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Green Human Resource Management as a Professional Development System and Its Impact on Green Innovation: The Mediating Role of Organizational Health

إدارة الموارد البشرية الخضراء كنظام للتطوير المهني وأثرها على الابتكار الأخضر: الدور الوسيط للصحة التنظيمية

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ABSTRACT

The current study aims to examine the impact of the green human resource management (GHRM) practices, which are viewed in this study as a professional development system for the employees, on the green innovation, and to test the mediating role of the organizational health in the Jordanian Free and Development Zones Group. The study adopted the descriptive analytical approach, and a questionnaire was distributed to the employees of the Group in its free and development zones by using the comprehensive survey method on a population of (320) employees, where 287 valid responses were analyzed by using SPSS version 29 and SmartPLS 4 through the partial least squares structural equation modeling (PLS-SEM). The results showed that the GHRM practices have a positive and significant effect on the organizational health ($\beta = 0.787$, $p < 0.001$), and the organizational health has a positive and significant effect on the green innovation ($\beta = 0.705$, $p < 0.001$). Moreover, the indirect effect of the GHRM practices on the green innovation through the organizational health was positive and significant ($\beta = 0.555$, $p < 0.001$). The model explained 62.0% of the variance in the organizational health and 49.7% of the variance in the green innovation, and it showed a good predictive relevance. The study is among the few studies that consider the organizational health as a human development mechanism that transfers the effect of the GHRM practices to the green innovation, and it tests this mechanism inside a public economic organization. Accordingly, the study offers implications for the human resource development, the workplace learning and the professional development of the employees in the public sector.

الكلمات المفتاحية:
إدارة الموارد البشرية الخضراء، التدريب والتطوير الأخضر، الصحة التنظيمية، التنمية البشرية المهنية، الابتكار الأخضر،

الملخص

تهدف هذه الدراسة إلى بحث تأثير ممارسات إدارة الموارد البشرية الخضراء والتي يُنظر إليها في هذا السياق كنظام للتطوير المهني للموظفين، على الابتكار الأخضر، واختبار الدور الوسيط للصحة التنظيمية في "مجموعة المناطق الحرة والتنموية" الأردنية. اعتمدت الدراسة المنهج الوصفي التحليلي، وجرى توزيع استبانة على موظفي المجموعة في مناطقها الحرة والتنموية باستخدام أسلوب المسح الشامل لمجتمع

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الدراسة البالغ (320) موظفاً. وقد تم تحليل 287 استجابة صالحة باستخدام برنامجي (SPSS) الإصدار 29 و(SmartPLS) الإصدار 4، عبر تطبيق نمذجة المعادلات الهيكلية بطريقة المربعات الصغرى الجزئية (PLS-SEM). أظهرت النتائج أن لممارسات إدارة الموارد البشرية الخضراء تأثيراً إيجابياً ودالاً إحصائياً على الصحة التنظيمية ($\beta = 0.787$، $p < 0.001$)، كما تبين أن للصحة التنظيمية تأثيراً إيجابياً ودالاً إحصائياً على الابتكار الأخضر ($\beta = 0.705$، $p < 0.001$). علاوة على ذلك، وُجد تأثير غير مباشر إيجابي ودال إحصائياً لممارسات إدارة الموارد البشرية الخضراء على الابتكار الأخضر من خلال الصحة التنظيمية ($\beta = 0.555$، $p < 0.001$). وقد فسر النموذج 62.0% من التباين في الصحة التنظيمية، و49.7% من التباين في الابتكار الأخضر، كما أظهر قدرة تنبؤية جيدة. وتُعد هذه الدراسة من بين الدراسات القليلة التي تنظر إلى الصحة التنظيمية كآلية للتنمية البشرية تنقل أثر ممارسات إدارة الموارد البشرية الخضراء إلى الابتكار الأخضر، وتختبر هذه الآلية داخل مؤسسة اقتصادية عامة. وبناءً عليه، تقدم الدراسة دلالات عملية تتعلق بتطوير الموارد البشرية، والتعلم في بيئة العمل، والتطوير المهني للموظفين في القطاع العام.

.PLS-SEM

JEL Classification: M12, M53, Q15, O*56.*

1. Introduction

The organizations in the current time are facing increasing pressures to move toward the green economy, and these pressures come from the international organizations, the governments, the investors and the society in general. Accordingly, the organizations started to transform from the traditional organizations to green organizations that consider the environmental dimension in all of their activities, and the human resource management is considered one of the main functions that carry this transformation inside the organization (Renwick et al., 2013; Jackson et al., 2011). In this context, the green human resource management (GHRM) refers to the set of the human resource practices which aim to develop the environmental awareness, the knowledge and the commitment of the employees, and it includes the green recruitment, the green training and development, the green performance management and the green rewards (Tang et al., 2018; Ren et al., 2018).

Moreover, it should be noted that the GHRM is not only an administrative tool, but it is also a system for the professional development of the employees. The green training and development, for example, is a form of the workplace learning in which the employees acquire new environmental knowledge, new skills and new values, and the green performance management and the green rewards give the employees a continuous feedback that guides their professional growth (Pinzone et al., 2019; Saeed et al., 2019). Therefore, the GHRM can be read from the perspective of the professional human development, where the organization invests in the human capital of its employees in order to build their ability, their motivation and their opportunity to participate in the environmental goals (Appelbaum et al., 2000; Becker, 1964). This perspective is consistent with the recent studies published in the International Journal of Pedagogy and Professional Human Development Insights, which showed that the development of the professional

competencies of the employees, such as the digital skills and the employability skills, is reflected on their performance and on the performance of their institutions (Sharadgah et al., 2025; Hazaimeh, 2025; Shboul, 2025). On the other hand, the organizations care to provide a suitable work environment for the employees, and the organizations which have a high level of the organizational health are able to set realistic goals, to achieve the creativity and to keep a strong position in the competition (Kaluza et al., 2020; Reece et al., 2021). The organizational health expresses the ability of the organization to function effectively, to cope with the changes and to grow over the long term, and it includes the cohesion, the creativity, the morale and the consideration (Miles, 1969; Hoy & Feldman, 1987). In addition, the practical evidence indicates that the healthy organizations achieve in the long term a total return for the shareholders which is about three times the return of the unhealthy organizations (Camp et al., 2024). Hence, the organizational health is considered an outcome of the human development inside the organization, and it is a suitable outcome for studying the effect of the human resource practices on the employees and on the organization at the same time.

With regard to the free zones, the data of the United Nations Conference on Trade and Development indicate that the number of the special economic zones in the world reached about (5400) zones distributed on more than (145) economies, and more than (500) new zones are under planning (UNCTAD, 2019). Furthermore, the success of these zones is not related only to the size of the investments and the tax incentives, but it is related also to their environmental, social and governance performance (UNCTAD, 2019). In Jordan, the Economic Modernisation Vision (2022–2033) included a clear direction toward the sustainability, the renewable energy and the green jobs, and it linked this direction with the alignment of the skills of the workforce (Government of Jordan, 2022). Consequently, the Jordanian Free and Development Zones Group, which is the entity responsible for managing and developing the free and development zones in the Kingdom, is required to translate these national directions to internal practices that start from the recruitment of the employees and their training and end with the evaluation of their performance and their rewarding.

However, the review of the literature showed that the Jordanian studies on the GHRM focused in the hotel sector (Ababneh, 2021), the service companies listed on Amman Stock Exchange (Alsharah, 2024) and the Greater Amman Municipality (Shalaldeh & Ali, 2026), while the free and development zones remained outside the scope of these studies. Moreover, the bibliometric analysis of Faheem et al. (2024) showed that the studies which combined the GHRM and the green innovation did not exceed (46) studies from (312) records, and most of these studies focused on the environmental performance. In the same direction, the meta-analysis of Guo et al. (2025) on (172) studies that included (54,963) participants showed that the outcomes of the GHRM were measured mostly through the green behaviors and the attitudes of the employees, while the comprehensive organizational outcomes did not receive the same attention. Based on the above, the organizational health is still an outcome which is not studied enough in the GHRM literature, and the role of the organizational health as a mechanism that links the GHRM with the green innovation was not examined from the perspective of the professional human development.

In addition, the studies that tested the mechanisms through which the GHRM affects the green outcomes focused mostly on the strategic and the cultural mediators. Kanan et al. (2023) found that the green innovation partially mediates the relationship between the GHRM practices and the sustainable performance in the Palestinian manufacturing industries, while Din et al. (2024) indicated that the green competitive advantage is the channel through which the effect of the GHRM and the green innovation is transferred to the environmental performance, and Muisyo et al. (2022) showed that the effect of the GHRM on the green competitive advantage passes through the enablers of the green culture. It is worth mentioning that these studies treated the green innovation as a mediator or as an outcome of the strategic mechanisms, and they did not consider the internal health of the organization, which includes the cohesion, the creativity, the morale and the consideration, as the human mechanism through which the GHRM practices are transferred to the green innovation. Moreover, most of these studies were conducted in the industrial organizations, and the public organizations with an economic nature such as the Jordanian Free and Development Zones Group did not receive the same attention.

Accordingly, the current study aims to examine the impact of the GHRM practices on the organizational health and on the green innovation, and to test the mediating role of the organizational health in the relationship between the GHRM practices and the green innovation in the Jordanian Free and Development Zones Group. In other words, the study tries to answer the following questions: (1) Do the GHRM practices affect the organizational health? (2) Does the organizational health affect the green innovation? (3) Does the organizational health mediate the relationship between the GHRM practices and the green innovation?

The study contributes to the literature in several ways. First, the study reads the GHRM as a professional development system, and it links this system with the organizational health as a human development outcome, and this extends the GHRM research from the green behavior of the employees to the health of the organization as a whole. Second, the study integrates the ability-motivation-opportunity theory, the perceived organizational support theory, the human capital theory and the resource-based view in one model, and it shows a human pathway in which the GHRM builds a healthy organization and the healthy organization produces the green innovation, which is different from the strategic pathway that was examined in the previous studies. Third, the study provides evidence from a public economic organization in a developing country, and this context is different from the industrial context that dominates the previous studies. The rest of the paper is organized as follows: Section 2 presents the literature review and the hypotheses development, Section 3 explains the methodology, Section 4 presents the results, Section 5 discusses the results, and Section 6 presents the conclusion, the implications and the limitations.

2. Literature Review and Hypotheses Development

2.1 Theoretical Foundation

The current study depends on four complementary theories. The first theory is the resource-based view (RBV), which suggests that the organization achieves a sustainable competitive advantage when it owns

resources that are valuable, rare, difficult to imitate and difficult to substitute (Barney, 1991). Moreover, the natural-resource-based view extended this logic to the environmental capabilities, and it argued that the pollution prevention, the product stewardship and the sustainable development are sources for the competitive advantage (Hart, 1995). According to this theory, the employees who are recruited, trained and rewarded on an environmental basis represent a rare resource which is difficult to imitate, and the organization that is able to mobilize these employees in a healthy work environment can transfer this resource to the green innovation, which is considered in its turn a source of the competitive advantage (Porter, 1985; Porter & van der Linde, 1995).

The second theory is the ability-motivation-opportunity (AMO) theory, which explains that the performance of the employees is a function of their ability, their motivation and their opportunity to participate (Appelbaum et al., 2000). In this context, the green recruitment and the green training and development raise the ability of the employees, while the green performance management and the green rewards raise their motivation, and the organizational climate gives them the opportunity to suggest new environmental ideas and solutions. Therefore, the AMO theory is suitable to explain how the GHRM practices build a healthy work environment, and how this environment is transferred then to the innovative behavior and to the green innovation of the organization.

The third theory is the perceived organizational support theory, which is based on the social exchange theory (Blau, 1964; Eisenberger et al., 1986). The theory suggests that the employees form a general perception regarding the degree to which the organization values their contributions and cares about their well-being, and this perception leads to positive outcomes such as the commitment, the satisfaction and the improved performance. Hence, when the organization applies the GHRM practices, the employees perceive these practices as a form of support and care, and they respond by more cohesion, more morale and more participation, which are the components of the organizational health.

The fourth theory is the human capital theory, which considers the education and the training as an investment in the people that raises their productivity (Becker, 1964). It should be noted that this theory provides the link between the GHRM and the professional human development, since the green training and development is a planned learning investment that builds the environmental competencies of the employees, and this investment is reflected on the employees and on the organization in the same time (Pinzone et al., 2019; Gyensare et al., 2024).

2.2 Organizational Health as a Professional Human Development Outcome

The concept of the organizational health was introduced by Miles (1969), who described the healthy organization as the organization that survives in its environment, and also continues to grow and to develop its abilities to cope with the changes over the long term. Moreover, Hoy and Feldman (1987) developed the concept in the educational institutions, and they considered the organizational health as the degree of the harmony between the different levels of the organization and its ability to achieve its goals and to meet the

needs of its members. In this study, the organizational health is measured by four dimensions: the cohesion, which refers to the positive relations and the cooperation between the employees; the creativity, which refers to the support of the new ideas and the development of the creative skills; the morale, which refers to the positive climate, the loyalty and the feeling of security; and the consideration, which refers to the respect, the trust and the fairness between the management and the employees (Al-Sarayreh, 2013; Khalaf, 2020; Zahdeh, 2021).

In addition, the organizational health is closely related to the human development inside the organization. Kaluza et al. (2020) showed that the perceptions of the leaders regarding the organizational health climate affect the exhaustion and the engagement of the employees, and Reece et al. (2021) found that the feeling of the employees that they matter is an indicator of the organizational health and the success of the employees. Furthermore, the studies in the educational settings showed that the organizational health is related to the organizational citizenship behavior of the teachers (Zahdeh, 2021), and the studies published in this journal showed that the professional well-being, the leadership and the development of the competencies are linked with the effectiveness of the institutions (Al Katheeri et al., 2025; Alqudah, 2025). Based on the above, the organizational health is considered in this study as a professional human development outcome, where the healthy organization is the organization which develops its people and is developed by them.

2.3 Green Human Resource Management as a Professional Development System

The GHRM refers to the use of the human resource management policies and practices to support the sustainable use of the resources inside the organization and to promote the environmental causes (Renwick et al., 2013). Moreover, the review of Yong et al. (2020) and the review of Amrutha and Geetha (2020) showed that the GHRM research grew fast during the last decade, and the GHRM practices are related to the environmental performance, the green behavior of the employees and the social sustainability. In the current study, the GHRM is measured by four practices. The green recruitment refers to attracting and selecting the candidates who have the environmental awareness and values; the green training and development refers to the programs that develop the environmental knowledge, skills and awareness of the employees; the green performance management refers to including the environmental goals and indicators in the evaluation of the employees; and the green rewards refer to the financial and non-financial incentives that encourage the environmental initiatives (Tang et al., 2018; Al-Sawi & Al-Dabbagh, 2021).

From the perspective of the professional human development, these four practices form together a development cycle. The green recruitment selects the employees who are ready to learn, the green training and development builds their competencies, the green performance management gives them goals and feedback, and the green rewards recognize their progress and reinforce it. Accordingly, the GHRM works as a system for the workplace learning and the professional growth, and this is consistent with Pinzone et al. (2019), who found that the green training affects the pro-environmental behaviors and the job satisfaction

of the employees, and with Gyensare et al. (2024), who found that the GHRM practices improve the well-being of the employees and their sustainable work behavior. In the same context, the studies of this journal showed that the training and the professional development of the employees in the digital and vocational skills raise their performance (Sharadgah et al., 2025; Hazaimeh, 2025), and the green skills can be viewed as a new type of these professional skills.

2.4 GHRM Practices and Organizational Health

The previous studies indicate that the GHRM practices have positive effects on the attitudes and the behaviors of the employees. Dumont et al. (2017) found that the GHRM affects the green behavior of the employees through the psychological green climate, and Kim et al. (2019) showed that the GHRM affects the eco-friendly behavior of the hotel employees and the environmental performance. Moreover, Shafaei and Nejati (2024) found that the GHRM is related to the innovative behavior of the employees, and Gyensare et al. (2024) found that the GHRM improves the well-being of the employees. These outcomes, namely the positive climate, the well-being, the satisfaction and the innovative behavior, are close to the dimensions of the organizational health.

According to the perceived organizational support theory, when the Group applies the GHRM practices, the employees perceive that the Group cares about them and about the environment, and they respond with more cohesion and more morale. In addition, according to the human capital theory, the green training and development raises the knowledge and the skills of the employees, and this supports the creativity dimension of the organizational health. Furthermore, the green performance management and the green rewards create clear and fair rules for the evaluation and the recognition, and this supports the consideration dimension. Therefore, the following hypotheses are proposed:

H1: The GHRM practices have a positive effect on the organizational health in the Jordanian Free and Development Zones Group.

2.5 Organizational Health and Green Innovation

The green innovation refers to the development of the new or the improved products, processes and practices that reduce the negative effects on the environment, and it includes the green product innovation and the green process innovation (Chen et al., 2006). Moreover, the green innovation depends on the knowledge and the creativity of the employees, and therefore the human resource practices are considered an important antecedent for the green innovation (Song et al., 2021; Singh et al., 2020). In this context, Mamun (2026) found a positive and significant effect of the GHRM on the green innovation ($\beta = 0.662$, $p < 0.001$), and Kanan et al. (2023) and Fang et al. (2022) confirmed the significant effect of these practices on the green innovation, and Kuo et al. (2022) found that the GHRM practices affect the green innovation and the environmental performance. However, it should be noted that the GHRM practices do not produce the green ideas by themselves, but the green ideas are produced by the employees when they work in an environment that supports the cooperation, the creativity and the participation.

In this regard, the effect of the internal health of the organization extends to its environmental initiatives. Awwad Al-Shammari et al. (2022) found that the green innovation is related to the sustainable performance of the firms, and Pokalai et al. (2026) showed that the green innovation and the job satisfaction represent two pathways through which the GHRM is transferred to the green behavior of the employees. Furthermore, Shafaei and Nejati (2024) found that the green practices are linked with the innovative behavior of the employees, and Reece et al. (2021) found that the feeling of the employees that they matter is related to the organizational health and to the success of the employees. Accordingly, the organization that has a high level of the cohesion, the creativity, the morale and the consideration provides a work environment which encourages the employees to share their knowledge, to propose new environmental solutions and to put these solutions into practice.

According to the AMO theory, the organizational health gives the employees the opportunity to use their abilities, since the cohesion supports the teamwork and the knowledge sharing, the creativity dimension supports the new ideas, the morale raises the willingness of the employees to make an extra effort, and the consideration means that the management takes the suggestions of the employees into account and puts them into practice. From the perspective of the professional human development, the participation of the employees in the green innovation projects is a learning experience by itself, since the employees learn new methods, work in teams and see the results of their ideas. Therefore, the following hypothesis is proposed:

H2: The organizational health has a positive effect on the green innovation in the Jordanian Free and Development Zones Group.

2.6 The Mediating Role of Organizational Health

Based on the previous hypotheses, the GHRM practices are expected to affect the organizational health (H1), and the organizational health is expected to affect the green innovation (H2), and accordingly the organizational health can be a mechanism that transfers the effect of the GHRM practices to the green innovation. This logic is supported by the studies which found that the internal climate and the culture of the organization carry the effect of the GHRM to the green outcomes. Dumont et al. (2017) found that the psychological green climate mediates the effect of the GHRM on the green behavior of the employees, Fang et al. (2022) found that the green culture mediates the relationship between the GHRM and the environmental performance, and Muisyo et al. (2021) showed that the green organizational identity mediates the effect of the GHRM on the green competitive advantage. Moreover, Gyensare et al. (2024) found that the GHRM practices improve the well-being of the employees and their sustainable work behavior, and Pokalai et al. (2026) confirmed the role of the job satisfaction as an affective pathway between the GHRM and the green behavior.

On the other hand, the previous studies tested mostly the strategic mechanisms in this relationship. Din et al. (2024) found that the green competitive advantage mediates the relationship between the GHRM and the environmental performance, Gharbi et al. (2022) found that the innovation capacities mediate the

relationship between the GHRM and the competitive advantage in the Saudi food industry, and Abouelenien (2024) found that the eco-innovation and the green psychological climate play a role in the relationship between the GHRM and the green competitive advantage. In addition, Novitasari and Agustia (2023) found that the competitive advantage mediates the effect of the green innovation on the firm performance, Nuryakin and Maryati (2022) showed that the green competitive advantage mediates the effect of the green orientation on the performance, and Al Mansoori and Hafssa (2025) showed in this journal that the internal strategic capabilities of the organization improve the management and the competitive advantage in the UAE energy sector. It is worth mentioning that these studies confirm that the effect of the green practices passes through internal mechanisms, but they did not examine the organizational health as one of these mechanisms.

According to the AMO theory and the perceived organizational support theory, the GHRM practices develop the ability and the motivation of the employees and make them feel that the Group values them, and this is reflected on the cohesion, the creativity, the morale and the consideration inside the Group. Then, the healthy organization gives the employees the opportunity to transfer their green knowledge to new products, processes and practices. In other words, the GHRM builds the people, the people build a healthy organization, and the healthy organization produces the green innovation. Therefore, the following hypothesis is proposed:

H3: The organizational health mediates the relationship between the GHRM practices and the green innovation in the Jordanian Free and Development Zones Group.

2.7 Research Model

Based on the above discussion, the research model of the current study was developed as shown in Figure 1. The model includes the GHRM practices as an independent variable, the organizational health as a mediating variable, and the green innovation as a dependent variable.

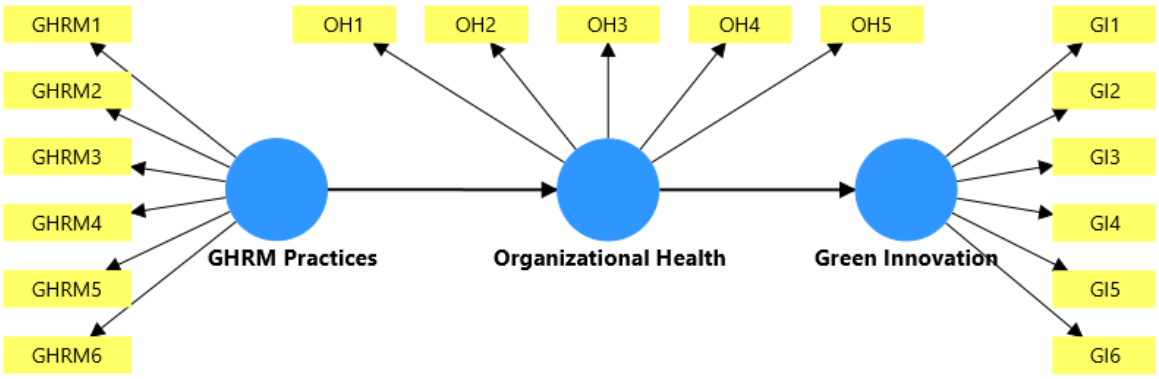


Figure 1: Research model

Source: Developed by the authors based on the literature review.

3. Methodology

3.1 Research Design and Context

The current study adopted the descriptive analytical approach with a quantitative design, since this approach is suitable to describe the phenomenon as it exists in the reality and to test the relationships between the variables. The study was conducted in the Jordanian Free and Development Zones Group, which was established in 2016 after the merger of the Free Zones Corporation and the Development Zones Commission, and it manages the Zarqa Free Zone, the Ajloun Development Zone, the Airport Free Zone, the Sahab Free Zone, the Muwaqqar Free Zone, the Karak Free Zone, the Karama Free Zone and the Dead Sea Development Zone. It is worth mentioning that the Group is a public company owned by the government, and it has an economic role in attracting the investments, and it is required to align its practices with the national directions toward the green economy (Government of Jordan, 2022).

3.2 Population and Sample

The population of the study consists from all the administrative employees in the Jordanian Free and Development Zones Group, and their number is (320) employees according to the annual report of the Group for the year 2023. Due to the small size of the population and the geographical closeness of its units, the comprehensive survey method was used, where the questionnaire was distributed to all the members of the population. The number of the returned questionnaires was (302) questionnaires, which represents a return rate of 94.4%, and after excluding (15) incomplete questionnaires, (287) questionnaires were valid for the analysis, which represents a response rate of 89.7% from the study population. Moreover, the minimum sample size was checked by two methods. According to the inverse square root method, and by assuming a minimum path coefficient of 0.20 at the significance level of 5%, the minimum sample size required is (155) observations (Hair et al., 2022). In addition, the G*Power analysis was conducted for the maximum number of the predictors of an endogenous construct in the model, which is one predictor, with a medium effect size ($f^2 = 0.15$), a significance level of 0.05 and a statistical power of 0.95, and the result showed that the minimum sample size required is (89) observations. Accordingly, the final sample of (287) observations exceeds the minimum requirements of the two methods, and it is sufficient for the PLS-SEM analysis (Hair et al., 2022).

3.3 Measurement Instrument

The questionnaire was developed based on the previous studies and it was adapted to the context of the Group. The questionnaire consists from two parts: the first part includes the demographic characteristics (gender, age, educational level, job title and years of experience), and the second part includes the items of the study variables. All the items were measured by a five-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. Moreover, the content validity of the questionnaire was checked by a group of the academic referees, and their comments were considered in the final version. Table 1 summarizes the measurement of the variables, and the items used in the final model are presented in Appendix A.

Table 1: Measurement of the study variables

Variable	Items	Sources
GHRM practices (GHRM)	6	Al-Sawi & Al-Dabbagh (2021); Al-Hamouri et al. (2017); Tang et al. (2018)
Organizational health (OH)	5	Al-Sarayreh (2013); Al-Ashqar (2022); Khalaf (2020)
Green innovation (GI)	6	Khazaal & Diab (2019a); Zawawi (2022); Chen et al. (2006)

Note: All the constructs were specified as first-order reflective constructs. The GHRM practices were measured by six items and the organizational health was measured by five items, and these items were retained in the final model.

3.4 Data Analysis Procedure

The data were analyzed by using the SPSS version 29 for the descriptive statistics, the normality test and the multicollinearity test, and the SmartPLS 4 was used for the partial least squares structural equation modeling (PLS-SEM) (Ringle et al., 2022). The PLS-SEM was selected because the study aims to predict and explain the variance of the organizational health, and because the model includes a mediating variable, and it does not require the multivariate normality of the data (Hair et al., 2019).

The analysis was conducted in two stages. In the first stage, the measurement model was evaluated through the indicator loadings (≥ 0.70), the internal consistency reliability by the Cronbach's alpha and the composite reliability (≥ 0.70), the convergent validity by the average variance extracted (AVE ≥ 0.50), and the discriminant validity by the heterotrait-monotrait ratio (HTMT < 0.85 or 0.90) (Henseler et al., 2015; Fornell & Larcker, 1981). In the second stage, the structural model was evaluated through the collinearity (VIF < 3.3), the coefficient of determination (R^2), the effect size (f^2), the predictive relevance (Q^2) and the PLSpredict (Shmueli et al., 2019), and the hypotheses were tested by the bootstrapping procedure with 5,000 subsamples. As for the mediating effect, the research model specifies the organizational health as the mechanism that transfers the effect of the GHRM practices to the green innovation, and the significance of the indirect effect was tested by the bootstrapping procedure according to Preacher and Hayes (2008) and Zhao et al. (2010). In addition, the common method bias was checked by the Harman's single factor test and by the full collinearity assessment approach (Podsakoff et al., 2003; Kock, 2015).

4. Results

4.1 Measurement Model Assessment

The measurement model was evaluated in order to check the reliability and the validity of the constructs before the testing of the hypotheses. Figure 2 presents the measurement model with the outer loadings of the items and the coefficients of determination of the endogenous constructs. It can be seen that all the outer loadings were higher than the threshold of 0.70, and they ranged from 0.774 (GHRM6) to 0.945 (GI5), and accordingly all the items were retained in the model (Hair et al., 2022).

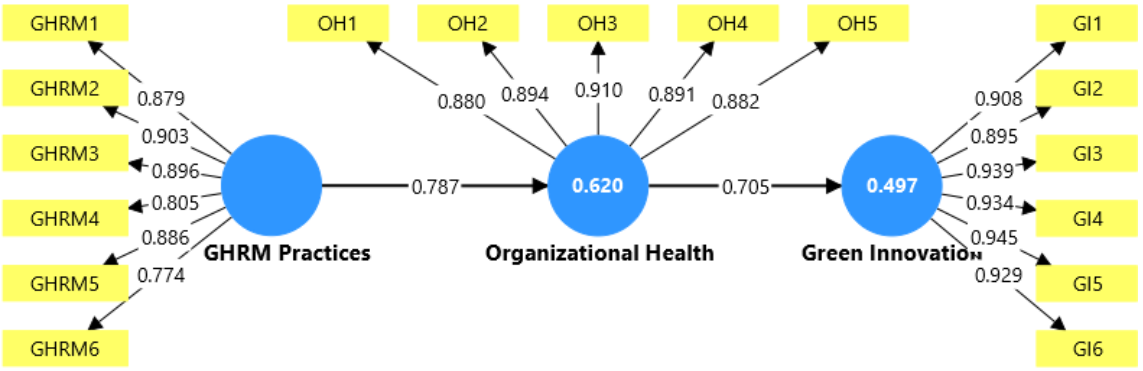


Figure 2: Measurement model (outer loadings and R^2)

Source: SmartPLS 4 output.

Moreover, Table 2 shows that the values of the Cronbach's alpha ranged from 0.928 to 0.966, and the values of the composite reliability (rho_c) ranged from 0.944 to 0.973, and all these values are higher than 0.70, which confirms the internal consistency reliability of the constructs. In addition, the average variance extracted (AVE) ranged from 0.737 for the GHRM practices to 0.856 for the green innovation, and these values are higher than 0.50, and this means that each construct explains more than half of the variance of its items, which confirms the convergent validity (Hair et al., 2019).

Table 2: Reliability and convergent validity

Construct	Item	Loading	Cronbach's α	rho_a	rho_c	AVE
GHRM practices	GHRM1	0.879	0.928	0.929	0.944	0.737
	GHRM2	0.903				
	GHRM3	0.896				
	GHRM4	0.805				
	GHRM5	0.886				
	GHRM6	0.774				
Organizational health	OH1	0.880	0.935	0.936	0.951	0.794
	OH2	0.894				
	OH3	0.910				
	OH4	0.891				
	OH5	0.882				
Green innovation	GI1	0.908	0.966	0.969	0.973	0.856
	GI2	0.895				
	GI3	0.939				
	GI4	0.934				
	GI5	0.945				
	GI6	0.929				

Note: rho_a and rho_c refer to the composite reliability; AVE = average variance extracted.

With regard to the discriminant validity, it was assessed by the Fornell-Larcker criterion and by the heterotrait-monotrait ratio (HTMT). As shown in Table 3, the square root of the AVE of each construct (0.858 for the GHRM practices, 0.891 for the organizational health and 0.925 for the green innovation) is higher than its correlations with the other constructs, which ranged from 0.705 to 0.787 (Fornell & Larcker, 1981). Furthermore, Table 4 shows that all the HTMT values were lower than the conservative threshold of 0.85, where the highest value was 0.842 between the GHRM practices and the organizational health (Henseler et al., 2015). Accordingly, the discriminant validity of the constructs was established.

Table 3: Discriminant validity: Fornell-Larcker criterion

Construct	GHRM	OH	GI
GHRM practices	**0.858**		
Organizational health	0.787	**0.891**	
Green innovation	0.769	0.705	**0.925**

Note: The bold diagonal values are the square root of the AVE, and the off-diagonal values are the correlations between the constructs.

Table 4: Discriminant validity: heterotrait-monotrait ratio (HTMT)

Construct	GHRM	OH	GI
GHRM practices			
Organizational health	0.842		
Green innovation	0.808	0.738	

In addition, the common method bias was checked, since the data of all the variables were collected from the same respondents by the same questionnaire. Accordingly, the common method bias is not considered a serious problem in the current study (Podsakoff et al., 2003; Kock, 2015).

4.2 Structural Model Assessment

After the confirmation of the measurement model, the structural model was evaluated. As for the collinearity, each endogenous construct in the model is predicted by one construct only, where the organizational health is predicted by the GHRM practices and the green innovation is predicted by the organizational health, and accordingly the inner VIF values are equal to 1.000, and the collinearity is not a problem in the structural model.

Moreover, Table 5 shows that the GHRM practices explained 62.0% of the variance in the organizational health ($R^2 = 0.620$, adjusted $R^2 = 0.619$), and the organizational health explained 49.7% of the variance in the green innovation ($R^2 = 0.497$, adjusted $R^2 = 0.495$). According to Hair et al. (2019), these values indicate a moderate explanatory power for the organizational health and a close to moderate explanatory power for the green innovation. With regard to the predictive power, the PLSpredict procedure showed that the Q^2predict values were 0.617 for the organizational health and 0.543 for the green innovation, and both values

are higher than zero, which indicates that the model has a predictive relevance for the two endogenous constructs (Shmueli et al., 2019).

Table 5: Explanatory and predictive power of the model

Endogenous construct	R^2	Adjusted R^2	Q^2predict	RMSE	MAE
Organizational health	0.620	0.619	0.617	0.623	0.460
Green innovation	0.497	0.495	0.543	0.681	0.520

4.3 Hypotheses Testing

The hypotheses were tested by the bootstrapping procedure with 5,000 subsamples, and Figure 3 presents the path coefficients and their p values, while Table 6 summarizes the results of the hypotheses testing.

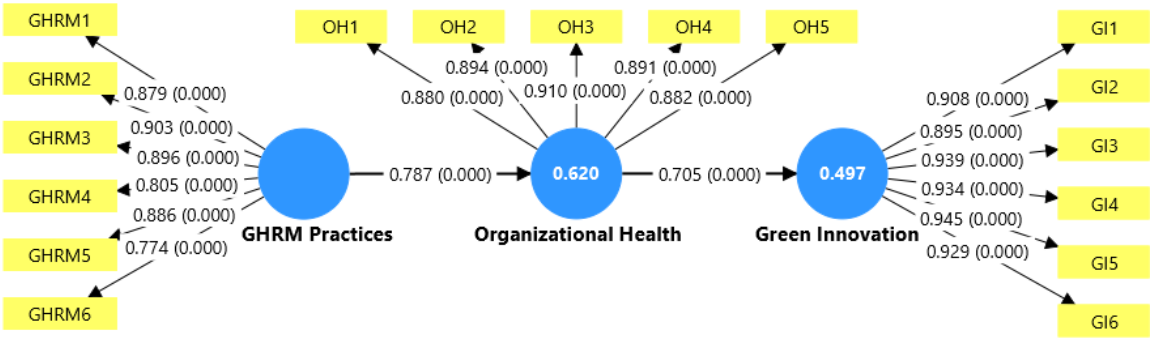


Figure 3: Structural model results (path coefficients and p values)

Source: SmartPLS 4 output (bootstrapping with 5,000 subsamples).

Table 6: Results of the hypotheses testing

Hypothesis	Path	β	Mean	SD	t value	p value	f^2	Decision
H1	GHRM → OH	0.787	0.788	0.027	29.198	0.000	1.632	Supported
H2	OH → GI	0.705	0.704	0.036	19.737	0.000	0.987	Supported
H3	GHRM → OH → GI	0.555	0.556	0.043	13.033	0.000	-	Supported

Note: H3 is the specific indirect effect. GHRM = green human resource management practices; OH = organizational health; GI = green innovation; SD = standard deviation.

The results in Table 6 showed that the GHRM practices have a positive and significant effect on the organizational health ($\beta = 0.787$, $t = 29.198$, $p < 0.001$), and therefore H1 is supported. Moreover, the effect size of the GHRM practices on the organizational health was large ($f^2 = 1.632$), since it is higher than the threshold of 0.35 (Hair et al., 2022). In other words, the improvement of the GHRM practices by one standard deviation is associated with an improvement of the organizational health by 0.787 standard deviation.

Furthermore, the results showed that the organizational health has a positive and significant effect on the green innovation ($\beta = 0.705$, $t = 19.737$, $p < 0.001$), and accordingly H2 is supported, and the effect size was also large ($f^2 = 0.987$). As for the mediating role of the organizational health, the specific indirect effect

of the GHRM practices on the green innovation through the organizational health was positive and significant (β = 0.555, t = 13.033, p < 0.001), and therefore H3 is supported. It should be noted that the research model did not include a direct path from the GHRM practices to the green innovation, and accordingly the total effect of the GHRM practices on the green innovation in the model (0.555) is the same of the indirect effect, which means that the effect of the GHRM practices on the green innovation is transferred through the organizational health in the specified model.

5. Discussion

The results of the study showed that the GHRM practices have a positive and significant effect on the organizational health (β = 0.787), and the GHRM practices explained 62.0% of the variance in the organizational health. This result is consistent with the perceived organizational support theory, where the employees perceive the green practices as a sign of the care of the Group about them and about the environment, and they respond with more cohesion, more morale and more creativity. Moreover, this result is consistent with Gyensare et al. (2024), who found that the GHRM improves the well-being of the employees, and with Pinzone et al. (2019), who found that the green training raises the job satisfaction. From the perspective of the professional human development, this result indicates that the GHRM is not only a tool for the environmental management, but it is a development system that improves the work environment and the human side of the organization, and this is consistent with the human capital theory, which considers the training as an investment that returns on the employees and on the organization (Becker, 1964).

Furthermore, the results showed that the organizational health has a positive and significant effect on the green innovation (β = 0.705). This result means that the green innovation in the Group is not only a technical issue, but it depends on the human climate inside the Group, where the cohesion between the employees supports the teamwork and the knowledge sharing, the morale raises the willingness of the employees to make an extra effort, and the consideration makes the management take the suggestions of the employees into practice. This result is consistent with Shafaei and Nejati (2024), who linked the green practices with the innovative behavior of the employees, and with Pokalai et al. (2026), who showed that the affective pathway, such as the job satisfaction, carries the effect of the GHRM to the green behavior. In addition, the result supports the logic of the AMO theory, where the healthy organization gives the employees the opportunity to use the abilities and the motivation which were developed by the GHRM practices.

In addition, the results confirmed the mediating role of the organizational health, where the indirect effect of the GHRM practices on the green innovation through the organizational health was significant (β = 0.555). This result is consistent with Dumont et al. (2017) and Fang et al. (2022), who found that the green climate and the green culture carry the effect of the GHRM to the green outcomes, and it is also close to the direct effect of the GHRM on the green innovation reported by Mamun (2026) (β = 0.662). However, the current study extends the findings of Kanan et al. (2023) and Din et al. (2024), which focused on the green

innovation and the green competitive advantage as strategic channels, by showing a human channel in which the GHRM builds a healthy organization and the healthy organization produces the green innovation. On the other hand, the organizational health explained 49.7% of the variance in the green innovation, and this means that about half of the variance is explained by other factors such as the technology, the budget, the regulations and the leadership, which were not included in the current model.

6. Conclusion

The current study examined the impact of the GHRM practices on the green innovation and the mediating role of the organizational health in the Jordanian Free and Development Zones Group. The study viewed the GHRM as a professional development system that develops the ability, the motivation and the opportunity of the employees, and it viewed the organizational health as a human development outcome and as a mechanism at the same time. The results showed that the GHRM practices have a strong positive effect on the organizational health ($\beta = 0.787$, $p < 0.001$), the organizational health has a positive effect on the green innovation ($\beta = 0.705$, $p < 0.001$), and the organizational health mediates the relationship between the GHRM practices and the green innovation ($\beta = 0.555$, $p < 0.001$). Based on the above, it can be concluded that the investment in the green competencies of the employees is reflected first on the health of the organization, and then the healthy organization transfers this investment to the green innovation.

6.1 Theoretical Implications

The study contributes to the GHRM literature by moving the focus from the green behavior of the employees to the organizational health, and this responds to the call of Guo et al. (2025) for studying the comprehensive organizational outcomes of the GHRM. Moreover, the study links the GHRM literature with the literature of the professional human development and the workplace learning, and it shows that the human capital theory and the AMO theory can explain together how the green learning of the employees is transferred to organizational outcomes. In addition, the study introduces the organizational health as a human mechanism between the GHRM and the green innovation, and this provides an explanation which is different from the strategic and the cultural mechanisms that were examined in the previous studies (Kanan et al., 2023; Din et al., 2024; Muisyo et al., 2022).

6.2 Practical Implications

The results provide several implications for the management of the Group and for the policy makers. First, the Group should design continuous green training programs that are part of the professional development path of the employees, and these programs should include the environmental knowledge, the green skills and the practical projects. Second, the Group should include clear environmental indicators in the performance management system and link these indicators with the rewards and the recognition, since the feedback and the recognition are part of the professional growth of the employees. Third, since the effect of the GHRM on the green innovation passes through the organizational health, the Group should care about the cohesion, the morale and the consideration inside its units, for example by taking the suggestions of the

employees into practice and by building green teams, so that the employees apply what they learned in real green innovation projects. Fourth, the human resource development units in the public sector, and the training institutions in general, can use the GHRM model as a framework for developing the green competencies of the employees in line with the Economic Modernisation Vision (Government of Jordan, 2022).

6.3 Limitations and Future Research

The study has some limitations which open directions for future research. First, the study used a cross-sectional design, and therefore the future studies can use a longitudinal design to confirm the causal relationships. Second, the data were collected from the employees through a self-report questionnaire, and the future studies can use multiple sources of the data such as the managers and the objective indicators of the green innovation. Third, the research model did not include a direct path from the GHRM practices to the green innovation, and the GHRM practices and the organizational health were measured as unidimensional constructs, and accordingly the future studies can add the direct path in order to determine the type of the mediation (Zhao et al., 2010), and they can examine the effect of each dimension separately. Fourth, the study was applied on one public organization in Jordan, and the future studies can apply the model on the educational institutions, the universities and the private sector, and they can compare between the countries. Fifth, the future studies can add the competitive advantage as a parallel mediator by using the scales of Adel and Attia (2023) and Jamai (2023), and they can add moderating variables such as the green transformational leadership, the green organizational culture or the use of the artificial intelligence in the training.

Declarations

Author contributions: A.H.A.A.-Q.: conceptualization, data collection, formal analysis, writing (original draft); All author supervision, methodology, writing (review and editing); validation.

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Conflict of interest: The authors declare no conflict of interest.

Ethical approval and informed consent: The participation in the survey was voluntary and anonymous, and the respondents were informed about the purpose of the study before answering the questionnaire.

Data availability: The data that support the findings of this study are available from the corresponding author upon reasonable request.

AI Disclosure Statement: The authors used an AI tool for language editing, restructuring of the manuscript and drawing the research model figure. The authors reviewed and verified all the content and take full responsibility for it. Edit to match the actual use.

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