Digital Transformation in Green HRM: Implementation of HR Analytics to Improve HR Sustainability in Manufacturing Companies in Bandung City

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Abstract

This study aims to analyze the influence of Green Human Resource Management (Green HRM) and Implementation of HR Analytics on Employee Green Behavior and its implications for Sustainable Human Resource Management (Sustainable HRM). Using quantitative methods with multiple linear regression analysis, this study involved 98 respondents from companies in the green industry sector. The results showed that Green HRM and Implementation of HR Analytics simultaneously and partially had a significant effect on Employee Green Behavior with an F value of 1707.554 and R^2 of 97.3%. However, when the three variables (Green HRM, Implementation of HR Analytics, and Employee Green Behavior) were tested against Sustainable HRM, the results showed a significant effect simultaneously, but not partially significant, with an F value of 35.559 and R^2 of 53.2%. The conclusion of this study indicates that although green HR policies and the use of HR analytics are effective in encouraging employee green behavior, sustainable HRM requires the support of other factors beyond the model studied. Therefore, this study recommends further exploration of external factors and strategic policies that can support the implementation of Sustainable HRM as a whole.
Keywords : Green HRM, Employee Green Behavior, Sustainable HRM

Introduction

In the transition from Industry 4.0 to Industry 5.0, organizations are increasingly leveraging digital transformation to improve HR efficiency and competitiveness. This transformation involves the adoption of advanced technologies such as AI and data analytics, which streamline HR processes and enhance employee experience (Eger & Žižka, 2024). Simultaneously, the rise of Green Human Resource Management (Green HRM) reflects a growing commitment to sustainability, with a focus on environmentally friendly practices that not only reduce ecological impact but also promote employee well-being and productivity (Zulkifli & Wasesa, 2024). By integrating Green HRM with digital transformation, organizations can create a more sustainable and responsible HR framework

that prioritizes environmental stewardship and the holistic development of their workforce. This dual approach is in line with the human-centric ethos of Industry 5.0, emphasizing creativity and innovation while ensuring a healthy work environment (Prajapati, 2024). In the context of rapid digitalization, HR Analytics has emerged as an essential tool for implementing Green HRM by facilitating data-driven decision-making. By leveraging big data, artificial intelligence, and cloud computing, organizations can analyze employee behavioral trends and predict workforce needs, ultimately leading to more efficient recruitment, training, and performance evaluation processes (Katfi et al., 2025). This optimization not only improves operational efficiency but also supports the creation of environmentally friendly policies, thereby reducing resource consumption (Shaikh et al., 2024). Additionally, HR Analytics plays a vital role in promoting environmental sustainability by providing insights that help organizations align their human resource practices with environmentally friendly initiatives, thereby contributing to a sustainable workforce management strategy (Surendra et al., 2024). Overall, the integration of HR Analytics into Green HRM practices is critical for organizations aiming to minimize their environmental impact while improving employee well-being and productivity (Shaikh et al., 2024).

Digital transformation in human resource management (HRM) is critical for manufacturing companies, improving operational efficiency and supporting sustainability. By integrating digital technologies, organizations can streamline HR processes, reduce paper usage, and optimize work schedules, which collectively contribute to increased productivity and reduced environmental impact (Xuyang, 2024). Additionally, optimizing workforce management increases transparency, enabling better resource allocation and reduced labor costs (Ma et al., 2024). However, the transition to digital HRM is not without its challenges. Barriers such as inadequate human resource readiness, high technology costs, and resistance to change can hinder effective implementation (Shen, 2024). Overcoming these barriers is critical for manufacturing companies to fully leverage the benefits of digital transformation, ensuring they remain competitive while also prioritizing sustainability in their operations (Fang & Xie, 2024). Manufacturing companies in Bandung City play a significant role in implementing Green HRM, especially through digital transformation, which can significantly reduce

energy and resource consumption (Shaikh et al., 2024). However, the successful integration of HR Analytics to support these sustainability initiatives faces several challenges. Among them is technological readiness, as companies must build the necessary digital infrastructure to effectively leverage HR Analytics (Purwanti, 2024). In addition, workforce digital skills are critical; employees must be proficient in using digital technologies to enhance sustainability efforts (Ichdan & Maryani, 2024). Furthermore, aligning company policies with sustainability principles is essential to foster a culture of environmental responsibility within the organization (Shaikh et al., 2024). Addressing these challenges will enable manufacturing companies to effectively leverage digital transformation, thereby promoting operational sustainability and improving their overall performance in the context of Green HRM (Dwita et al., 2024).

Literature Review

Green Human Resource Management (Green HRM)

Green HRM is a strategic approach that integrates environmentally friendly practices into human resource management, fostering a sustainable organizational culture. At the heart of this approach are key components such as green recruitment, which emphasizes environmentally friendly hiring processes, and green training and development, which aims to equip employees with the skills necessary for sustainable practices (Abdulbaqi & Mhaibes, 2024). In addition, environmental performance assessment plays a vital role by assessing employees' contributions to sustainability, thereby promoting accountability and ownership of environmental impact (Al-Romeedy & Alharethi, 2024). Involving employees in sustainability initiatives is essential, as it increases motivation and commitment to reducing the organization's carbon footprint (Zournatzidou et al., 2024). Collectively, these elements of Green HRM not only improve organizational efficiency but also align employee values with the company's sustainability goals, ultimately leading to a more engaged workforce and significant reductions in environmental impact (Enbaia et al., 2024).

Digital Transformation in HR Management

Digital transformation in HR management leverages advanced technologies to improve operational efficiency and employee experience. Key components of this transformation include cloud-based HR systems, which offer scalability and flexibility, allowing organizations to manage HR processes remotely and automate tasks effectively (Nazara et al., 2024). In addition, artificial intelligence (AI) plays a critical role by automating recruitment and talent management, thereby improving decision-making accuracy and reducing bias (Lu, 2024). Furthermore, big data analytics allows organizations to analyze vast data sets, facilitating data-driven decisions that can identify trends and optimize HR outcomes ("The Role of Data Analytics in Digital Transformation: A Study of How Firms Leverage Data for Insights," 2024). Together, these technologies contribute to HR automation, which streamlines repetitive tasks, allowing HR professionals to focus on strategic initiatives (Li et al., 2024). Ultimately, the integration of these digital tools not only improves efficiency but also fosters a more engaging work environment for employees, aligning with the goals of modern HR management (Lazarov, 2024).

HR Analytics in Supporting Green HRM

HR Analytics plays a vital role in improving organizational efficiency by leveraging data-driven insights to optimize HR practices. Using predictive analytics, organizations can effectively analyze the impact of Green HRM initiatives, such as sustainability training and energy efficiency, on employee behavior and performance (Katfi et al., 2025). This approach not only measures the effectiveness of these programs but also assesses their impact on employee engagement and satisfaction, fostering a more committed workforce (Alam, 2024). Additionally, HR Analytics helps in optimizing work schedules, which can significantly reduce energy waste and improve operational efficiency, aligning with sustainability goals (Gulia & Rastogi, 2024). Overall, integrating HR Analytics with Green HRM practices enables organizations to make data-driven decisions based on information that promotes environmental sustainability and employee well-being (Westover, 2024). Previous studies have shown that integrating HR Analytics with Green HRM can improve HR

sustainability by reducing the organization's carbon footprint, improving workforce efficiency, and building a more environmentally friendly work culture (Ahmad, 2020).

Methods

This study uses a quantitative approach with descriptive and explanatory methods. This approach was chosen to understand how the implementation of HR Analytics in Green HRM can improve HR sustainability in manufacturing companies in Bandung City. The population in this study All manufacturing companies in Bandung City that have implemented or are in the process of implementing Green HRM and digital transformation in HR management. Sample: Selected using the purposive sampling method, The number of respondents is determined based on the Slovin formula or using a minimum approach of 100-150 respondents consisting of HR managers, division heads, and employees involved in the Green HRM program. The variables in this study use the Dependent Variable (Y), Human Resource Sustainability (Sustainable HRM), Independent Variable (X), X1: HR Analytics Implementation, X2: Green HRM, Intervening Variable, Employee Green Behavior.

Results and Discussion
Validity & Reliability Test

Table 1. Validity Test

Correlations	Sig. (2-tailed)	Information
Imp HR Analytics	0,000	Valid
Green HRM	0,000	Valid
Employee Green Behavior	0,000	Valid
Sustainable HRM	0,000	Valid
**. Correlation is significant at the 0.01 level (2-tailed).		

SPSS 25 Data Processing Results

Interpretation:

Based on the results of statistical testing, all items in this study have a significance value of 0.000 (<0.005), thus the items in this study are declared valid..

Table 2. Reliability Test

Reliability Statistics

Cronbach's Alpha	N of Items
0,894	4

SPSS Data Processing Results

Interpretation:

Based on the results of the reliability test. All items in this study have a cronbach`s Alpha value of 0.894. (> 0.700), thus all items in this study are declared reliable and worthy of being continued in this study.

1. t-test and f-test

Model 1.

F-Test Table

ANOVAª

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	930,255	2	465,128	1707,554	,000ᵇ
	Residual	25,877	95	0,272		
	Total	956,133	97			

a. Dependent Variable: Employee Green Behavior

b. Predictors: (Constant), Green HRM, Imp HR Analytics

SPSS Data Processing Results

Interpretation

Based on the results of the F test for the regression model with dependent variables Employee Green Behavior and predictors Green HRM and Implementation of HR Analytics are as follows: F value = 1707.554, Significance (Sig.) = 0.000, The significance value of 0.000 <0.05 indicates that the regression model used is statistically significant. This means that together the independent variables (Green HRM and Implementation of HR Analytics) have a significant influence on the dependent variable (Employee Green Behavior).

Table T test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3,662	0,536		6,829	0,000
	Imp HR Analytics	0,162	0,039	0,432	4,118	0,000
	Green HRM	0,153	0,029	0,558	5,315	0,000

a. Dependent Variable: Employee Green Behavior

SPSS Data Processing Results

Interpretation

1. Implementation of HR Analytics:

t = 4.118, Significance (Sig.) = 0.000, Every 1 unit increase in Implementation of HR Analytics will increase Employee Green Behavior by 0.162 units, assuming other variables are constant. A significance value of 0.000 <0.05 indicates that the influence of this variable is statistically significant.

2. Green HRM:

t = 5.315, Significance (Sig.) = 0.000, Every 1 unit increase in Green HRM will increase Employee Green Behavior by 0.153 units, assuming other variables are constant. A significance value

of 0.000 <0.05 indicates that the influence of this variable is statistically significant.

Table R Square

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,986[a]	0,973	0,972	0,522

a. Predictors: (Constant), Green HRM, Imp HR Analytics

SPSS Data Processing Results

Interpretation

The R Square value is 0.973, thus 97.3% of variables X1 and X2 contribute 97.3% to the dependent variable, while the remaining 2.7% is influenced by other variables outside the research.

Model 2.

Tabel Uji F

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1421,746	3	473,915	35,559	,000[b]
	Residual	1252,785	94	13,327		
	Total	2674,531	97			

a. Dependent Variable: Sustainable HRM

b. Predictors: (Constant), Employee Green Behavior , Imp HR Analytics, Green HRM

SPSS Data Proccessing Results

Interpretation

The R Square value is 0.973, thus 97.3% of variables X1 and X2 contribute 97.3% to the dependent variable, while the remaining 2.7% is influenced by other variables outside the research.

Table T tes

Coefficientsᵃ

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	34,591	4,581		7,552	0,000
	Imp HR Analytics	0,466	0,298	0,744	1,562	0,122
	Green HRM	0,086	0,229	0,188	0,376	0,707
	Employee Green Behavior	-0,343	0,718	-0,205	-0,477	0,634

a. Dependent Variable: Sustainable HRM

Interpretation

1. Implementation of HR Analytics:

Value t = 1.562, Significance (Sig.) = 0.122, Interpretation: Every 1 unit increase in Implementation of HR Analytics will increase Sustainable HRM by 0.466 units, assuming other variables are constant. However, the significance value of 0.122 > 0.05 indicates that the effect of Implementation of HR Analytics on Sustainable HRM is not statistically significant at the 95% confidence level.

2. Green HRM:

Value t = 0.376, Significance (Sig.) = 0.707, Every 1 unit increase in Green HRM will increase Sustainable HRM by 0.086 units. However, the significance value of 0.707 > 0.05 indicates that the effect of Green HRM on Sustainable HRM is not significant.

3. Employee Green Behavior:

t value = -0.477, Significance (Sig.) = 0.634 Every 1 unit increase in Employee Green Behavior will actually decrease Sustainable HRM by 0.343 units. However, the significance value of 0.634 > 0.05 indicates that the influence of this variable on Sustainable HRM is not statistically significant.

Tabel R Square

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,729[a]	0,532	0,517	3,651

a. Predictors: (Constant), Employee Green Behavior , Imp HR Analytics, Green HRM

Interpretation

R Square value = 0.532, This value indicates that 53.2% of the variability in Sustainable HRM can be explained by the three independent variables (Employee Green Behavior, Implementation of HR Analytics, and Green HRM). Meanwhile, the remaining 46.8% is explained by other factors not included in this model.

Conclusion

Based on the results of data analysis, this study concludes that Green Human Resource Management (Green HRM) and Implementation of HR Analytics significantly influence Employee Green Behavior. Model 1 shows that both independent variables simultaneously provide a very strong contribution to employee green behavior, with a coefficient of determination of 97.3%. The t-test results also show that both Green HRM and Implementation of HR Analytics have a positive and significant partial influence on Employee Green Behavior, emphasizing the importance of implementing environmentally friendly HR policies and utilizing HR analytics in encouraging green behavior in the workplace.

However, when the three variables (Green HRM, Implementation of HR Analytics, and Employee Green Behavior) are tested against Sustainable HRM in Model 2, the results show that although all three variables have a significant effect simultaneously, none of them have a partial effect. The coefficient of determination of 53.2% indicates that only part of the variability of Sustainable HRM can be explained by these three variables, while the rest is influenced by other factors outside the model.

The comparison of these two models indicates that although Green HRM and Implementation of HR Analytics are very effective in shaping employees' environmentally friendly behavior, their contribution to sustainable HR management requires support from additional factors. Therefore, this study emphasizes the need to strengthen sustainable HR strategies and further explore external elements or organizational policies that can support the achievement of Sustainable HRM as a whole.

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