuring robust estimation of relationships among the study variables.

3.3.4 Distribution of Respondents by Employee Role

Respondents represented diverse operational, managerial, and HR roles within Telangana dark-store supply chains. Delivery Executives/Riders constituted the largest respondent group (n = 120), followed by Picker-Packers (n = 100), Store Managers/Storekeepers (n = 80), Operation Managers/Leads (n = 60), and HR Executives/Managers/HRBPs (n = 40). This hierarchical distribution enabled comprehensive assessment of Green HRM practices, emotional wage, and employee well-being across multiple organizational levels within dark-store operations.

3.4 Data Collection and Measurement

3.4.1 Data Collection

Primary data were collected using a structured questionnaire designed to assess Green HRM strategies, emotional wage, and employee well-being among dark-store employees. Measurement scales were adapted from validated studies to ensure content validity, contextual suitability, and reliability within the retail logistics environment.

3.4.2 Measurement Constructs and Scale Items

The questionnaire used a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The study instrument consisted of three major constructs: Green HRM Strategies, Emotional Wage, and Employee Well-Being. Green HRM Strategies included five dimensions: green recruitment and onboarding, green training, green performance management and rewards, green internal communication, and green sustainable culture. Emotional Wage comprised strategic, human, value creation, and motivational dimensions, while Employee Well-Being included psychological, social, workplace, and subjective well-being dimensions. The detailed measurement items used for each construct are presented in Table 1.

Table 1
Measurement Scale Items used for each construct

Construct	Measurement Items
Green HRM Strategies	
Green Recruitment and Onboarding (GRO)	1. Company demonstrates commitment to environmental sustainability; 2. Environmentally conscious employees are preferred during selection; 3. Environmental initiatives are explained during onboarding; 4. Environmental goals are shared with new employees; 5. Job roles include environmentally responsible practices
Green Training (GT)	6. Organization provides training on green living and resource use; 7. Employees are trained to protect the environment; 8. Training builds awareness of environmental protection; 9. Continuous learning enhances green skills; 10. Training promotes eco-friendly work practices
Green Performance Management and Rewards (GPMR)	11. Performance goals include environmental criteria; 12. Environmental efforts are discussed in appraisals; 13. Employees achieving green goals are rewarded; 14. Rewards are provided for green ideas; 15. Sustainability indicators are part of evaluation
Green Internal Communication (GIC)	16. Environmental initiatives are recognized internally; 17. Green messages are shared through internal channels; 18. Employees can suggest ideas on environmental issues; 19. Sustainability goals and progress are communicated; 20. Environmental messages are embedded in communication
Green Sustainable Culture (GSC)	21. Organization promotes environmental responsibility; 22. Managers emphasize environmental impact of work; 23. Environmental events and activities are organized; 24. Employees are encouraged to adopt eco-friendly habits; 25. Sustainability is embedded in organizational values
Emotional Wage	
Strategic Dimension	26. Organization supports employee well-being; 27. Employees are encouraged to take leadership roles; 28. Flexible work culture is promoted; 29. Adequate organizational support resources exist; 30. Management provides effective leadership; 31. HR practices support employees effectively
Human Dimension	32. Working conditions enable smooth job performance; 33. Work culture is positive and supportive; 34. Physical workplace conditions meet employee needs; 35. Organization supports personal growth; 36. Employee achievements are recognized; 37. Opportunities for development are available
Value Creation Dimension	38. Compensation policies are fair and transparent; 39. Recognition systems are clear and structured; 40. Flexible work arrangements are provided; 41. Organization prioritizes employee happiness; 42. Employees are encouraged toward self-fulfillment; 43. Promotion opportunities are available
Motivational Dimension	44. Sufficient time for family life is available; 45. Organization respects diversity; 46. Healthy lifestyle is encouraged; 47. Employees are fairly paid with benefits; 48. Goal achievement is appreciated; 49. Rewards reflect employee contribution

Construct	Measurement Items
Employee Well-being	
Psychological Well-being	50. Able to handle daily responsibilities effectively; 51. Focused on important life priorities; 52. Confident in decision-making; 53. Life has purpose and direction; 54. Life viewed as continuous learning; 55. Confident in personal abilities
Social Well-being	56. Feels valued as a team member; 57. Trust exists among team members; 58. Maintains close workplace relationships; 59. Ideas are accepted by colleagues; 60. Comfortable sharing problems at work; 61. Enjoys spending time with colleagues
Workplace Well-being	62. Satisfied with current job; 63. Work is meaningful; 64. Achievements increase motivation; 65. Workplace environment is supportive; 66. Career advancement opportunities exist; 67. Maintains work–life balance
Subjective Well-being	68. Feels happy most of the time; 69. Maintains a positive outlook; 70. Feels good about oneself; 71. Manages life challenges effectively; 72. Satisfied with life overall; 73. Looks forward to each day

3.5 Reliability and Validity of the Instrument

Questionnaire reliability underwent assessment using Cronbach's alpha, with all constructs showing satisfactory internal consistency. Expert review and Content Validity Index (CVI) assessment established content validity. Item-level and scale-level validity measures confirmed suitability of the instrument regarding measurement of Green HRM strategies, emotional wage, and employee well-being within dark-store operations. Harman's Single-Factor Test examined common method bias, while results showed less than 50% total variance explained through the first factor, indicating absence of serious common method bias concerns.

3.6 Ethical Considerations

Participation remained voluntary, while respondents received information regarding academic purpose of the research. Strict confidentiality and anonymity remained maintained throughout data collection, with no personally identifiable information obtained. Respondents retained freedom regarding withdrawal during any stage without consequences, ensuring compliance with ethical research standards.

3.7 Data Analysis and Hypotheses

IBM SPSS Statistics Version 26 supported data analysis procedures. Descriptive statistics summarized demographic characteristics, while Pearson correlation and multiple regression analyses examined relationships and direct effects among Green HRM Strategies, Emotional Wage, and Employee Well-Being. Hayes' PROCESS Macro (Model 4) combined with bootstrapping procedures assessed mediating influence of Emotional Wage. Based on conceptual framework (Fig. 3), four hypotheses underwent formulation: H1, Green HRM positively influences Emotional Wage; H2, Emotional Wage positively

influences Employee Well-Being; H3, Green HRM positively influences Employee Well-Being; and H4, Emotional Wage mediates relationship between Green HRM and Employee Well-Being.

3.8 Measurement Model Assessment and Validity Analysis

Confirmatory Factor Analysis (CFA) using IBM SPSS Amos evaluated reliability, validity, and overall fitness of latent constructs representing Green HRM Strategies, Emotional Wage, and Employee Well-Being. Standardized factor loadings (> 0.60) assessed indicator reliability, whereas Cronbach's alpha and Composite Reliability (CR > 0.70) examined internal consistency. Average Variance Extracted (AVE > 0.50) confirmed convergent validity, while Fornell–Larcker criterion verified discriminant validity. Model fitness evaluation included χ^2/df (< 3.00), Comparative Fit Index (CFI > 0.90), Tucker–Lewis Index (TLI > 0.90), and Root Mean Square Error of Approximation (RMSEA < 0.08).

3.9 PROCESS Macro Mediation Analysis

Hayes' PROCESS Macro (Model 4) within IBM SPSS Statistics examined mediating influence of Emotional Wage regarding relationship between Green HRM Strategies and Employee Well-Being. Bootstrapping procedures assessed significance of indirect effects and determined extent of mediation. PROCESS Macro analysis provided preliminary empirical support regarding proposed mediation framework prior SEM estimation.

3.10 SEM Analysis

SEM was conducted using IBM SPSS Amos to examine the direct and mediating relationships among Green HRM Strategies, Emotional Wage, and Employee Well-Being within an integrated analytical framework. The SEM procedure involved two stages: (i) validation of the measurement model using CFA, and (ii) estimation of the structural model for hypothesis testing. Mediation analysis was performed using bootstrapping procedures to evaluate the indirect effect of Emotional Wage. The structural relationships were represented as Equations (1–3):

$$\text{Emotional Wage} = \beta_1 (\text{Green HRM Strategies}) + e_1 \quad (1)$$

$$\text{Employee Well-Being} = \beta_2 (\text{Green HRM Strategies}) + \beta_3 (\text{Emotional Wage}) + e_2 \quad (2)$$

$$\text{Indirect Effect} = \beta_1 \times \beta_3 \quad (3)$$

Where β represents standardized path coefficients and e denotes residual error terms.

3.11 Statistical analysis

IBM SPSS AMOS supported advanced statistical validation procedures within proposed conceptual framework. Confirmatory Factor Analysis (CFA) assessed construct reliability, convergent validity, discriminant validity, and measurement model fitness using standardized factor loadings, Composite Reliability (CR), Average Variance Extracted (AVE), and goodness-of-fit indices. Structural Equation

Modeling (SEM) further evaluated integrated structural relationships among Green HRM Strategies, Emotional Wage, and Employee Well-Being. Bootstrapping procedures additionally examined significance of indirect mediation effects within structural model estimation.

4. RESULTS

4.1 Employee Distribution and Workforce Profile

4.1.1 Distribution of Employee Responses across Districts and Organizations

As presented in Fig. 1, Hyderabad contributed the highest respondent share (30%), followed by Medchal–Malkajgiri, Rangareddy, and Warangal Urban (12.5% each), ensuring broad geographical representation across Telangana dark-store operations. Organizational participation also remained relatively balanced in Fig. 1, with Blinkit (22.25%) and BigBasket (21.75%) showing slightly higher representation, followed by DMart Ready (20%), Swiggy Instamart (19%), and Zepto (17%). This balanced distribution enhanced contextual diversity and reduced organizational bias, thereby strengthening the generalizability of sustainability-oriented HRM assessment across operational environments (Muisyo et al., 2022; Yasin et al., 2025).

4.1.2 Distribution of Respondents by Employee Role

The respondent distribution by employee role indicates that Delivery Executives/Riders constituted 30% of the sample, followed by Picker-Packers (25%), Store Managers/Storekeepers (20%), Operation Managers/Leads (15%), and HR personnel (10%). The predominance of frontline operational employees reflects the labor-intensive nature of dark-store logistics and provides valuable insights into the implementation of Green HRM practices and employee well-being within high-pressure supply chain environments (Paché, 2022).

4.1.3 Demographic and Employment Profile of Respondents

The demographic profile presented in Fig. 2 shows those employees aged 25–35 years dominate the sample (59.75%), while male employees represent 74.5% of the workforce. Employees with 1–3 years of experience constitute 51.5%, indicating a moderately experienced and high-turnover workforce typical of fast-moving retail logistics. Full-time employees account for 70% of the sample, reflecting strong operational dependence on permanent staffing structures (Gyensare et al., 2024).

The respondent profile provided adequate organizational, geographical, and hierarchical representation across dark-store supply chains in Telangana. The predominance of young frontline employees reflects the workforce composition of the sector and enhances the relevance of examining sustainability-

oriented HRM practices in relation to employee well-being within operationally intensive retail logistics environments.

4.2 Integrated Assessment of Green HRM Strategies, Emotional Wage, and Employee Well-Being

The descriptive analysis examines the extent of Green HRM strategy adoption, employee perceptions of emotional wage practices, and well-being outcomes within dark-store retail logistics operations in Telangana. The results highlight the overall patterns and distribution of the study variables, providing a basis for subsequent analyses.

4.2.1 Green HRM Strategy Implementation and Descriptive Perceptions

As illustrated in Fig. 4, the Green HRM strategy dimensions recorded mean scores ranging from 3.62 to 4.08, accompanied by standard deviations between 0.60 and 0.78. These values suggest that employees generally perceived green HRM initiatives positively, although responses exhibited a moderate level of variation. Among the dimensions, Green Sustainable Culture emerged as the most strongly endorsed practice, followed by Green Training and Green Internal Communication, reflecting a relatively high degree of sustainability integration within organizational processes. In contrast, Green Recruitment and Green Performance Management received comparatively lower ratings, suggesting that the incorporation of green-oriented HR systems remains at an intermediate stage within operational settings (Ullah et al., 2017; Mishra et al., 2017).

4.2.2 Emotional Wage and Non-Monetary Reward Perceptions

Figure 5 shows that the Emotional Wage dimensions achieved mean scores ranging from 3.88 to 4.18, while standard deviation values varied between 0.55 and 0.70. These results reflect generally favorable and relatively consistent employee evaluations of the non-financial benefits and supportive practices provided by their organizations. The highest ratings were observed for the Value Creation and Motivational dimensions, whereas the Strategic and Human dimensions also received positive assessments. This distribution underscores the significance of recognition, equitable treatment, leadership commitment, and work–life balance in enhancing employees' overall workplace experience (Martínez-Falcó et al., 2024; Faeni et al., 2025).

4.2.3 Employee Well-Being Outcomes

The results presented in Fig. 6 indicate that the Employee Well-Being dimensions attained mean scores between 3.85 and 4.12, with standard deviation values ranging from 0.57 to 0.71. This pattern suggests a consistently positive assessment of employee well-being across the sampled organizations, alongside a moderate degree of response dispersion. Among the dimensions examined, Subjective Well-Being and

Social Well-Being received the highest ratings, whereas Workplace Well-Being and Psychological Well-Being recorded comparatively lower, yet still favorable, scores. Collectively, these findings reinforce the view that sustainable HR practices contribute to multiple facets of employee well-being, encompassing psychological, social, workplace, and subjective domains within the context of retail logistics operations (Amjad et al., 2021; Martínez-Falcó et al., 2025).

4.3 Measurement Model and Validity

The CFA results established satisfactory psychometric adequacy of the measurement framework. As presented in Table 2, all latent constructs demonstrated adequate reliability and convergent validity, confirming the internal consistency and stability of the integrated SEM model. Furthermore, the standardized factor loading results presented in Table 3 confirmed acceptable construct representation across all study dimensions, thereby supporting the multidimensional structure of Green HRM Strategies, Emotional Wage, and Employee Well-Being within dark-store operations.

Table 2
Reliability and Validity Assessment

Construct	Cronbach's Alpha	Composite Reliability (CR)	AVE	Interpretation
Green HRM Strategies	0.91	0.92	0.61	Reliable and Valid
Emotional Wage	0.89	0.90	0.59	Reliable and Valid
Employee Well-Being	0.93	0.94	0.64	Reliable and Valid

Table 3
Standardized Factor Loadings of Study Dimensions

Construct Dimension		Loading Range	Interpretation
Green HRM Strategies	Green Recruitment and Onboarding	0.64–0.78	Acceptable
	Green Training	0.69–0.82	Strong
	Green Performance Management and Rewards	0.67–0.80	Strong
	Green Internal Communication	0.70–0.84	Strong
	Green Sustainable Culture	0.74–0.88	Very Strong
Emotional Wage	Strategic Dimension	0.68–0.83	Strong
	Human Dimension	0.65–0.79	Acceptable
	Value Creation Dimension	0.76–0.89	Very Strong
	Motivational Dimension	0.72–0.86	Strong
Employee Well-Being	Psychological Well-Being	0.67–0.81	Strong
	Social Well-Being	0.71–0.85	Strong
	Workplace Well-Being	0.69–0.83	Strong
	Subjective Well-Being	0.73–0.87	Very Strong

The CFA findings indicate that all observed indicators exceeded the recommended standardized loading threshold, thereby confirming satisfactory construct reliability and validity within the SEM framework. Comparatively stronger loading ranges were observed for Green Sustainable Culture, Value Creation, and Subjective Well-Being dimensions, indicating higher latent construct stability within the integrated measurement model.

4.4 Structural Model

4.4.1 PROCESS Macro Mediation

Mediation analysis was initially conducted using Hayes' PROCESS Macro (Model 4) in IBM SPSS Statistics to examine the indirect effect of Emotional Wage in the relationship between Green HRM Strategies and Employee Well-Being. Bootstrapping procedures confirmed a statistically significant indirect effect of Green HRM Strategies on Employee Well-Being through Emotional Wage ($\beta = 0.41$, $p < 0.001$). In addition, the direct relationship between Green HRM Strategies and Employee Well-Being remained statistically significant after the inclusion of the mediator ($\beta = 0.39$, $p < 0.001$), thereby indicating partial mediation within the proposed conceptual framework. The PROCESS Macro findings suggest that Green HRM practices not only directly enhance employee well-being but also indirectly

improve well-being through emotional and motivational mechanisms associated with Emotional Wage. These preliminary mediation results provided empirical support for proceeding with the integrated SEM validation framework.

4.4.2 SEM Structural Model

SEM analysis using IBM SPSS AMOS further validated the structural relationships among Green HRM Strategies, Emotional Wage, and Employee Well-Being within dark-store supply chains. The SEM structural model and standardized path relationships are illustrated in Fig. 7. The structural model demonstrated acceptable goodness-of-fit and statistically significant relationships among the latent constructs. The SEM bootstrapping results further confirmed the partial mediating role of Emotional Wage within the integrated structural framework. The SEM structural diagram served as the primary mediation validation framework for interpretation and publication purposes. The standardized structural equations derived from the SEM model are presented in Equations 4–6:

$$EW = 0.68\ (GHRM) + e_1 \quad (4)$$

$$EWB = 0.39\ (GHRM) + 0.61\ (EW) + e_2 \quad (5)$$

$$\text{Indirect Effect} = 0.68 \times 0.61 = 0.41 \quad (6)$$

The SEM findings confirm that Green HRM Strategies significantly influence both Emotional Wage and Employee Well-Being, while Emotional Wage also exerts a significant positive effect on Employee Well-Being. The statistically significant indirect effect further demonstrates that Emotional Wage partially mediates the relationship between Green HRM Strategies and Employee Well-Being. These findings indicate that Green HRM practices improve employee well-being through both direct organizational support mechanisms and indirect intrinsic motivational pathways within dark-store supply chain operations (Amjad et al., 2021; Martínez-Falcó et al., 2024; Yasin et al., 2025).

5. DISCUSSION

5.1 Mechanism-Based Interpretation, Theoretical Extension, and Contextual Implications

5.1.1 Green HRM as System-Level Capability

The findings indicate that Green Human Resource Management (GHRM) operates as an integrated system of HR practices rather than isolated functions. This aligns with the Ability–Motivation–Opportunity (AMO) framework, where bundled HR practices collectively enhance employee capability, motivation, and opportunity for sustainability-oriented behavior (Muisyo et al., 2022; Mishra et al., 2017). The observed mean values (3.62–4.08) further reflect moderate-to-strong employee perception of GHRM

practices, with Green Sustainable Culture (4.02–4.08) indicating strong institutional embedding of sustainability within organizational identity.

5.1.2 Emotional Wage as Mediating Construct

Emotional wage emerges as a critical socio-psychological mechanism linking GHRM practices to employee outcomes. High mean values (3.88–4.18), particularly in value creation and motivational dimensions, indicate strong employee perception of non-monetary rewards such as recognition, fairness, and developmental support. Grounded in Social Exchange Theory, emotional wage reflects perceived organizational reciprocity and extends beyond traditional job satisfaction, thereby justifying its mediating role in the GHRM–well-being relationship (Martínez-Falcó et al., 2024; Faeni et al., 2025).

5.1.3 Employee Well-Being Outcomes

Employee well-being demonstrates consistently positive outcomes across psychological, social, workplace, and subjective dimensions (3.85–4.12). Among these, subjective and social well-being are relatively stronger, indicating that employee wellness is primarily shaped through relational and psychological mechanisms rather than direct HR interventions (Gyensare et al., 2024; Amjad et al., 2021).

5.1.4 Integrated Mechanism

The integration of Social Exchange Theory and the AMO framework establishes a structured mechanism wherein GHRM functions as a system-level input, emotional wage acts as a mediating psychological mechanism, and employee well-being represents the final outcome. This integrated model addresses prior fragmentation in HRM research by explaining how sustainability-oriented HR systems influence employee outcomes through reciprocal psychological processes in high-intensity operational environments.

5.1.5 PROCESS Macro and SEM Structural Relationships

- **PROCESS Macro Mediation Validation**: Hayes' PROCESS Macro (Model 4) confirmed the significant mediating role of Emotional Wage in the relationship between Green HRM Strategies and Employee Well-Being. Bootstrapping results indicated a significant indirect effect ($\beta = 0.41$, $p < 0.001$), while the direct effect of Green HRM Strategies on Employee Well-Being remained significant ($\beta = 0.39$, $p < 0.001$), confirming partial mediation. These findings suggest that Green HRM practices improve employee well-being through both direct organizational support and indirect emotional–motivational mechanisms (Amjad et al., 2021; Martínez-Falcó et al., 2024; Yasin et al., 2025).
- **SEM Structural Relationships**: The SEM results further validated significant relationships among Green HRM Strategies, Emotional Wage, and Employee Well-Being. Green HRM significantly influenced Emotional Wage ($\beta = 0.68$), while Emotional Wage positively affected Employee Well-Being ($\beta = 0.61$). The indirect effect ($\beta = 0.41$) further supported partial mediation. In addition, the acceptable model-fit indices (CFI = 0.93; RMSEA = 0.056) confirmed the robustness of the proposed framework. These findings extend prior Green HRM research by empirically validating Emotional

Wage as a key mediating mechanism within dark-store supply chains (Martínez-Falcó et al., 2024; Ullah et al., 2017).

5.2 Methodological and Contextual Implications

Although the cross-sectional design and self-reported data introduce potential common method bias, construct-level differentiation across GHRM, emotional wage, and well-being (SD range: 0.55–0.78) strengthens measurement reliability and reduces bias concerns (Ullah et al., 2017; Mishra et al., 2017). The study's focus on dark-store supply chains in Telangana (Paché, 2022; Mpunga, 2025) enhances contextual relevance, as these environments are characterized by high operational intensity and time-sensitive delivery systems. The positive well-being outcomes observed suggest that GHRM acts as a buffering mechanism under high-pressure work conditions, extending the applicability of AMO and Social Exchange Theory to digitally driven logistics ecosystems.

5.3 Measurement Model Assessment: Reliability, Validity, CFA, and Content Validity

Measurement model assessment examined psychometric adequacy, internal consistency, construct validity, and structural coherence of the study instrument regarding Green HRM Strategies, Emotional Wage, and Employee Well-Being. Reliability, validity, Confirmatory Factor Analysis (CFA), and content validity assessments collectively evaluated suitability of the integrated measurement framework within dark-store supply chain environments. Table 4 presents the integrated reliability, validity, CFA, and content validity statistics of the study constructs, including Cronbach's alpha, Composite Reliability (CR), Average Variance Extracted (AVE), and Content Validity Index (CVI) measures.

Table 4
Integrated Reliability, Validity, and CFA Assessment of Study Constructs

Construct	Cronbach's α	CR	AVE	S-CVI/Ave	S-CVI/UA	Interpretation
Green HRM Strategies	0.936	0.92	> 0.50	0.985	0.885	Reliable and valid
Emotional Wage	0.970	0.90	> 0.50	0.992	0.895	Highly reliable and valid
Employee Well-Being	0.975	0.94	> 0.50	0.990	0.890	Highly reliable and valid
Overall Instrument	0.970	—	—	0.989	0.890	Strong psychometric adequacy

5.3.1 Reliability

Reliability assessment confirmed strong internal consistency across all study constructs, with Cronbach's alpha values exceeding recommended threshold levels (> 0.70) (Das and Singh, 2016). Green

HRM dimensions demonstrated acceptable to excellent reliability (α = 0.79–0.92), while Emotional Wage (α = 0.92–0.96) and Employee Well-Being (α = 0.92–0.95) reported very high reliability levels. Overall construct reliability remained high across Green HRM Strategies (α = 0.936), Emotional Wage (α = 0.970), and Employee Well-Being (α = 0.975), whereas overall instrument reliability reached α = 0.97, confirming excellent measurement stability across all 73 items. These findings confirm strong scale consistency and stable latent construct measurement across sustainability-oriented HRM practices, socio-emotional rewards, and employee well-being dimensions. High reliability coefficients further support suitability of the instrument regarding advanced multivariate and SEM-based analyses.

5.3.2 Validity

Validity assessment evaluated conceptual adequacy and construct coherence regarding Green HRM Strategies, Emotional Wage, and Employee Well-Being dimensions within dark-store operational environments. Construct-level consistency and conceptual alignment examined adequacy of measurement items regarding latent variable representation. High consistency across latent dimensions confirmed appropriate alignment between theoretical constructs and observed variables, supporting adequacy of the integrated measurement framework. Strong construct coherence further validated suitability of the instrument regarding sustainability-oriented HRM assessment within high-intensity operational settings.

5.3.3 Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) assessed psychometric adequacy and structural coherence of the proposed measurement model using Composite Reliability (CR), Average Variance Extracted (AVE), standardized factor loadings, and model fit indicators. CFA further examined convergent validity and latent construct representation within the SEM framework. CFA results established strong construct adequacy, with Green HRM Strategies (CR = 0.92), Emotional Wage (CR = 0.90), and Employee Well-Being (CR = 0.94) exceeding recommended reliability thresholds. AVE values remained above 0.50 across all constructs, confirming convergent validity and satisfactory variance explanation through latent variables. Green Sustainable Culture, Value Creation, and Subjective Well-Being demonstrated comparatively stronger factor loading ranges, indicating higher construct stability and conceptual representation within the integrated SEM framework (Amjad et al., 2021).

5.3.4 Content Validity

Content validity assessment employed Item-Level Content Validity Index (I-CVI) and Scale-Level Content Validity Index (S-CVI) using average (S-CVI/Ave) and universal agreement (S-CVI/UA) methods (Ibrahim et al., 2024; Martínez-Falcó et al., 2025). Expert evaluation examined relevance, adequacy, and representativeness of measurement items across all study constructs. All measurement items recorded high I-CVI values ranging between 0.90 and 1.00, confirming strong item relevance across constructs. Green HRM Strategies reported S-CVI/Ave = 0.985 and S-CVI/UA = 0.885, Emotional Wage recorded S-CVI/Ave = 0.992 and S-CVI/UA = 0.895, while Employee Well-Being demonstrated S-CVI/Ave = 0.990 and S-CVI/UA = 0.890. Overall questionnaire validity remained high (S-CVI/Ave = 0.989; S-CVI/UA = 0.890),

confirming strong expert consensus and adequate construct representation within sustainability-oriented HRM research.

5.4 Statistical Analysis of Green Human Resource Management, Emotional Wage, and Employee Well-Being

The study examined relationships among Green Human Resource Management (GHRM), emotional wage (EW), and employee well-being (EWB) in dark-store supply chains using correlation, regression, and ANOVA analyses. A total of 400 employee responses were analyzed to test Hypotheses H1–H4, assessing both direct and indirect effects, including the mediating role of emotional wage. The results provide empirical evidence that sustainable HR practices influence non-financial rewards, psychological health, and overall employee well-being.

5.4.1 Correlation Analysis

Pearson correlation analysis examined relationships among Green Human Resource Management (GHRM), emotional wage (EW), and employee well-being (EWB) in dark-store supply chains, with results supporting Hypotheses H1–H4 (Table 5). GHRM showed a positive relationship with emotional wage (H1) and employee well-being (H3), while emotional wage was positively associated with employee well-being (H2), indicating moderate to strong associations. These findings align with sustainability HRM and psychosocial research (Khan et al., 2024; Ibrahim et al., 2024; Yuan et al., 2024). The significant EW–EWB link supports its partial mediating role (H4), consistent with prior mediation studies (Gyensare et al., 2024; Mpunga et al., 2025). Results suggest that GHRM improves employee satisfaction and well-being by reducing stress and enhancing retention and operational efficiency in dark-store supply chains (Paché, 2022; Raj et al., 2026).

.

Table 5
Pearson Correlation Between Green Human Resource Management, Emotional Wage, and Employee Well-Being in Dark-Store Supply Chains

Variable	GHRM	Emotional Wage (EW)	Employee Well-Being (EWB)
GHRM	1	0.470	0.333
EW	0.470	1	0.472
EWB	0.333	0.472	1

5.4.2 Regression Analysis

Regression analysis examined the magnitude, direction, and mediating effects of GHRM on emotional wage and employee well-being. Based on 400 responses (Table 6), GHRM significantly predicts emotional wage ($\beta = 0.470$, $p < 0.001$), while emotional wage significantly predicts employee well-being ($\beta = 0.472$, $p < 0.001$), confirming strong relationships. Employee well-being is influenced by both GHRM

and emotional wage, indicating partial mediation consistent with psychosocial HR mechanisms (Ibrahim et al., 2024; Martínez-Falcó et al., 2025). The findings confirm a dual pathway where GHRM affects well-being directly and indirectly through emotional wage, supporting sustainability HR mediation evidence (Gyensare et al., 2024; Mpunga et al., 2025). Overall, results show that sustainability-oriented HR practices enhance employee well-being through structural and psychological mechanisms in dark-store supply chains (Paché, 2022; Raj et al., 2026).

Table 6
Regression Analysis of Green Human Resource Management and Emotional Wage on Employee Well-Being in Dark-Store Supply Chains

Hypothesis	Predictor(s)	Dependent Variable	β	t	p	R^2	Interpretation
H1	GHRM	Emotional Wage	0.470	10.619	< 0.001	0.221	GHRM significantly predicts EW
H2	EW	Employee Well-Being	0.472	10.688	< 0.001	0.223	EW significantly predicts EWB
H3	GHRM	Employee Well-Being	0.333	7.047	< 0.001	0.111	GHRM directly predicts EWB
H4	GHRM + EW	Employee Well-Being	GHRM: 0.140, EW: 0.410	GHRM: 2.876, EW: 8.170	GHRM: 0.004, EW: <0.001	0.239	EW partially mediates GHRM effect on EWB

5.4.3 ANOVA Analysis

ANOVA was conducted to test the statistical significance of regression models for H1–H4, assessing whether predictors jointly explain variance in employee well-being. As shown in Table 7, the models are highly significant ($p < 0.001$), confirming that Green Human Resource Management (GHRM) and emotional wage significantly predict employee well-being. High F-values indicate strong explanatory power, validating the regression results. H4 is also supported, confirming the partial mediation effect of emotional wage in the relationship between GHRM and employee well-being. These findings highlight the importance of sustainable HR practices in improving employee mental health, reducing turnover, and enhancing workplace productivity.

Table 7
ANOVA Results of Regression Models Examining Green Human Resource Management, Emotional Wage, and Employee Well-Being

Hypothesis	Predictor(s)	Dependent Variable	F	df1	df2	p	Interpretation
H1	GHRM	Emotional Wage	112.757	1	398	< 0.001	Model is significant; GHRM predicts EW
H2	EW	Employee Well-Being	114.243	1	398	< 0.001	Model is significant; EW predicts EWB
H3	GHRM	Employee Well-Being	49.654	1	398	< 0.001	Model is significant; GHRM predicts EWB
H4	GHRM + EW	Employee Well-Being	62.301	2	397	< 0.001	Model is significant; EW partially mediates GHRM effect on EWB

5.5 Integrated Comparative Evaluation

Green Human Resource Management (GHRM), emotional wage, and employee well-being represent interconnected dimensions influencing sustainability-oriented workforce outcomes within dark-store supply chains. The integrated evaluation combines descriptive, correlational, regression, and mediation findings to explain how sustainability-focused HR practices shape employee perceptions and well-being outcomes.

5.5.1 Green HRM Strategy Implementation and Descriptive Perceptions

Green HRM practices demonstrated consistently positive employee perceptions across recruitment, training, performance management, communication, and sustainability culture dimensions. Green Sustainable Culture and Green Internal Communication recorded comparatively higher mean values (3.95–4.10), indicating strong organizational emphasis on sustainability awareness and employee engagement. Workforce representation across districts, organizations, and operational roles strengthened contextual validity and reflected broad applicability of sustainability-oriented HR practices within high-intensity dark-store environments. Reliability and validity indicators further confirmed strong psychometric adequacy of Green HRM constructs, with Cronbach's alpha values exceeding recommended thresholds and CFA results supporting convergent validity and construct stability (Deshwal et al., 2015; Ullah et al., 2017; Vadithe et al., 2025). The relevance of sustainability-oriented operational systems within intensive fulfillment environments is further supported by studies highlighting the evolving structure and operational characteristics of dark-store logistics and sustainable infrastructure systems (Pintado et al., 2022; Munarso et al., 2025).

5.5.2 Emotional Wage and Non-Monetary Reward Perceptions

Emotional wage dimensions, including strategic, human, value creation, and motivational components, reported high perception scores ranging between 3.88 and 4.18, reflecting positive employee evaluations regarding recognition, organizational support, flexibility, and psychosocial rewards. Correlation and regression analyses confirmed significant relationships between Green HRM and emotional wage ($r = 0.470$; $\beta = 0.470$, $p < 0.01$), indicating that sustainability-oriented HR systems substantially enhance socio-emotional employee experiences. Mediation analysis further demonstrated that emotional wage functions as a significant psychological mechanism linking GHRM practices with employee outcomes through partial mediation effects. These findings support Social Exchange Theory (SET) and Ability–Motivation–Opportunity (AMO) theory, where sustainability-oriented HR practices strengthen employee reciprocity, motivation, and perceived organizational support (Martínez-Falcó et al., 2025; Ibrahim et al., 2024; Vadithe et al., 2025). The findings also align with broader sustainability governance perspectives emphasizing the importance of organizational support mechanisms, transparency, and stakeholder-oriented practices in strengthening employee engagement and value creation processes (Tare et al., 2025; Mamytova et al., 2026).

5.5.3 Employee Well-Being Outcomes

Employee well-being dimensions demonstrated consistently favorable outcomes across psychological, social, workplace, and subjective well-being domains, with mean values ranging from 3.85 to 4.12. Significant positive relationships emerged between emotional wage and employee well-being ($r = 0.472$; $\beta = 0.472$), while Green HRM also demonstrated a positive direct influence on well-being ($\beta = 0.333$). However, indirect effects through emotional wage remained comparatively stronger, indicating that psychosocial rewards represent a more influential pathway connecting sustainability-oriented HR practices with employee well-being outcomes. Integrated SEM and mediation findings confirmed that employee well-being within dark-store supply chains depends not only on environmental HR systems but also on emotional and motivational support mechanisms embedded within organizational practices (Gyensare et al., 2024; Mpunga et al., 2025; Vadithe et al., 2025). This observation is consistent with contemporary sustainability studies suggesting that long-term organizational resilience and sustainability performance are strengthened when environmental initiatives are accompanied by supportive human-centered and governance-oriented practices (Munarso et al., 2025; Mamytova et al., 2026).

The integrated findings confirm that Green HRM practices positively influence employee well-being both directly and indirectly through emotional wage within dark-store supply chains. Emotional wage emerged as the stronger psychosocial mechanism, highlighting the importance of combining sustainability-oriented HR practices with non-monetary employee support systems to achieve long-term workforce well-being and organizational sustainability. These findings are further supported by recent evidence demonstrating that sustainability-focused HR systems, operational innovation, and governance-oriented

sustainability strategies collectively contribute to organizational effectiveness and sustainable development outcomes across diverse sectors (Pintado et al., 2022; Vadithe et al., 2025; Mamytova et al., 2026).

5.6 Implications and Contributions

The findings confirm that Green HRM positively influences employee well-being directly and indirectly through emotional wage within dark-store supply chains. Emotional wage emerged as a significant mediating mechanism, indicating that psychosocial rewards strengthen the impact of sustainability-oriented HR practices on employee outcomes. Integration of Social Exchange Theory (SET) and Ability–Motivation–Opportunity (AMO) theory extends Green HRM literature into digitally coordinated and high-intensity quick-commerce environments. Practically, sustainability-oriented HR practices, green communication, and emotional wage systems improve employee motivation, engagement, retention, and psychological well-being. The findings provide strategic direction for organizations and policymakers regarding development of sustainable workforce management practices within retail and supply chain sectors.

5.7 Limitations and Future Research

The cross-sectional design limits causal interpretation among Green HRM, emotional wage, and employee well-being. Context-specific focus on Telangana dark-store supply chains may restrict generalizability across sectors and regions, while self-reported responses may introduce perceptual bias. Future studies may adopt longitudinal and comparative approaches across industries and countries to examine long-term organizational and psychological outcomes of Green HRM practices. Further research may also explore artificial intelligence, digital HR systems, and technology-enabled employee support mechanisms within high-pressure fulfillment environments.

5.8 Originality and Managerial Value

The study contributes original empirical evidence regarding Green HRM, emotional wage, and employee well-being within underexplored dark-store supply chains. Emotional wage was validated as a significant socio-psychological mechanism linking sustainability-oriented HR practices with employee well-being through an integrated SEM framework. The validated model demonstrates that sustainability-focused HR systems combined with psychosocial support mechanisms generate stronger workforce outcomes than environmental HR practices alone. The framework therefore offers practical guidance regarding sustainable and employee-centered HR strategy development within digital supply chain ecosystems.

6. CONCLUSION

Findings confirmed significant positive influence of Green Human Resource Management (GHRM) on emotional wage and employee well-being within dark-store supply chains. Green recruitment, environmental training, sustainable performance management, internal communication, and green organizational culture strengthened psychosocial rewards and workforce well-being. Emotional wage

functioned as partial mediating mechanism, indicating stronger employee outcomes through sustainability-oriented HR systems combined with non-financial organizational support. Correlation, regression, mediation, and SEM analyses confirmed significant relationships among study constructs. CFA results established strong reliability, convergent validity, and satisfactory model fit. Green HRM positively influenced Emotional Wage (β = 0.68) and Employee Well-Being (β = 0.61), whereas indirect mediation effect (β = 0.41) validated significant psychosocial transmission pathway. Sustainability-focused HR systems improved employee satisfaction, motivation, mental health, engagement, operational efficiency, and workforce stability within high-pressure fulfillment environments. Cross-sectional design, Telangana-specific context, and self-reported responses may restrict broader generalizability. Future investigations may adopt longitudinal and multi-sectoral approaches regarding long-term organizational and psychological outcomes associated with sustainability-oriented HR practices.

Declarations

Ethics Approval Statement: This study involving human participants was reviewed and approved by the Research Ethics Committee/Institutional Ethics Committee of Lovely Professional University, Punjab, India. The research was conducted in accordance with the ethical standards of the institution. Informed consent was obtained from all participants prior to their participation in the study, and participation was voluntary. The confidentiality and anonymity of respondents were maintained throughout the research process.

Ethical Approval

All methods employed in this study were carried out in accordance with relevant ethical guidelines and regulations. The study involved a questionnaire-based survey of employees working in dark stores across Telangana, India. Participation was voluntary, and respondents were informed about the purpose of the study before data collection. The research complied with the ethical standards applicable to social science research involving human participants.

Consent to Participate

Informed consent was obtained from all participants prior to their participation in the study. Respondents were informed about the objectives of the research, and participation was entirely voluntary. Participants were assured that their responses would remain anonymous and confidential and would be used solely for academic and research purposes.

Consent to Publish:

Not applicable.

Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Funding

The authors received no specific funding, grant, or financial support from any funding agency in the public, commercial, or not-for-profit sectors for the conduct of this research.

Author Contribution

Author Contributions*Hitesh Bhoi (H.B.)*: Conceptualization, methodology, investigation, data collection, formal analysis, statistical analysis, interpretation of results, writing—original draft preparation, and manuscript development.*Pretty Bhalla (P.B.)*: Supervision, conceptualization, methodology validation, academic guidance, critical review and editing of the manuscript, and overall project administration.*Rita Kumari (R.K.)*: Literature review, data validation, data curation, manuscript review, editing, and quality assurance of research content.*Mridul M. (M.M.)*: Formal analysis, visualization, preparation of tables and figures, interpretation of findings, and manuscript review.*Syeda Zehra (S.Z.)*: Investigation, questionnaire administration, data collection, data organization, manuscript formatting, and review of the final draft.*D. Sivakumar (D.S.)*: Methodology validation, statistical review, interpretation of results, critical revision of the manuscript for important intellectual content, and final approval of the manuscript.*All authors* read and approved the final manuscript and agree to be accountable for all aspects of the work.

Data Availability

Availability of Data and MaterialsThe datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

References

1. Al-Jaber A, Alzghoul A, Alghizzawi M, AlFraihat SF, Elhawi R, Banihani T. Integrating HRM strategies to achieve sustainable development goals: The mediating roles of employee well-being and corporate governance. Administrative Sci. 2025;15(12):474.
2. Amjad F, Abbas W, Zia-UR-Rehman M, Baig SA, Hashim M, Khan A, Rehman HU. Effect of green human resource management practices on organizational sustainability: The mediating role of environmental and employee performance. Environ Sci Pollut Res. 2021;28(22):28191–206.
3. Benevene P, Buonomo I. (2020), Green human resource management: An evidence-based systematic literature review, Sustainability, Vol. 12 No. 15, p. 5974.

4. Chavhan R, Dutta P. Redesigning quick commerce fresh and short food supply chains: Circular economy strategies for sustainable last-mile operations. Br Food J. 2025;127(5):1676–701.
5. Das SC, Singh RK. Green HRM and organizational sustainability: An empirical review. Kegees J Social Sci. 2016;8(1):227–36.
6. Deshwal P. Green HRM: An organizational strategy of greening people. Int J Appl Res. 2015;1(13):176–81.
7. Efranto RY, Sipayung SN, Amrulloh ABY. Green human resource management: A decade of evolution in practices, employee green behavior, and organizational sustainability. Cogent Bus Manage. 2026;13(1):2598686.
8. Faeni DP, Oktaviani RF, Riyadh HA, Faeni RP, Beshr BAH. (2025), Green human resource management and sustainable practices on corporate reputation and employee well-being: A model for Indonesia's F&B industry, Environmental Challenges, Vol. 18, p. 101082.
9. Guimarães P, Rodrigues N. Transformations in retail in the digital age: Dark stores, brick-and-mortar retailers, and emerging logistics dynamics. Retail, and Consumption: The Wiley Blackwell Companion to the City; 2026. pp. 376–94.
10. Gyensare MA, Adomako S, Amankwah-Amoah J. Green HRM practices, employee well-being, and sustainable work behavior: Examining the moderating role of resource commitment. Bus Strategy Environ. 2024;33(4):3129–41.
11. Ibrahim I, Alzubi MMS, Ali K. The impact of green human resource management practices (GHRMPs) on turnover intention (TI): Moderated by work-health balance (WHB) and work-family balance (WFB). J Ecohumanism. 2024;3(7):2618–34.
12. Iqbal R, Shahzad K, Chaudhary R. Green human resource management practices as a strategic choice for enhancing employees' environmental outcomes: An affective events theory perspective. Int J Manpow. 2024;45(4):801–19.
13. Jamil S, Zaman SI, Kayikci Y, Khan SA. (2023), The role of green recruitment on organizational sustainability performance: A study within the context of green human resource management, Sustainability, 15 21, p. 15567.
14. Kamboj J, Anthonysamy E. Mapping the green human resource management practices: A systematic scoping review and its implications for employees’ well-being. Hum Syst Manage. 2024;43(6):1062–81.
15. Khan K. Examining the mediating role of employee engagement to reinforce environmental performance through green HRM practices with the moderating role of green leader emotional intelligence. Int J Bus Strategy Horizon. 2024;1(1):34–65.
16. Mamytova NS, Sarbassova GA, Omarbekova M, Mukanova KA, Alzhanova LA, Shamshedenova SS, Talgatbekova A, Turakkazy AA, Raimbekova UK, Zhanseiit FK, Pangaliyev Y, Mkilima T. Linking environmental, social, and governance investment metrics to technology adoption and carbon reduction in global energy companies. Global J Environ Sci Manage. 2026;12(2):967–88.

17. Martínez Falcó J, Sánchez-García E, Marco-Lajara B, Millán-Tudela LA. Green human resource management and green performance in the wine industry: The mediating role of employee well-being. Int J Organizational Anal. 2025;33(5):985–1005.
18. Martínez-Falcó J, Sánchez-García E, Marco-Lajara B, Millán-Tudela LA. Enhancing employee wellbeing and happiness management in the wine industry: Unveiling the role of green human resource management. BMC Psychol. 2024;12(1):203.
19. Miah M, Szabó-Szentgróti G, Walter V. A systematic literature review on green human resource management (GHRM): An organizational sustainability perspective. Cogent Bus Manage. 2024;11(1):2371983.
20. Mishra P. Green human resource management: A framework for sustainable organizational development in an emerging economy. Int J Organizational Anal. 2017;25(5):762–88.
21. Mpunga M. The impact of green human resource management on decent work: Linking environmental sustainability and employee well-being. Int J Res Bus Social Sci. 2025;14(2):128–40.
22. Muisyo PK, Qin S, Julius MM, Ho TH, Ho TH. Green HRM and employer branding: The role of collective affective commitment to environmental management change and environmental reputation. J Sustainable Tourism. 2022;30(8):1897–914.
23. Munarso SJ, Purwanta W, Elmatsani HM, Arianto A, Hendriadi A, Benyamin B, Djafar MJ, Kailaku SI, Sjafrina N, Astuti P, Latif A, Daulay H, Santoso AD. Strategic sustainability assessment of rural agribusiness infrastructure systems in humid tropical regions. Global J Environ Sci Manage. 2025;11(4):1769–90.
24. Paché G. Dark store expansion: Ultrafast logistics for Q-commerce. IUP J Supply Chain Manage. 2022;19(3):61–72.
25. Pintado E, de Oliveira LC, Garcia JE. Using EPP boxes in a dark store: A new approach to simplify food retail E-commerce deliveries. Bus Syst Research: Int J Soc Adv Innov Res Econ. 2022;13(3):130–43.
26. Raj A, Das D, Sawik T. Mitigating disruption impact in Q-commerce through optimization of dark store resilient portfolio. Transp Res E. 2026;205:104518.
27. Schorung M. Quick commerce and the evolving business models of the food retail industry: Investigating the quick commerce supply chain and the urban impacts of dark stores. Transp Res Procedia. 2024;79:305–12.
28. Tare N, Trivedi V, Upadhyay P, Vaidya B, Waghmare P, Mehta MR. Enhancing AI and machine learning transparency in financial risk management. Multidisciplinary Research Perspectives for the Greener Future; 2025. p. 224.
29. Ullah MM. (2017), Integrating environmental sustainability into human resources management: A comprehensive review on green human resources management (Green HRM) practices, Economics and Management, Vol. 6 No. 1, pp. 14–19.
30. Vadithe RN, Rajput RC, Kesari B. Impact of green HRM implementation on organizational sustainability in IT sector: A mediation analysis. Sustainable Futures. 2025;9:100507.

31. Wang Y, Ummar R, Qureshi TM, Ul Haq J, Bonn MA. (2025), Employee sustainability: How green practices drive employee well-being and citizenship behavior, Sustainability, Vol. 17 No. 3, p. 936.
32. Yasin R, Bataineh MS, Atif M, Hossain MTB. Green HRM and employer branding: Corporate environmental sustainability and organizational safety climate mediating role and moderating role of job experience. Benchmarking: An International Journal; 2025.
33. Yuan Y, Ren S, Tang G, Ji H, Cooke FL, Wang Z. How green human resource management affects employee voluntary workplace green behaviour: An integrated model. Hum Resource Manage J. 2024;34(1):91–121.

Figures

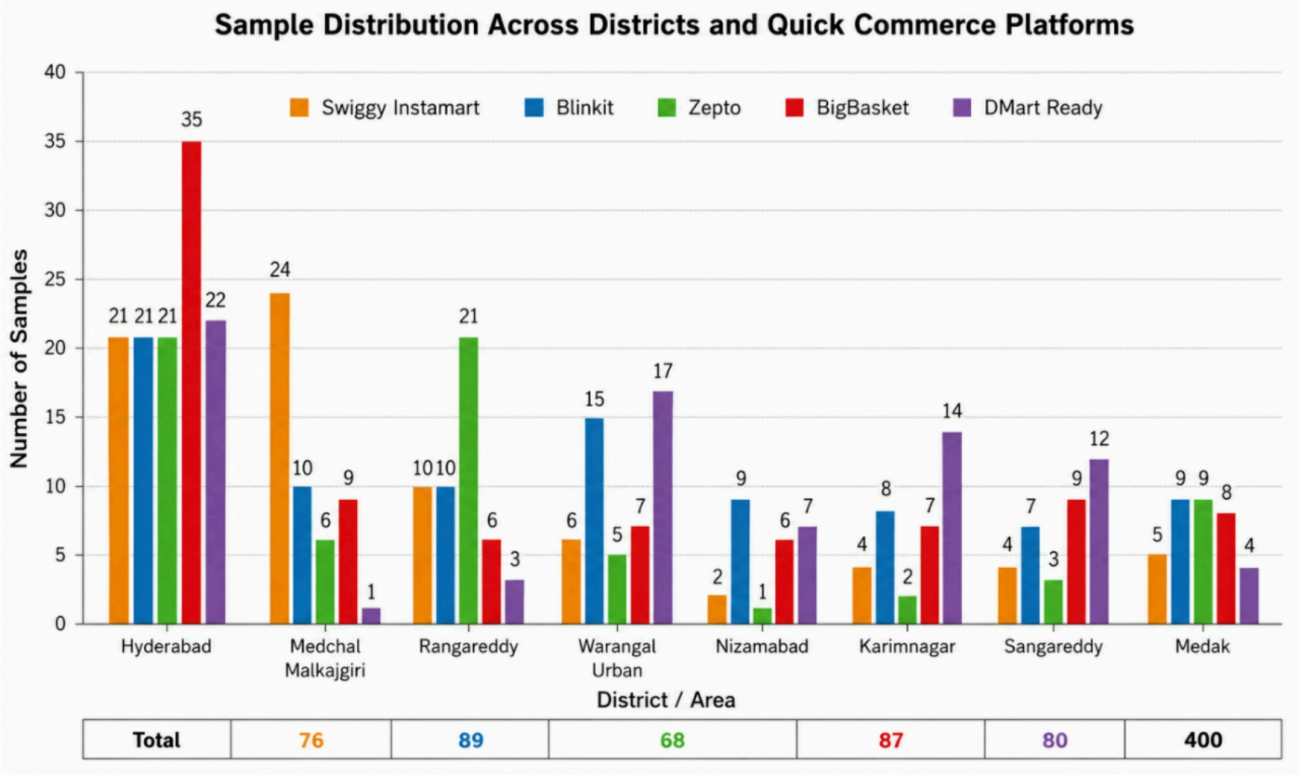


Figure 1

Distribution of Employee Responses across Selected Dark Stores Telangana

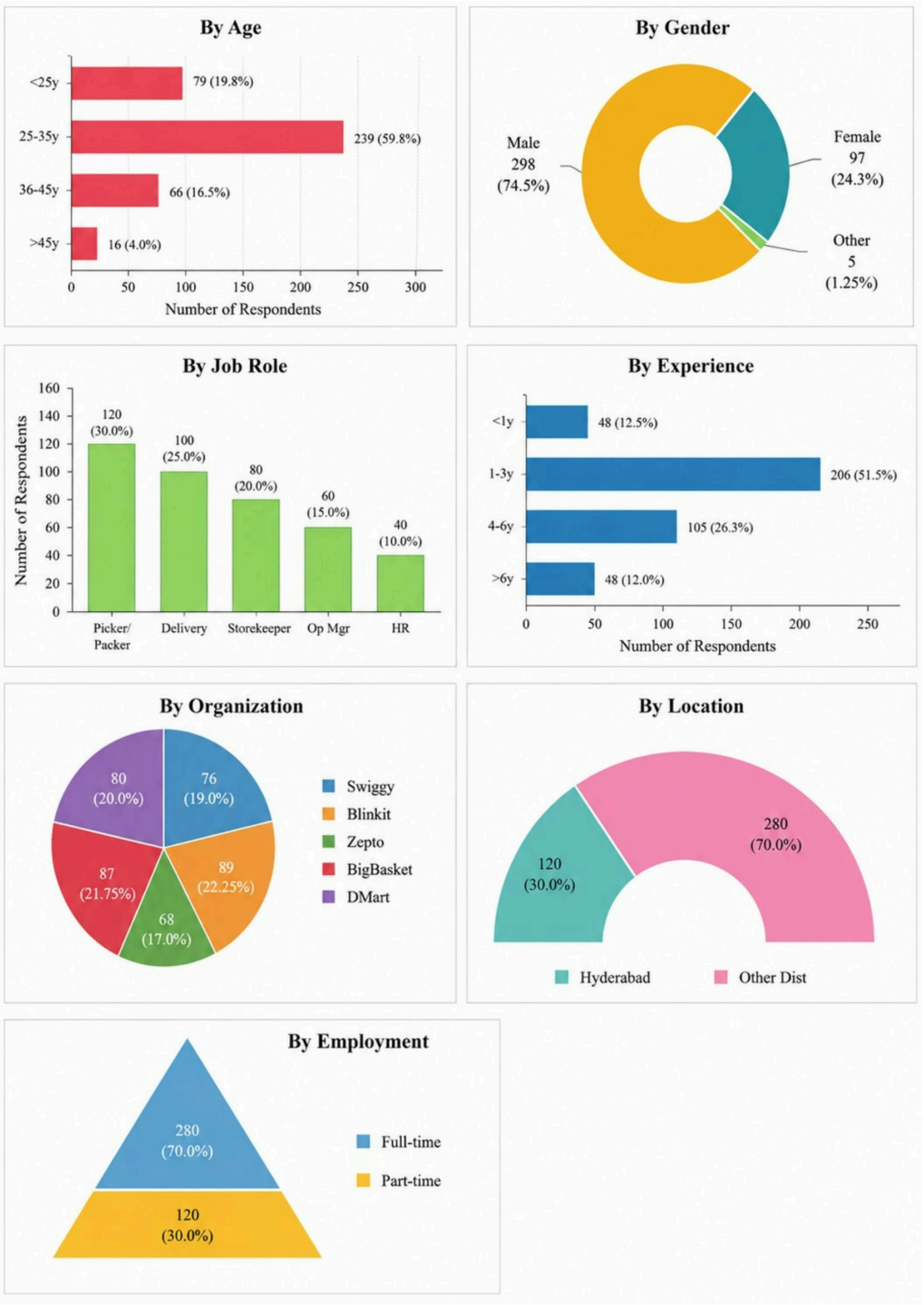


Figure 2

Demographic and Employment Distribution of Respondents in Telangana Dark Stores

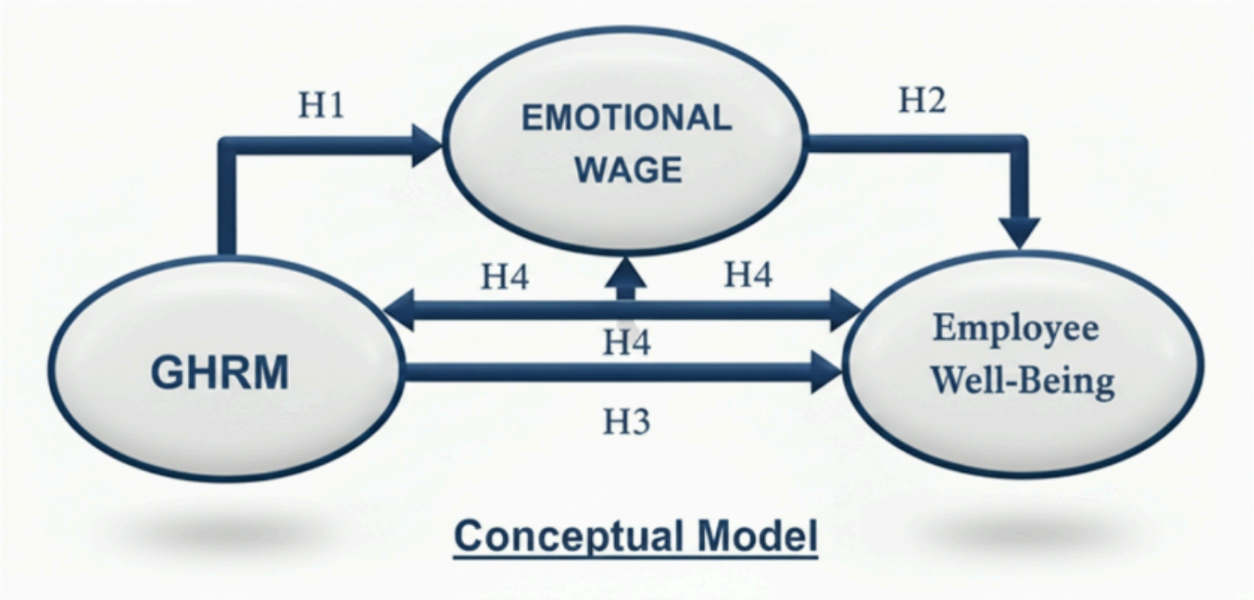


Figure 3

Conceptual Model of GHRM, Emotional Wage, and Well-Being

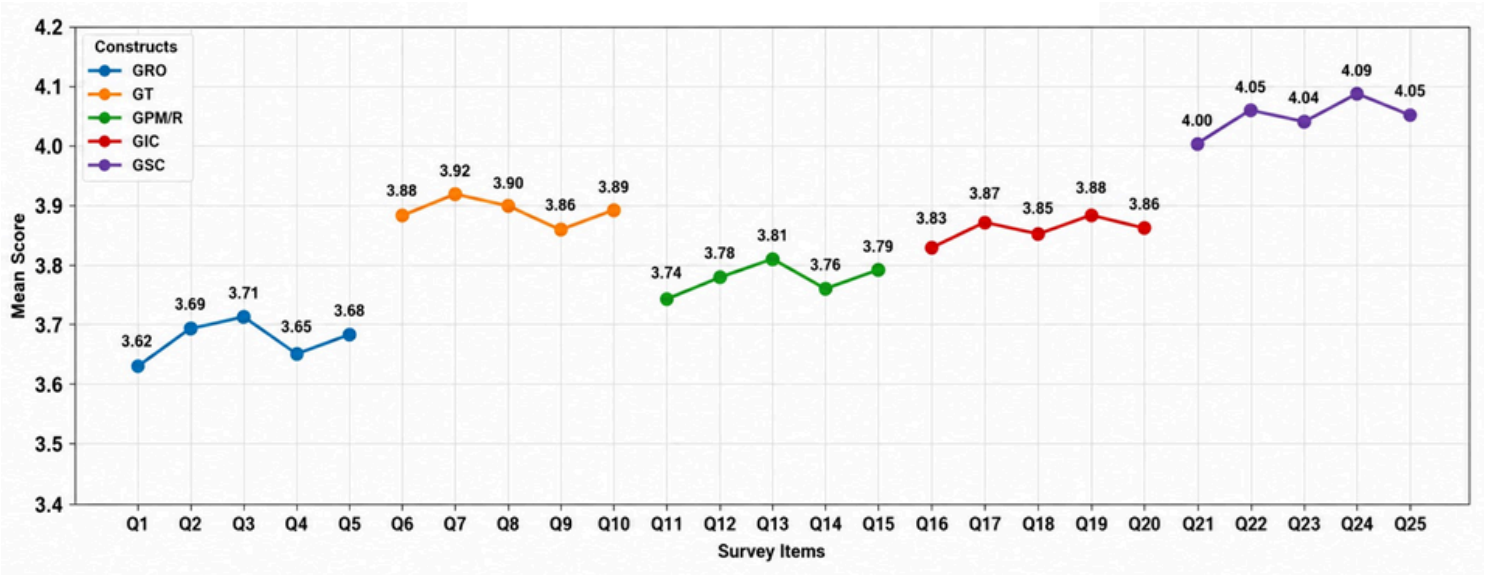


Figure 4

Descriptive statistics and internal consistency of Green HRM strategies

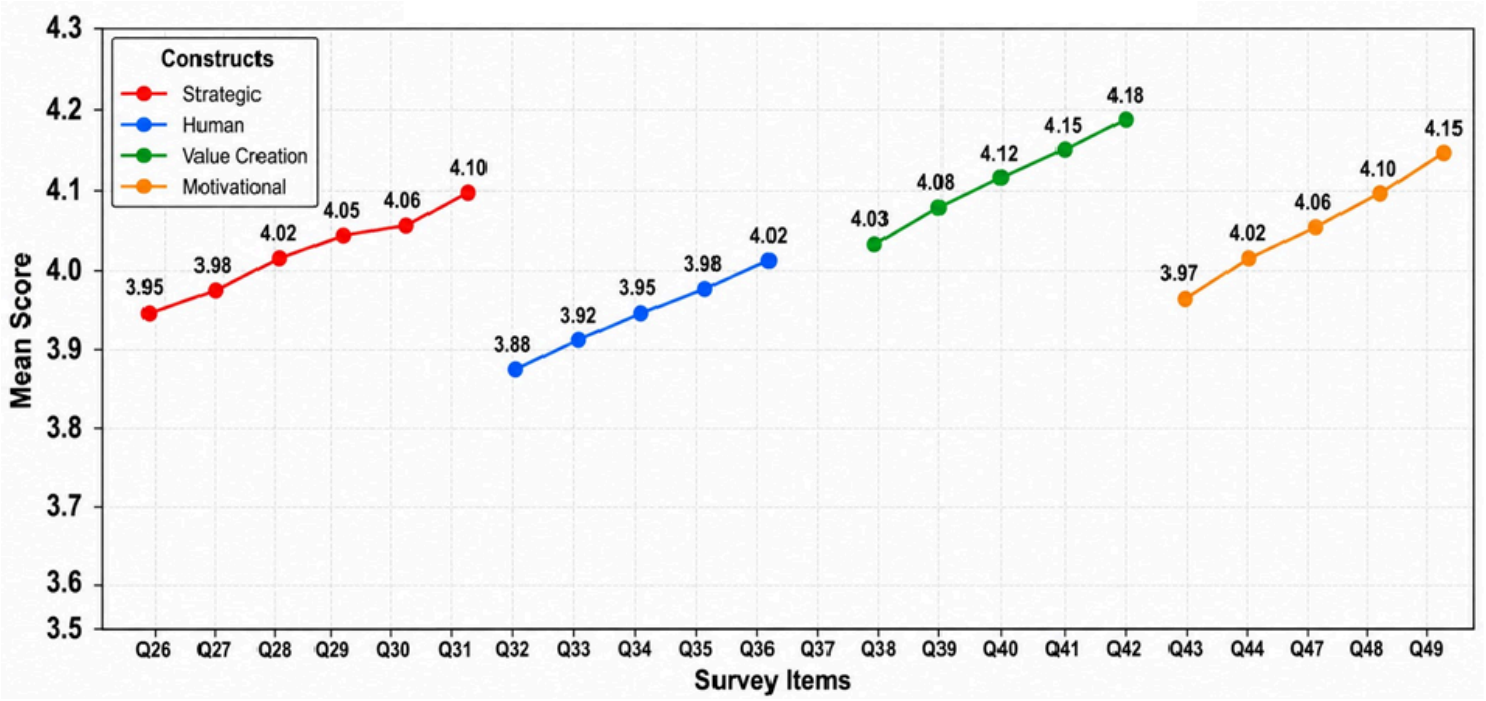


Figure 5

Descriptive statistics and distribution of Emotional Wage dimensions

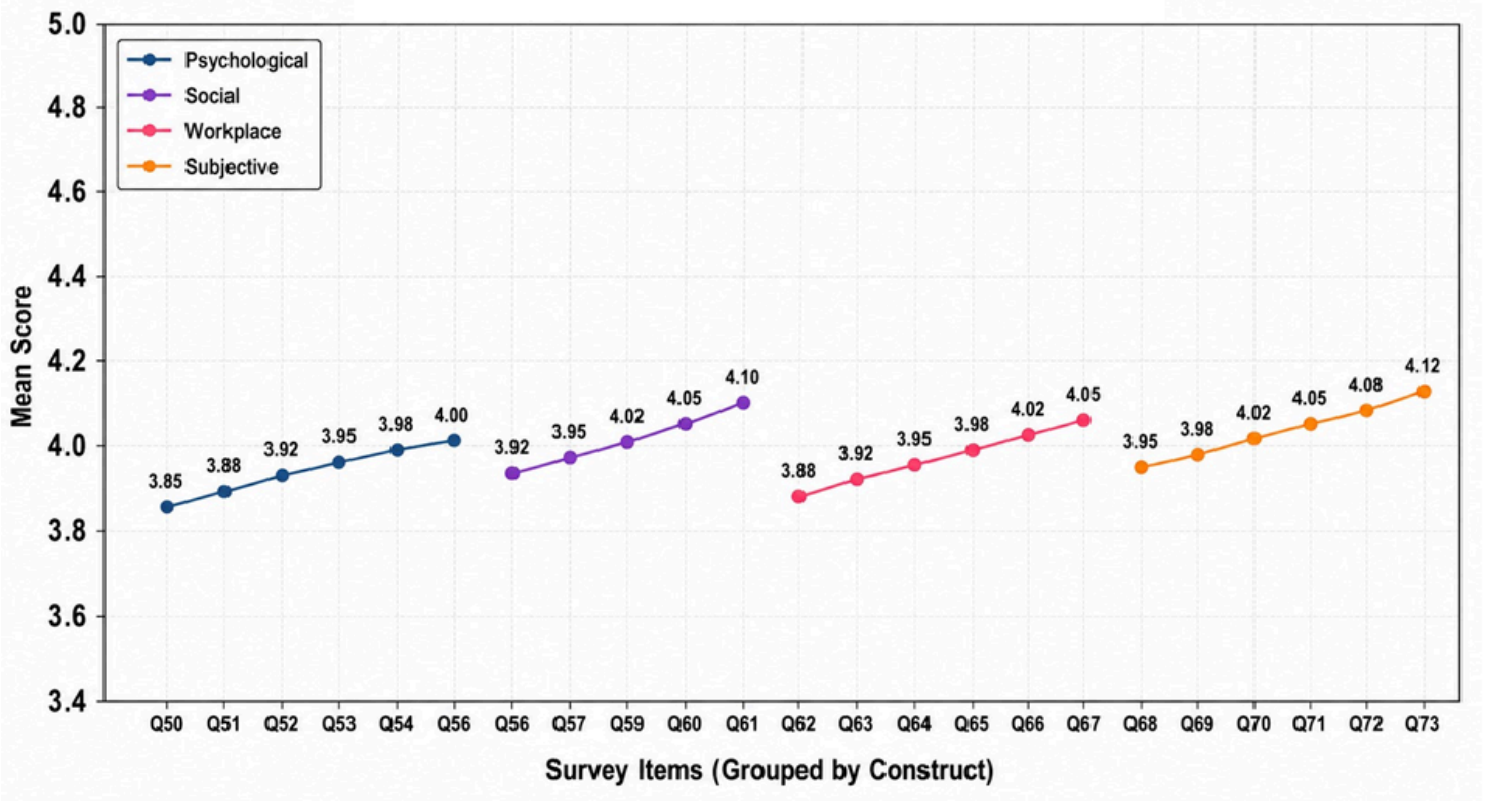
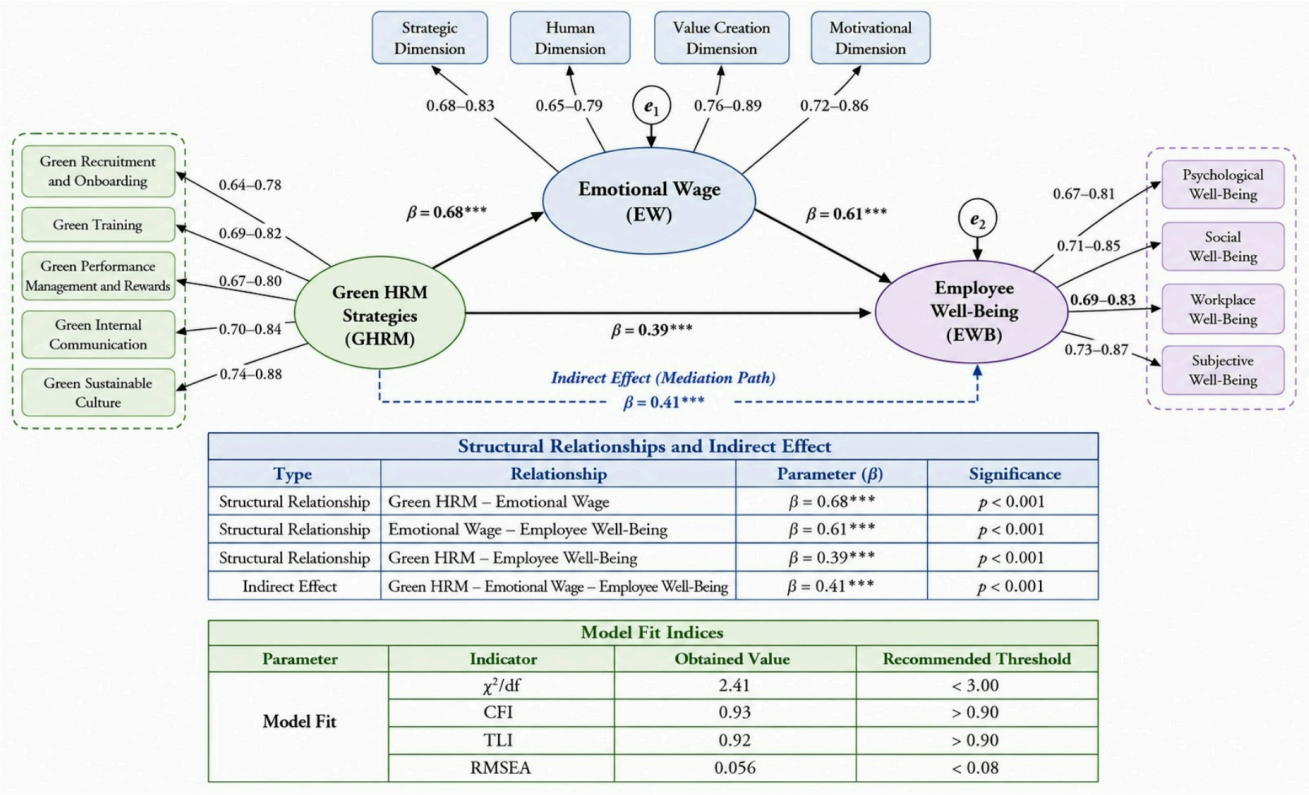


Figure 6

Descriptive statistical summary of Employee Well-Being dimensions



Structural Relationships and Indirect Effect

Type	Relationship	Parameter (β)	Significance
Structural Relationship	Green HRM – Emotional Wage	$\beta = 0.68^{***}$	$p < 0.001$
Structural Relationship	Emotional Wage – Employee Well-Being	$\beta = 0.61^{***}$	$p < 0.001$
Structural Relationship	Green HRM – Employee Well-Being	$\beta = 0.39^{***}$	$p < 0.001$
Indirect Effect	Green HRM – Emotional Wage – Employee Well-Being	$\beta = 0.41^{***}$	$p < 0.001$

Model Fit Indices

Parameter	Indicator	Obtained Value	Recommended Threshold
Model Fit	χ^2/df	2.41	< 3.00
	CFI	0.93	> 0.90
	TLI	0.92	> 0.90
	RMSEA	0.056	< 0.08

Figure 7

SEM of the Relationships among Green HRM Strategies, Emotional Wage, and Employee Well-Being in Dark-Store Supply Chains