



Green Transformational Leadership and Its Impact on Sustainable Performance in Manufacturing Companies: The Role of Organizational Support and Human Resource Management

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Abstract

In recent years, escalating environmental crises have prompted a worldwide commitment to sustainable business practices, with the adoption of green initiatives and strategies emerging as a key solution. Organizational improvement is widely acknowledged as a crucial mechanism for implementing strategic programs and facilitating fundamental change within firms. This study examines the effects of green transformational leadership, green human resource management (GHRM), green innovation, and organizational support on the sustainable performance of manufacturing companies operating in the Shiraz Grand Industrial Park. Furthermore, it explores the moderating effect of perceived organizational support on the associations between green transformational leadership, GHRM, green innovation, and sustainable performance. Data were gathered through a structured questionnaire and analyzed using structural equation modeling (SEM) via AMOS software. The findings indicate that green transformational leadership, GHRM, and green innovation each exert a direct and significant positive influence on sustainable firm performance. These findings provide actionable insights for policymakers and managers aiming to design effective strategies for sustainable development.

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Introduction

In recent years, organizations have increasingly integrated green principles into their core operational strategies (Harouni et al., 2024). Transformational leadership is a leadership style that emphasizes understanding, embracing, and guiding organizational change through the development of collaborative networks, teamwork, and a learning-oriented culture, thereby enhancing global competitiveness (Yazdani et al., 2024). A sustainability-oriented approach incorporates strategic planning and management to balance economic, social, and environmental objectives. This holistic perspective not only enhances performance across multiple dimensions but also addresses outcomes traditionally overlooked in conventional performance models—particularly those related to social and environmental responsibility.

Sustainable performance encompasses criteria such as employee health and safety, increased use of renewable and clean energy sources, and waste reduction, all of which complement traditional economic performance metrics. In this context, recognizing stakeholder expectations and adopting a broader performance evaluation framework beyond traditional financial indicators has become increasingly essential (Amin & Salehnejad, 2020). Green performance enables organizations to improve productivity and efficiency by minimizing resource waste and reducing operational costs (Jain et al., 2018). Furthermore, shifts in global market dynamics and evolving consumer demand for sustainability have compelled organizations to reconfigure their business models and processes to address environmental challenges (Fernando et al., 2019).

Human capital—comprising knowledge, expertise, and skills—is widely regarded as one of the most valuable and strategic assets of any organization. Companies that effectively manage employee knowledge and capabilities can optimize resource utilization, achieve organizational goals, and gain a sustainable competitive advantage. This requires a coherent and integrated approach to human resource policy-making that aligns HR strategies with overall organizational objectives to ensure internal consistency and coordination (Majidi, 2019). Peter and Lyon (1995) argue that firms actively pursuing green innovation can leverage both differentiation and cost leadership strategies to redefine competitive dynamics and establish long-term competitive advantage (Eskandari et al., 2016). Consequently, green innovation has gained prominence in the innovation literature due to growing awareness of sustainability and its impact on corporate performance and competitiveness (Sheikhi et al., 2023).

Organizational support plays a vital role in employee motivation and commitment. When employees perceive strong support from their organization, they are more likely to engage in organizational goals and demonstrate higher levels of motivation and performance. Organizations must therefore provide strategic benefits and resources to foster employee engagement. The stronger the perception of organizational support, the greater the alignment between employee behavior and organizational objectives, reinforcing commitment to positive workplace attitudes and sustainable practices (Akrami et al., 2017).

In Iran, Article 190 of the Fifth Five-Year Development Plan of the Islamic Republic of Iran and the Environmental Protection and Improvement Act recognize environmental enhancement and protection—including the prevention of air, water, and soil pollution and effective waste management—as public responsibilities. One of the key pathways to achieving sustainable development is the implementation of green management, which can significantly reduce both direct and indirect costs associated with environmental degradation. This study aims to analyze the influential factors within green human resource management (GHRM) models in polluting industries to better understand their role in improving the sustainable performance of Iran's industrial sector. Given the growing importance of green management practices and their impact on performance, this research seeks to address existing gaps in studies on green management and industrial performance in Iran.

Literature Review and Research Gaps

Numerous studies have explored the relationships among green management, human resource management, and organizational performance. Pezhuhan et al. (2024) examined the impact of



transformational leadership on corporate entrepreneurship, with organizational learning as a mediator. Their findings confirmed that transformational leadership positively influences both corporate entrepreneurship and organizational learning, with the latter mediating the relationship.

Ebrahimi and Nasiri (2024) investigated factors influencing the development of green employee behavior, including managerial and organizational support, financial incentives, and institutionalized environmental practices. Landran et al. (2023) found that GHRM practices positively affect green creativity, green organizational commitment, and corporate culture, all of which in turn enhance green innovation.

Koulek and Selajgeh (2023) studied the effect of GHRM on green innovation in the Lamerd Cement Factory, with green environmental knowledge acting as a mediator. Sebro et al. (2022) analyzed the influence of green transformational leadership and GHRM on green innovation and environmental performance at Esfahan Steel Company. Results showed significant positive effects, with GHRM having the strongest impact on green innovation, and green innovation mediating the relationship with environmental performance.

Eghbal et al. (2021) explored the link between GHRM and green supply chain management in Iran's furniture manufacturing sector, identifying five GHRM practices—training, empowerment, rewards, performance management, and recruitment—that positively influence green supply chain practices. Senior management commitment was found to moderate these relationships.

Rajabpour et al. (2021) emphasized the mediating role of organizational commitment in the relationship between GHRM and hospitals' environmental performance. Amiri et al. (2020) showed that GHRM influences employees' pro-environmental behavior, with individual green values moderating the effects of green training and performance management—but not green recruitment.

Niazi et al. (2023) found that both GHRM and green innovation positively affect green corporate social responsibility (CSR), which in turn mediates their impact on environmental performance. However, GHRM showed no direct link to environmental performance.

Kara et al. (2023) demonstrated that GHRM mediates the relationship between organizational sustainability and employees' innovative behavior in the tourism sector. Zhao et al. (2022) developed a moderated mediation model based on social exchange and person-environment fit theories, showing that GHRM positively predicts green employee behavior, with psychological factors mediating this relationship.

Orkason et al. (2022) explored future employees' (e.g., university students) perceptions of organizations practicing GHRM and found that such practices influence both voluntary and task-related green behaviors, mediated by perceptions of a green organizational climate.

Merasak et al. (2021) identified leadership styles and skills—such as sustainability leadership and innovation leadership—as key drivers of sustainable innovation in Michelin-starred restaurants, with both internal (e.g., vision, employee skills) and external (e.g., market demand, stakeholder engagement) factors influencing innovation outcomes.

Despite the growing body of research on GHRM, studies focusing on academic communities and the manufacturing sector remain limited. This study contributes to the literature by focusing on manufacturing firms in the Shiraz Industrial Zone, an under-researched context. Given the critical roles of green transformational leadership, human resource management, innovation, and organizational support in achieving sustainable performance, further in-depth investigation is warranted.

The following hypotheses are proposed:

H1: Green transformational leadership has a significant positive effect on sustainable business performance.

H2: Green human resource management has a significant positive effect on sustainable business performance.



H3: Green innovation has a significant positive effect on sustainable business performance.

H4: Organizational support moderates the relationship between green transformational leadership and sustainable business performance.

H5: Organizational support moderates the relationship between green human resource management and sustainable business performance.

H6: Organizational support moderates the relationship between green innovation and sustainable business performance.

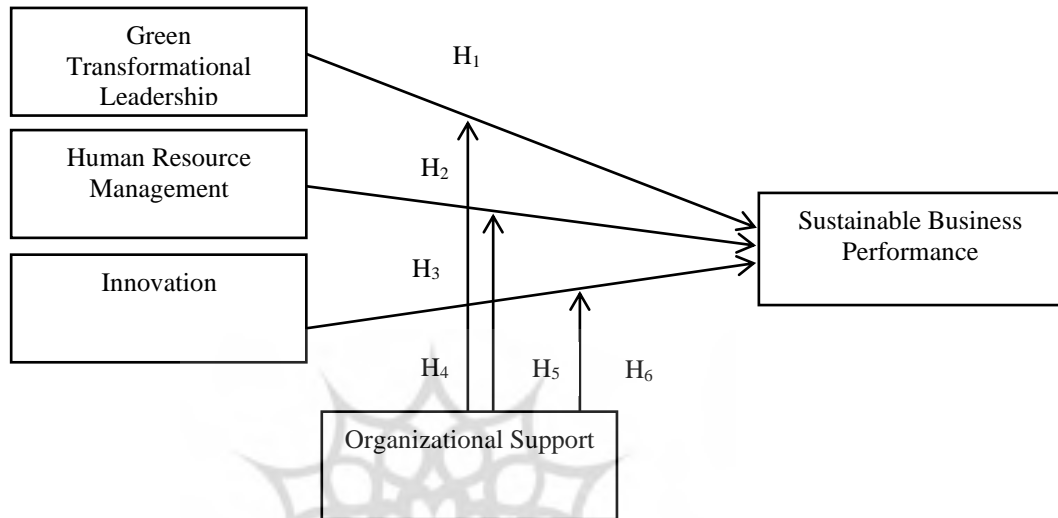


Figure 1. Conceptual Model of the Research Adapted Wei and Lihua (2022)

Materials and methods

This study is applied in purpose and field-based in data collection. The population consists of managers and supervisors in manufacturing companies located in the Shiraz Grand Industrial Town, totaling 420 individuals. Using Cochran's formula, a sample size of 200 was determined and selected via random sampling.

Data were collected using a structured questionnaire divided into two sections: (1) demographic information and (2) measurement items for the study variables—green transformational leadership, green HRM, green innovation, organizational support, and sustainable business performance—rated on a five-point Likert scale.

- Green transformational leadership was measured using a 6-item scale from Singh et al. (2020).
- Green HRM was assessed using a 6-item scale from the same source.
- Green innovation was measured with a 4-item scale from Singh et al. (2020).
- Organizational support was evaluated using a 4-item scale from Eairween (2018).
- Sustainable business performance was measured with a 5-item scale from Singh et al. (2020).

Face and content validity were confirmed by a panel of seven experts, including managers and senior industry professionals. Reliability was assessed using Cronbach's alpha. Data were analyzed using SPSS version 26 and AMOS version 24. Structural equation modeling (SEM) was employed to test the hypotheses. SEM is a robust statistical technique suitable for analyzing complex multivariate relationships, allowing for the simultaneous estimation of measurement and structural models, and testing latent variable relationships (Hair et al., 2010; Violato, 2007). It enables the examination of direct, indirect, and moderating effects, as well as the assessment of model fit.



Research Findings

The frequency distributions of the demographic variables of the participants in the quantitative phase, which were based on sex, age, and education level, are presented in Table 1. The majority of respondents were male (74%), over 36 years old (58%), and held a bachelor's or master's degree (85%).

Table 1. Frequency distribution of demographic variables

Demographic Variables	Category	Frequency	Percentage
Gender	Male	148	74%
	Female	52	26%
Age	20-25 years	7	4%
	26-30 years	17	9%
	31-35 years	60	30%
	Over 36 years	116	58%
Education	Below Diploma/Diploma	30	15%
	Bachelor's Degree	90	45%
	Master's Degree and above	80	40%

The descriptive findings indicate that among the respondents, 148 were male (74%), and 52 were female (26%). More than half of the sample population consists of men, whereas 26% consists of women. With respect to educational level, 30 respondents (15%) had a diploma or below, 90 respondents (45%) held a bachelor's degree, and 80 respondents (40%) had a master's degree or higher. The second largest educational category was bachelor's degree holders at 45%. With respect to age groups, 7 respondents (4%) were aged 20--25 years, 17 respondents (9%) were aged 26--30 years, 60 respondents (30%) were aged 31--35 years, and 116 respondents (58%) were over 36 years old. The largest age group was those over 36 years old, accounting for 58% of the sample, whereas the smallest group was the 20--25 years category, accounting for only 4% of the sample. To assess the reliability of the questionnaire, Cronbach's alpha coefficient was used. The results are presented in Table 2.

Table 2. Cronbach's Alpha Coefficient Values

Variables	Symbol	Cronbach's Alpha
Green Transformational Leadership	RTS	0.791
Human Resource Management	MME	0.779
Innovation	NOA	0.797
Organizational Support	HMS	0.806
Sustainable Business Performance	AMK	0.799

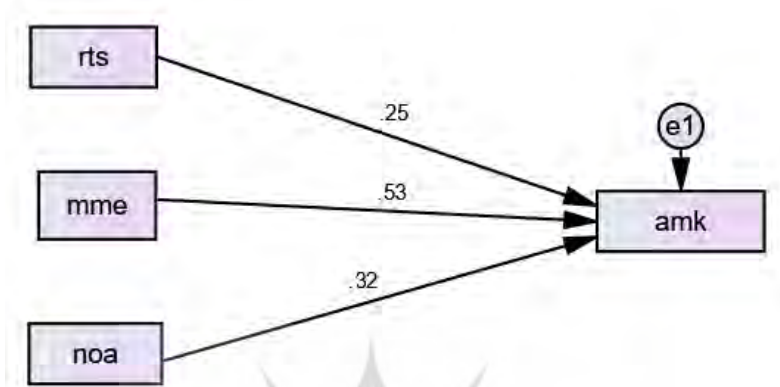
Cronbach's alpha coefficient is one of the most common methods for measuring the reliability and internal consistency of questionnaires. The alpha coefficient ranges from 0 to 1, with values above 0.6 generally considered acceptable. The closer the value is to 1, the higher the internal correlation among the items, indicating greater homogeneity of the questions (Hair et al., 2006). The obtained values for all the variables confirm the reliability of the questionnaire. The Kaiser-Meyer-Olkin (KMO) index ranges between 0 and 1 and indicates whether the correlations among variable pairs can be explained by other variables. The closer this value is to 1, the more suitable the sample size is for factor analysis. The minimum acceptable KMO value is 0.6.

Bartlett's test examines the hypothesis that the observed correlation matrix belongs to a population with uncorrelated variables. For a factor model to be meaningful and useful, the variables must be correlated; otherwise, there is no justification for factor analysis. A significance level below 0.05 indicates the suitability of the factor model (Momeni & Faal Qayoumi, 2011). Table 3 presents the test statistics, showing a KMO value of 0.835 and a significance level of 0.000, confirming the adequacy of the model.

**Table 3.** KMO Index and Bartlett's Test Results

Test Statistic	Value
KMO Measure	0.835
Degrees of Freedom	300
Significance Level	0.000

Figure 2 illustrates the estimated structural model, showing the relationships between the observed variables and the latent constructs. The standardized factor loadings and the error variances for the measurement items can be analysed in this model. The e values represent the measurement errors associated with the variables.

**Figure 2.** Conceptual Model in Standardized Form

Considering that at least three fit indices (one from each group: absolute, incremental, and parsimonious) must fall within an acceptable range (Ghasemi, 2009), this study evaluates the model via the goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normed fit index (NFI), root mean square residual (RMR), relative fit index (RFI), and root mean square error of approximation (RMSEA). At this stage, all indices fall within the acceptable range. Table (4) presents the goodness-of-fit indices.

Table 4. Goodness-of-fit indices

Status	Acceptable Range	Value	Index
Confirmed	> 0.90	0.973	AGFI
Confirmed	< 0.05	0.004	RMR
Confirmed	> 0.90	0.923	GFI
Confirmed	> 0.90	0.939	NFI
Confirmed	> 0.90	0.926	RFI
Confirmed	< 0.08	0.008	RMSEA

The partial fit indices (critical ratio and significance level) indicate that all structural coefficients (effects) of the variables (research hypotheses) are significantly different from zero (the *** symbol represents $P < 0.001$). The regression weights for the structural coefficients and factor loadings are shown in Table (5).

Table 5. Critical Values at the Significance Level

Variable Relationship	Critical Value	Significance Level
amk <--- rhs	5.118	***
amk <--- mme	4.839	***
amk <--- noa	2.072	0.004

Hayes (2013) introduced a method for calculating the moderating role of variables on the basis of linear regression techniques. He developed a strategy to integrate moderation and mediation into a unified model



known as conditional process analysis. Table (6) presents the results of the moderation effect of Organizational Support.

Table 6. Moderation analysis results

Variable	R ² Change	P	Status
rts * hms	0.024	***	Confirmed
mme * hms	0.018	***	Confirmed
noa * hms	0.011	***	Confirmed

Discussion and Conclusion

The intensifying global competition, technological evolution, workforce diversity, and rising customer expectations necessitate organizational change and transformation. This study examined the roles of green transformational leadership, green HRM, and green innovation in enhancing sustainable performance in manufacturing firms in Shiraz, with organizational support as a moderating factor. The findings confirm that green transformational leadership positively influences sustainable performance. Leaders adopting this style inspire employees, foster green creativity, and encourage critical evaluation of environmental issues, aligning with Evangelista et al. (2017) and Moein et al. (2021). Effective communication and employee involvement in green strategy development further strengthen this relationship. Green HRM also significantly enhances sustainable performance. Practices such as green recruitment, training, performance appraisal, and rewards increase employee awareness and commitment to sustainability (Ababneh, 2021; Akbari & Shayegh, 2023). These practices institutionalize green culture and directly improve environmental and economic outcomes. Green innovation drives sustainable performance by reducing environmental impacts through technological and process improvements (Asadi et al., 2020). Innovations in energy efficiency, green materials, and product design contribute to long-term financial and environmental stability (Awan et al., 2019; Ruhani Rad, 2023). Importantly, organizational support significantly strengthens the relationships between all three predictors (green leadership, GHRM, innovation) and sustainable performance. Supported employees are more motivated to adopt green behaviors and contribute to organizational goals (Sroufe, 2017; Suifan et al., 2018). Organizational support facilitates the implementation of green HRM practices (Azudin & Mansour, 2018) and fosters a culture conducive to innovation (Moslehpour et al., 2018). To enhance sustainable performance, managers in the Shiraz Grand Industrial Park are advised to:

- Publicize green initiatives on the company website and join environmental organizations.
- Provide training on recycling, energy optimization, and environmental best practices.
- Optimize raw material use and improve scrap recycling, especially of metal and construction waste.
- Upgrade filtration systems to capture production emissions and improve wastewater treatment infrastructure.

Green transformational leadership, supported by effective green HRM and innovation, plays a pivotal role in advancing sustainable performance in manufacturing firms. Organizational support acts as a critical enabler, amplifying the impact of these drivers. The integration of leadership, human resource strategies, innovation, and supportive organizational culture is essential for achieving long-term environmental and economic sustainability. This study contributes to both theory and practice by validating a comprehensive model in a real-world industrial context and offering actionable insights for managers and policymakers.

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