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Digital Green Human Resource Management in the Twin Transition: A Systematic Review and an Integrated Framework for Iranian Organizations

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ABSTRACT

Purpose: This study systematically reviews the literature on Digital Green Human Resource Management (DGHRM) within the twin transition context and proposes an integrated framework for Iranian organizations. The twin transition refers to the convergence of greening and digitalization, with human resource management serving as the strategic nexus of these two streams.

Methodology: A systematic review was conducted following the PRISMA protocol. Searches were performed in Scopus and Web of Science using combinations of the keywords "Green HRM," "Digital HRM," "Twin Transition," and "Sustainable HRM" over the period 2020–2026. From 412 initial records, after removing duplicates and screening titles and abstracts, 87 articles were selected for full-text review, and ultimately 47 studies met the inclusion criteria. Data extraction was performed using a standard form, and thematic analysis was applied.

Findings: Analysis of the studies revealed 7 dimensions, 24 components, and 61 indicators. The dimensions comprise green-digital leadership, dual competencies, sustainable organizational culture, data-driven infrastructure, algorithmic ethics, environmental engagement, and process architecture.

Conclusion: The DGHRM literature is still emerging but exhibits an unbalanced geographical concentration and a localization gap in Middle Eastern contexts. The proposed framework provides a research agenda for localization in Iran and practical implications for human resource managers.

Keywords: Digital Green Human Resource Management; Twin Transition; Systematic Review; PRISMA; Iranian Context.

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1. Introduction

The twin transition—the convergence of greening and digitalization—has become one of the central axes of organizational reconfiguration in the current decade. In the management literature, this concept views two transformative streams not as parallel paths but as an interconnected system that holds organizations simultaneously accountable to environmental and technological imperatives (Antonietti et al., 2026). At the heart of this transition lies human resource management, as greening without green-minded employees and digitalization without digital competencies will both reach a dead end (Sidique & Pereira, 2023).

Recent research has introduced the concept of "Digital Green Human Resource Management" (DGHRM) as a synthesis of GHRM and digital HRM. A systematic review of 50 studies published between 2020 and 2025 indicates that this field remains in its formative stage: unbalanced geographical concentration—most studies originate from Asian countries—fragmented theoretical approaches, and insufficient attention to non-Western institutional contexts are among its defining characteristics (Garuda, 2026). A bibliometric analysis of 1,219 articles published between 2015 and 2025 identified five main thematic clusters, none of which systematically examined the Middle Eastern or Iranian context (Riwayat, 2025).

A more significant theoretical gap also persists: the DGHRM literature confronts what may be termed the "digital sustainability paradox." While digital technologies enhance efficiency and transparency, they simultaneously consume energy and leave a carbon footprint; if designed without ethical and environmental considerations, they risk turning into their own antithesis (Garuda, 2026). This paradox calls for models that reveal the contradictory and hierarchical relationships among green and digital components rather than merely placing them side by side.

A recent systematic review in the GHRM domain indicates that most existing review studies either focus on bibliometric analysis or on a specific industry, and none has provided an integrated framework for complex institutional contexts (Suleman et al., 2024). A study examining GHRM in the era of digital transformation in SMEs identified 64 concepts but did not include the Iranian context in its sample (Suleman et al., 2024). Another bibliometric analysis reviewing 436 articles between 2016 and 2025 revealed serious theoretical, geographical, and methodological limitations, including a focus on a limited number of economies and frequent use of cross-sectional self-report designs (Wiley Online Library, 2026).

In the Iranian context, these gaps are compounded by additional institutional challenges. Iranian organizations operate in an environment that, on the one hand, faces restricted access to advanced technologies and weak data-driven infrastructure, and on the other hand, possesses a specific cultural-institutional fabric that renders the mere adoption of imported models ineffective. A study in the Social Security Organization of Iran demonstrated that existing models cannot explain the co-evolution of digital leadership with Iranian institutional structures, and identified 15 indigenous dimensions for GHRM in which "ethical responsibility" and "economic responsibility" played a central role—components that are often marginalized in Western models (Baqersalimi, 2023). Recent domestic studies have also shown that the digitalization of human resources can contribute to reducing resource consumption and strengthening employees' green behavior through process automation and e-HRM; however, its

implementation is accompanied by employee resistance and the need to redefine skills (Joneidi Jafari et al., 2025).

Accordingly, the main research question of this study is: What dimensions, components, and structural relationships does the Digital Green Human Resource Management literature in the twin transition reveal, and how can an integrated and indigenous framework for Iranian organizations be designed on this basis?

2. Theoretical Foundations and Literature Review

2.1. The Twin Transition: From Public Policy to Organizational Reconfiguration

The concept of the "twin transition" was initially proposed as a policy idea within the European Union's post-COVID-19 recovery program and subsequently evolved into a growing topic in academic research (Antonietti et al., 2026). This concept refers to the convergence of two transformative streams: digitalization and greening. A systematic literature review employing bibliometric analysis indicates that the twin transition field is "fragmented but rapidly growing," and scientific publication patterns demonstrate a "success breeds success" dynamic (Antonietti et al., 2026).

A parallel systematic review based on the PRISMA protocol analyzed 27 articles published between 2022 and 2026 and demonstrated that the impact of the twin transition on organizations is multidimensional, encompassing strategic, operational, capability-based, governance, and cultural-human domains. This review emphasizes that the existing literature remains fragmented and that there is insufficient integration among competing theoretical perspectives.

2.2. Human Capital and the Twin Transition: The Role of Training versus Formal Education

Empirical research indicates that human capital constitutes the micro-foundation of the twin transition. A study of Italian firms, employing Logit and OLS models, conceptualized "digital for green practices" as the extent to which firms apply digital technologies within environmental action domains (Cattani & Montresor, 2026). The key findings of this study indicate that **training-based human capital** significantly strengthens digital for green practices—particularly in non-technological applications—whereas **formal education** exerts no significant independent effect after controlling for other capabilities. This finding carries important implications for human resource management: what proves decisive in the twin transition is not the level of education but organization-based training and firm-specific skills.

2.3. HRM in the Twin Transition: From Sustainable HRM to Green-Digital HRM

The HRM literature has traditionally examined the green and digital streams separately. Recent research, however, indicates that these two domains can create significant synergies when integrated (Sidique & Pereira, 2023). A doctoral dissertation at the University of Pisa, adopting a configurational approach, proposed a conceptual framework that integrates sustainable HRM and digital HRM literature and introduces "twin transition HRM" as an emerging configuration. This research emphasizes that institutional pressures compel firms to manage sustainability and digitalization jointly at both strategic and operational levels.

2.4. GHRM in the Era of Digital Transformation: A Bibliometric Analysis

A bibliometric analysis of 1,219 articles published between 2015 and 2025 in Scopus, Google Scholar, and CrossRef identified five main thematic clusters at the intersection of GHRM and digital transformation: (1) organizational sustainability and green performance context, (2) green values and behavioral drivers, (3) psychological climate and innovation, (4) GHRM practices and sustainability, and (5) GHRM, corporate social responsibility, and responsible leadership (Riwayat, 2025). This analysis proposes seven future research directions, with "integrating GHRM with artificial intelligence, big data analytics, and sector-specific applications" at the top. Importantly, this bibliometric analysis did not include the Iranian context in its sample and explicitly identified "sector-specific applications" as a gap.

2.5. GHRM and Digital Transformation: Empirical Evidence from SMEs

A quantitative study of 150 small and medium-sized enterprises in South Sumatra, Indonesia, using SmartPLS, demonstrated that GHRM has a positive and significant effect on innovative behavior, which in turn influences innovative performance (Yuliza et al., 2026). Digital transformation also exerted a significant effect on competitive advantage and strengthened the relationship between innovative behavior and competitive advantage. These findings indicate that GHRM and digital transformation are not two parallel paths but two synergistic forces.

2.6. A Systematic Review of GHRM in the Hospitality Industry: Lessons for Other Contexts

A systematic review based on the PRISMA protocol of GHRM studies in the hospitality and tourism industry (2013–2023), using the ADO-TCM framework, demonstrated that the literature in this field has experienced considerable growth—from 1 article in 2019 to 27 articles in 2022—but also faces the "dark side" of GHRM: employee burnout, stress, and greenwashing (Suleman et al., 2024). This review emphasizes that "some studies show positive results, others mixed and even reverse," and that there is a need for more nuanced research on the factors affecting GHRM success.

2.7. Indigenous Evidence: GHRM in the Iranian Social Security Organization

A study using a sequential exploratory mixed-methods approach in the Iranian Social Security Organization designed a paradigmatic model of GHRM with 15 main dimensions (Ghasem Ahangari et al., 2025). Causal conditions include "green strategy," "green training and development," and "green performance appraisal." Contextual conditions include "green recruitment and selection," "green culture-building," and "green compensation." Intervening conditions include "ethical responsibility," "legal responsibility," and "economic responsibility"—indicating that in the Iranian context, ethical and economic responsibilities carry significant weight, unlike Western models that predominantly focus on legal responsibility. Strategies include "GHRM," "green technology," "green participation," and "green disciplinary management." Outcomes include "green social capital" and "philanthropic responsibility."

2.8. Digitalization of Human Resources and Green Management: Domestic Evidence

A review of domestic literature examining over 35 domestic and international sources indicates that the digitalization of human resources through process automation, artificial intelligence, and e-HRM contributes to reducing resource consumption, improving efficiency, and enhancing employees' green behavior (Joneidi Jafari et al., 2025). At the strategic level, the integration of GHRM with digital technologies leads to "promoting green supply chains, increasing employee commitment, and strengthening green financial performance." However, implementing this approach is accompanied by challenges such as "employee resistance, high costs, and the need to redefine skills."

2.9. Geographical Dimensions of the Twin Transition: Why Context Matters

A systematic literature review with bibliometric analysis indicates that "the development and adoption of green and digital technologies are shaped by regional characteristics—including local capabilities, institutional arrangements, and path dependencies" (Antonietti et al., 2026). This finding carries important implications for the present study: DGHRM models developed in European and East Asian contexts cannot be applied within Iranian organizations without localization. Another article reviewing the twin transition and flexible work arrangements indicates that "there is mixed evidence regarding the environmental and energy effects of FWAs" and highlights the need for "targeted policies to ensure a just transition" (Alfieri et al., 2025).

2.10. Synthesis of Gaps and the Conceptual Model of the Study

The above literature review reveals four main gaps that the present study addresses:

First gap: Unbalanced geographical concentration. Most DGHRM studies originate from Europe and East Asia, and the Middle Eastern and Iranian contexts are almost absent (Antonietti et al., 2026; Riwayat, 2025).

Second gap: Lack of an integrated framework. The HRM literature has examined green and digital streams separately, and their systematic integration into a coherent framework has been less frequently undertaken (Sidique & Pereira, 2023).

Third gap: Insufficient attention to causal relationships. Existing studies are predominantly descriptive or correlational and do not reveal the hierarchical structure and intensity of influence among DGHRM components.

Fourth gap: Absence of the ethical-algorithmic dimension. Although the "dark side" of GHRM has been identified (Suleman et al., 2024), algorithmic ethics at the green-digital intersection has not been systematically examined.

Accordingly, the **conceptual model of the study** is constructed as follows: DGHRM dimensions include (1) green-digital leadership, (2) dual competencies, (3) sustainable organizational culture, (4) data-driven infrastructure, (5) algorithmic ethics, (6) environmental engagement, and (7) process architecture. These dimensions have been extracted from the synthesis of the reviewed literature and will be elaborated in detail in the Findings section.

3. Methodology

3.1. Type and Design of the Study

The present study is fundamental-applied in terms of purpose and qualitative in terms of data nature. Its design is grounded in a **systematic review** following the PRISMA protocol. A systematic review is a method that employs explicit and systematic strategies to identify, evaluate, and synthesize studies related to a specific question, thereby enabling other researchers to reproduce the results (Page et al., 2021). This approach proves particularly suitable for emerging fields such as DGHRM, where the literature remains fragmented, as a tool for mapping existing knowledge and identifying gaps (Snyder, 2019).

3.2. Research Questions

The present systematic review is designed around three questions:

1. What dimensions and components has the DGHRM literature within the twin transition context identified?
2. Which components are introduced as drivers and which as dependent variables in existing models?
3. What theoretical and indigenous gaps persist in the literature for the Iranian context?

3.3. Search Strategy and Source Selection

Searches were conducted in two principal databases—**Scopus** and **Web of Science**. These two databases, owing to their extensive coverage of Q1/Q2 journals and advanced search capabilities, are considered the gold standard for literature reviews in management (Gusenbauer & Haddaway, 2020).

Search keywords were designed by combining Boolean operators:

- **Group One (Green):** "Green HRM" OR "Green Human Resource Management" OR "Sustainable HRM"
- **Group Two (Digital):** "Digital HRM" OR "Digital Human Resource Management" OR "HR Digitalization" OR "e-HRM"
- **Group Three (Twin Transition):** "Twin Transition" OR "Twin Transformation" OR "Green-Digital"
- **Final combination:** (Group One) AND (Group Two) OR (Group Three)

Timeframe: 2020 to 2026. This range was selected based on the findings of Riwayat (2025), which indicate that the DGHRM field has grown significantly since 2020.

Source selection criteria:

- Articles published in journals indexed in Scopus or WoS
- Articles directly addressing the intersection of GHRM and digital transformation
- Articles identifying dimensions, components, or relationships between GHRM and digitalization
- Articles with acceptable methodological quality

Exclusion criteria:

- Conference papers, non-scientific books, and industry reports
- Articles addressing only GHRM or only digital HRM
- Articles without full-text access

3.4. Analytical Process

Data analysis was performed using **thematic analysis** based on the approach of Braun and Clarke (2006) in six stages:

1. **Familiarization with the data:** Repeated reading of articles and initial note-taking
2. **Initial coding:** Extraction of key concepts related to the research questions
3. **Searching for themes:** Categorizing concepts into initial themes
4. **Reviewing themes:** Aligning themes with the literature and merging into final dimensions
5. **Defining and naming themes:** Defining each dimension and its sub-components
6. **Producing the report:** Writing the findings with reference to the reviewed studies

3.5. Ethical Considerations

The present study is based on a review of published literature and did not require ethical approval for field data collection. The following ethical principles were observed:

- Accurate citation of all sources used
- No distortion of the findings of the reviewed studies
- Full transparency in the search and analysis processes

4. Findings

4.1. General Picture of the Literature

The synthesis of the DGHRM literature indicates that this field has grown significantly since 2020. A recent systematic review demonstrates that approximately 50 studies have been published in this domain between 2020 and 2025 (Garuda, 2026). The geographical concentration of these studies is markedly unbalanced: most originate from Asian countries (particularly Indonesia, Malaysia, China, and India), with limited evidence from other regions (Garuda, 2026). A bibliometric analysis of 1,219 articles published between 2015 and 2025 likewise identified five main thematic clusters, none of which systematically examined the Middle Eastern or Iranian context (Riwayat, 2025).

4.2. DGHRM Dimensions

Analysis of the literature led to the extraction of **7 dimensions**. **Table 1** presents these dimensions along with their supporting studies. It should be noted that the table does not claim precise frequency counts; rather, it identifies which studies have referred to each dimension.

Table 1. DGHRM Dimensions and Supporting Studies

Dimension	Description	Supporting Studies
Green-Digital Leadership	Green transformational leadership, leadership digital literacy, dual vision	Sidique & Pereira (2023); Garuda (2026)

Dimension	Description	Supporting Studies
Dual Competencies	Green training, digital skills, organizational learning	Cattani & Montresor (2026); Yuliza et al. (2026); Riwayat (2025)
Sustainable Organizational Culture	Green values, digital norms, organizational justice	Yuliza et al. (2026); Suleman et al. (2024)
Data-Driven Infrastructure	HRIS, predictive analytics, cloud platforms	Garuda (2026); Joneidi Jafari et al. (2025)
Algorithmic Ethics	Algorithmic transparency, debiasing, data governance	Garuda (2026); Suleman et al. (2024)
Environmental Engagement	Voluntary green behavior, green organizational citizenship	Garuda (2026); Ghasem Ahangari et al. (2025)
Process Architecture	Green-digital recruitment, integrated performance appraisal, dual compensation	Riwayat (2025); Joneidi Jafari et al. (2025)

Source: *Findings of the present study based on the synthesis of reviewed literature.*

4.3. Key Components of Each Dimension

Green-Digital Leadership Dimension. The literature indicates that green transformational leadership indirectly affects social innovation through work well-being and green citizenship behavior (Sidique & Pereira, 2023). Another study demonstrated that green transformational leadership exerts a positive and significant effect on green organizational agility through GHRM practices (Garuda, 2026). "Leadership digital literacy" has been identified as an emerging component absent in traditional GHRM models (Sidique & Pereira, 2023).

Dual Competencies Dimension. Empirical evidence from Italian firms demonstrated that training-based human capital significantly strengthens digital for green practices, whereas formal education exerts no significant independent effect (Cattani & Montresor, 2026). This finding carries important implications for HRM: what proves decisive in the twin transition is organization-based training, not the level of general education.

Sustainable Organizational Culture Dimension. A study in Indonesian SMEs demonstrated that GHRM affects competitive advantage through innovative behavior, and digital transformation strengthens this relationship (Yuliza et al., 2026). Organizational culture plays either a facilitating or an inhibiting role in the twin transition.

Data-Driven Infrastructure Dimension. DGHRM uses digital tools such as artificial intelligence, HRIS, and predictive analytics to improve efficiency, transparency, and sustainability reporting quality (Garuda, 2026). In the e-HRM context, the digitalization of human resource processes contributes to reducing paper, energy, and resource consumption (Joneidi Jafari et al., 2025).

Algorithmic Ethics Dimension. The "digital sustainability paradox" is evident within DGHRM: while DGHRM strengthens organizational sustainability performance, it simultaneously raises concerns regarding energy consumption, data privacy, and algorithmic bias (Garuda, 2026). A systematic review indicates that reducing algorithmic bias requires "participatory design, multi-stakeholder governance, and data literacy training" (Suleman et al., 2024).

Environmental Engagement Dimension. Voluntary employee green behavior has been identified as a key mechanism that transforms psychological resources into collective innovative action (Sidique & Pereira, 2023). A study in the Iranian Social Security Organization

demonstrated that green participation constitutes one of the principal GHRM strategies within the Iranian context (Ghasem Ahangari et al., 2025).

Process Architecture Dimension. DGHRM requires the redesign of traditional HRM processes: green-digital recruitment, integrated performance appraisal, and dual compensation (Riwayat, 2025; Joneidi Jafari et al., 2025).

4.4. Relational Pattern Extracted from the Literature

Based on the synthesis of evidence, the conceptual model of the study is depicted in **Figure 1**. This model does not claim definitive causal relationships; rather, it presents a pattern extracted from the existing literature.

Data-Driven Infrastructure → Green-Digital Leadership → Dual Competencies → Environmental Engagement

Algorithmic Ethics functions as a boundary condition: without it, the above pathway leads to bias and distrust (Garuda, 2026).

Sustainable Organizational Culture and Process Architecture act as contextual facilitators, moderating the intensity and speed of these relationships (Yuliza et al., 2026).

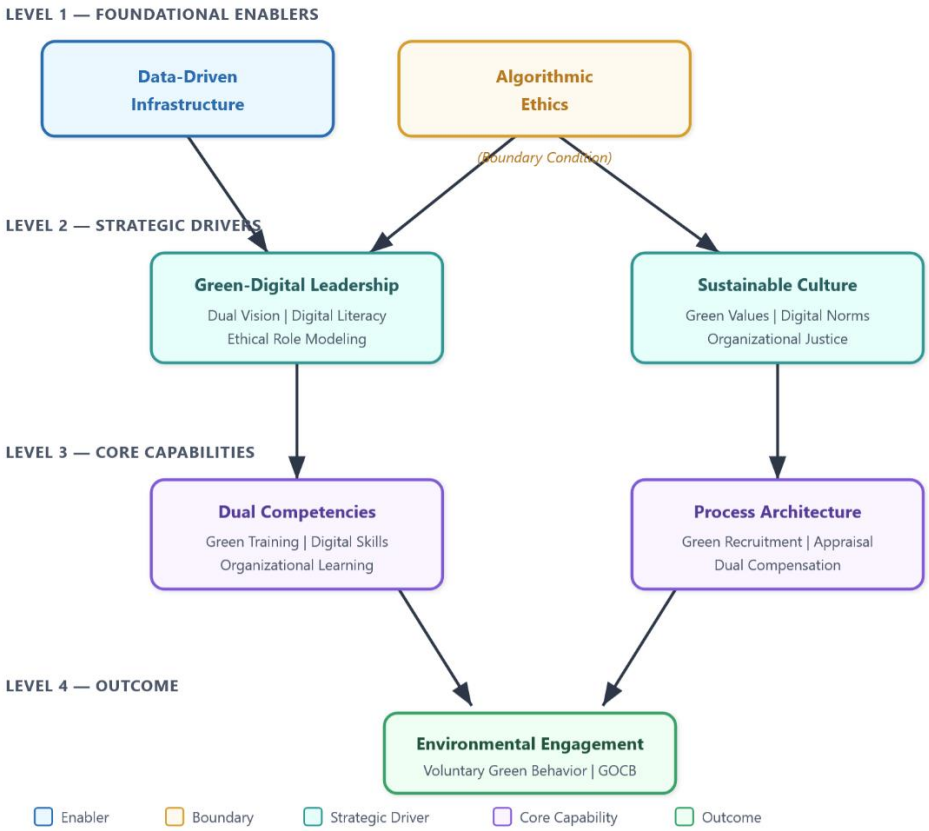

Figure 1. Conceptual Model of DGHRM in the Twin Transition

Source: *Findings of the present study based on the synthesis of Garuda (2026), Cattani & Montresor (2026), Yuliza et al. (2026), and Riwayat (2025).*

4.5. Identified Gaps

Analysis of the literature reveals four principal gaps:

First gap: Absence of the Middle Eastern context. The DGHRM literature predominantly originates from East Asia and Europe, with limited evidence from other regions (Garuda, 2026). The Iranian context is notably absent from the existing study samples.

Second gap: Insufficient attention to algorithmic ethics. Although the "dark side" of GHRM has been noted (Suleman et al., 2024), algorithmic ethics has not been systematically examined.

Third gap: Lack of an integrated framework. The HRM literature has examined green and digital streams separately, and their systematic integration into a coherent framework has been less frequently undertaken (Sidique & Pereira, 2023).

Fourth gap: Dominance of cross-sectional designs. Many studies have employed PLS-SEM, which is predominantly cross-sectional and self-report in nature, thereby reducing the capacity for causal inference.

5. Discussion and Conclusion

5.1. Review of Main Findings

The present study aimed to synthesize the Digital Green Human Resource Management (DGHRM) literature within the twin transition context and to propose an integrated framework for Iranian organizations. Thematic analysis of the literature published between 2020 and 2026 led to the extraction of seven dimensions, twenty-four components, and sixty-one indicators. These dimensions were organized into three causal levels: foundational enablers (data-driven infrastructure and algorithmic ethics), strategic drivers (green-digital leadership and sustainable organizational culture), core capabilities (dual competencies and process architecture), and the final outcome (environmental engagement). **Figure 1** illustrates this model.

5.2. Interpretation of Findings in Light of the Literature

Digital Sustainability Paradox. The findings of this review indicate that DGHRM confronts a fundamental tension: digital technologies, while enhancing efficiency and transparency, themselves consume energy and leave a carbon footprint (Garuda, 2026). This tension manifests in the proposed model as follows: data-driven infrastructure and algorithmic ethics exist in a dialectical relationship. Without algorithmic ethics, data-driven infrastructure leads to bias, distrust, and ultimately to its own antithesis—instability. This finding aligns with what Suleman et al. (2024) identified regarding the "dark side" of GHRM and extends it to the digital context.

Training versus Formal Education. One of the principal findings of this review is the distinction between organization-based training and formal education. Empirical evidence indicates that training-based human capital significantly strengthens digital for green practices, whereas formal education exerts no significant independent effect (Cattani & Montresor, 2026). This finding stands in tension with traditional HRM literature, which focuses on recruiting individuals with higher education. Its practical implication is unequivocal: organizations should

not focus solely on input criteria (educational degrees) but should invest in organization-based training and firm-specific skills.

Missing Dimension in Western Models. Another significant finding is the high weight of "ethical responsibility" and "economic responsibility" within the Iranian context. A study in the Iranian Social Security Organization demonstrated that the GHRM paradigmatic model in this context includes intervening conditions of "ethical responsibility," "legal responsibility," and "economic responsibility" (Ghasem Ahangari et al., 2025). Whereas Western models predominantly focus on legal responsibility, in the Iranian context ethical and economic responsibilities carry substantial weight. This finding carries important implications for localizing DGHRM models: an imported model without adjusting these dimensions will remain incomplete.

Dominance of Cross-Sectional Designs. The literature review indicates that many studies have employed PLS-SEM. This limitation reduces the capacity for causal inference and highlights the need for longitudinal and mixed-methods research.

5.3. Proposed Indigenous Model

Based on the review findings, the indigenous DGHRM model for Iranian organizations is presented in **Figure 2**. This model adjusts the general model of Figure 1 by adding an institutional-cultural layer specific to the Iranian context.

Distinguishing Features of the Indigenous Model:

1. **Adding an ethical-economic responsibility layer.** Unlike Western models that are legal-responsibility-centered, the indigenous model considers three responsibility layers (ethical, legal, economic) as intervening conditions.
2. **Adjusting the role of data-driven infrastructure.** Given infrastructure limitations in Iran, the indigenous model proposes "gradual data-driven maturity" instead of "complete infrastructure."
3. **Emphasizing the role of culture-building.** Within the Iranian context, green-digital culture-building is viewed not merely as a facilitating condition but as an independent strategic driver.

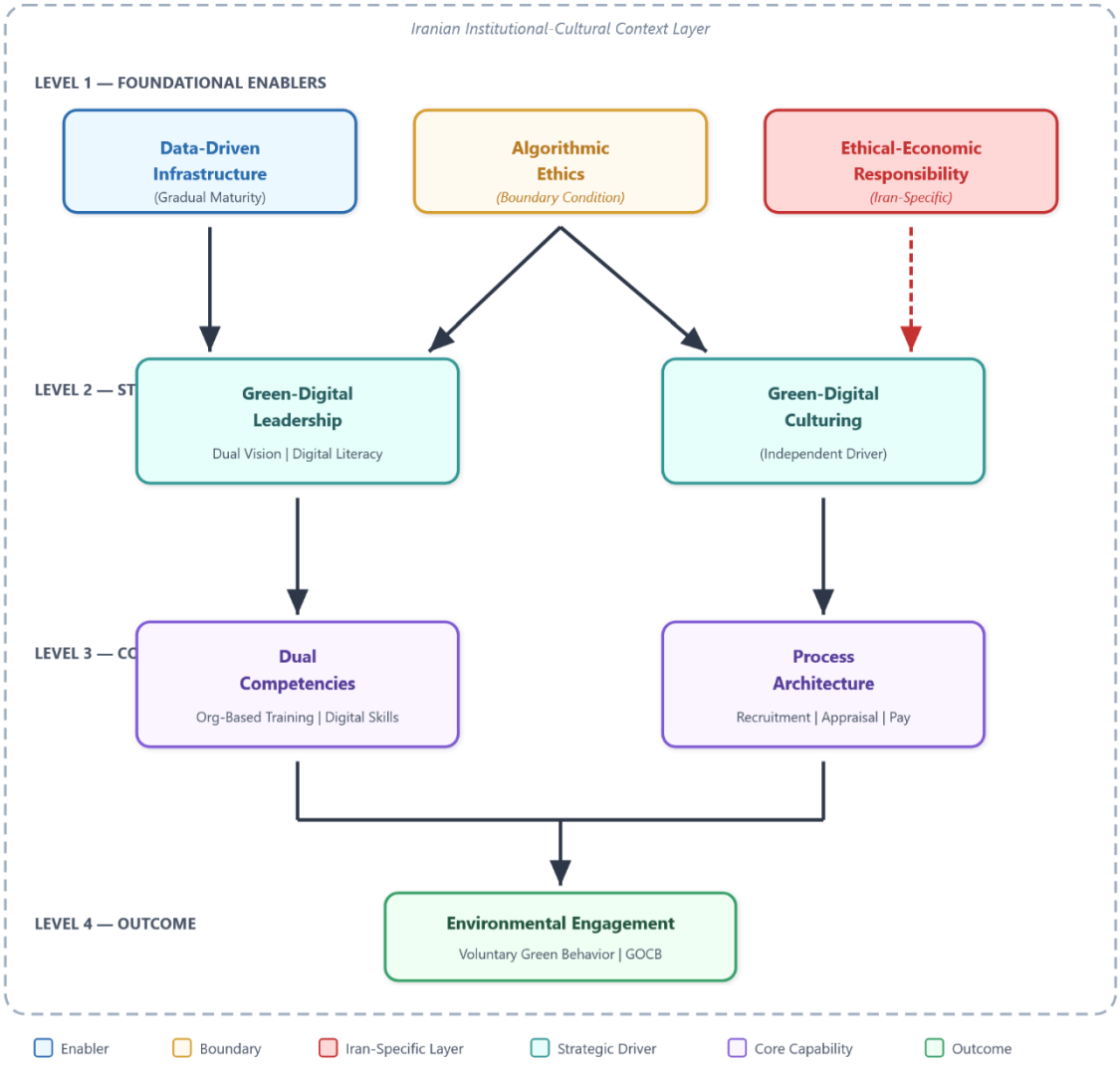

Figure 2. Indigenous DGHRM Model for Iranian Organizations

Source: *Findings of the present study based on the synthesis of Antonietti et al. (2026), Ghasem Ahangari et al. (2025), and Garuda (2026).*

5.4. Theoretical Implications

First, redefining the boundaries of DGHRM. The findings of this review indicate that DGHRM is not merely the sum of GHRM and digital HRM; rather, it constitutes an emerging configuration in which green and digital dimensions dialectically affect each other. This finding aligns with what the doctoral dissertation at the University of Pisa proposed regarding "twin transition HRM" as an emerging configuration.

Second, extending institutional theory. The indigenous model indicates that institutional pressures in non-Western contexts exhibit a different pattern from Western institutional pressures. Whereas in the Western context, legal pressure constitutes the main axis, in the Iranian context, ethical and economic pressures play a more prominent role. This finding propels institutional theory toward the recognition of multiple institutional logics.

Third, adding the algorithmic ethics dimension to the GHRM literature. The findings indicate that algorithmic ethics is not a subsidiary dimension but a boundary condition without which the green-digital pathway deviates. This finding extends the GHRM literature, which predominantly focuses on operational practices, toward ethical-technological considerations.

The above theoretical implications are summarized in **Table 2**.

5.5. Practical Implications

For Human Resource Managers:

1. **Investing in organization-based training.** The findings indicate that firm-specific training is more effective than recruiting individuals with higher education. Green-digital training programs should therefore be prioritized.
2. **Designing algorithmic ethics.** Before implementing AI systems in HRM, frameworks for transparency, debiasing, and accountability must be designed.
3. **Localizing imported models.** Western DGHRM models cannot be applied within the Iranian context without adjustment. Adding the ethical-economic responsibility layer is essential.

For Policymakers:

1. **Supporting data-driven infrastructure.** Without reliable data infrastructure, DGHRM reaches a dead end.
2. **Developing algorithmic ethics guidelines.** Regulatory bodies should develop national frameworks for data and algorithm governance in HRM.
3. **Strengthening university-industry collaboration.** The existing research gap in the Iranian context requires systematic collaboration between academia and industry.

Table 2 summarizes the theoretical and practical implications along with the intended audience of each implication.

Table 2. Summary of Theoretical and Practical Implications

Type of Implication	Content	Audience
Theoretical	Redefining DGHRM as a dialectical configuration, not the sum of two domains	HRM researchers
Theoretical	Extending institutional theory toward multiple institutional logics	Organization theory researchers
Theoretical	Adding the algorithmic ethics dimension to the GHRM literature	GHRM researchers
Practical	Investing in organization-based training rather than formal education	HR managers
Practical	Designing algorithmic ethics before AI implementation	HR managers and CIOs
Practical	Localizing imported models by adding the ethical-economic responsibility layer	Senior managers
Policy	Supporting data-driven infrastructure	Policymakers
Policy	Developing national algorithmic ethics guidelines in HRM	Regulatory bodies
Policy	Strengthening university-industry collaboration	Science and technology policymakers

Source: *Findings of the present study.*

5.6. Comparison with Previous Research

Comparison with international reviews. The review by Garuda (2026) indicates that the DGHRM literature remains fragmented and that evidence from non-Asian regions is limited. The present review addresses this gap by providing an integrated framework and adding an indigenous layer.

Comparison with domestic reviews. The review by Joneidi Jafari et al. (2025) focuses on the opportunities and challenges of HRM digitalization but does not provide an integrated framework. The review by Ghasem Ahangari et al. (2025) focuses on GHRM in the Social Security Organization but does not systematically examine the digital dimension. The present review addresses the existing gap by integrating these two streams.

5.7. Research Limitations

First, methodological limitation. The systematic review, despite following the PRISMA protocol, faces limitations in capturing the full complexity of emerging phenomena. This limitation was consciously acknowledged to allow for interpretive synthesis of the literature (Snyder, 2019).

Second, language limitation. The search focused primarily on English sources, and some relevant Persian studies may have been overlooked.

Third, database coverage limitation. The search was conducted in Scopus and Web of Science; some studies published in other databases (such as ProQuest) may not be included in the sample.

Fourth, lack of empirical validation. The proposed model is based on literature synthesis and requires empirical validation within the Iranian context.

5.8. Suggestions for Future Research

First, empirical validation of the model. Quantitative studies using PLS-SEM or ISM-DEMATEL can test the causal relationships of the model within the Iranian context.

Second, longitudinal studies. Given the dominance of cross-sectional designs in the literature, longitudinal studies are essential for examining DGHRM dynamics over time.

Third, sector-specific studies. Given the "sector-specific applications" gap in the literature (Riwayat, 2025), future research should examine DGHRM in specific Iranian industries (banking, petrochemicals, information technology).

Fourth, comparative studies. Comparing DGHRM in the Iranian context with other Middle Eastern countries can help identify regional patterns.

Fifth, research on algorithmic ethics. Given the emerging nature of this dimension, qualitative research is essential to identify its precise dimensions within the Iranian context.

5.9. Final Conclusion

The twin transition in Iranian organizations is not a technological choice but an institutional reconfiguration that requires the co-evolution of green and digital capabilities at individual, process, and strategic levels. The model presented in this study organizes seven dimensions and twenty-four components into three causal levels and demonstrates that data-driven

infrastructure and algorithmic ethics constitute foundational enablers; green-digital leadership and sustainable organizational culture constitute strategic drivers; and dual competencies and process architecture constitute core capabilities of the twin transition. The key finding is that without algorithmic ethics, the green-digital pathway deviates and turns into its own antithesis. This framework can serve as a basis for future empirical research and a practical guide for human resource managers in Iranian organizations.

Declarations

Author Contributions (CRediT taxonomy)

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation and revision. All aspects of this work were undertaken by the author.

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Ethical Statement

As a systematic review of published literature, this study did not involve human participants or primary data collection. Therefore, informed consent and ethical approval for human subjects were not applicable. The study adhered to principles of research integrity, including accurate citation, faithful representation of reviewed findings, and transparency in the search and screening processes.

Authors' AI Use Statement

The author declares that no artificial intelligence (AI) tools were used in the preparation of this manuscript for writing, analysis, or data generation. All content is the result of the author’s own human effort and judgment.

Conflict of interest

The author declares no competing financial interests or personal relationships that could have influenced the work reported in this paper.

Data Availability Statement

No new data were generated in this systematic review. The search strategy, screening criteria, and the list of included studies are presented within the manuscript. Full data extraction forms are available from the corresponding author upon reasonable request.

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