Available Online: 9 March 2026 DOI: 10.54254/3029-0880/2026.32156

Research on the organizational change effect of AI technology embedded in human resource management: a multi-case configuration analysis

Hoiseak Wang

China University of Mining and Technology (Beijing), Beijing, China

3146671680@qq.com

Abstract. AI tech gets thoroughly rooted in company functions, and when it starts blending into human resource stuff, big changes happen to organizations, but it's mostly on the micro effects of singular AI tools. It doesn't look at how many org conditions together would affect change. This study bridges this gap by probing how configurations, made up of embedded technology depth, the cross-disciplinary area of human resources, organizational support structure, and data governance development, bring about those good organizational results. Using fuzzy-set qualitative comparative analysis on 6 different companies from different sectors, the research found that there are three equifinal pathways to substantial transformation: strategically led deep transformation, business-collaborative agile evolution, or data-driven progressive improvement. Organizational support became a necessary foundation condition. Strong cross-function collaboration and strong data governance can make up for a slightly shallower technology embedding. And provides configurational theories to the knowledge of Artificial Intelligence–Human Resource Management (AI-HRM) literature and helps the managers make changes in organizations with AI.

Keywords: AI-HRM, organizational change, configuration analysis, fsQCA, technology embedding

1. Introduction

In today's digital economy, Artificial Intelligence (AI) technology transforms from a vague idea into a commercialized reality and sets up shop with all kinds of company functions, thus turning into a brand new competitive edge for companies [1]. HRM is an important backbone of organizations, but as it is now going through a big shift, it's becoming more like a proactive and predictive strategic business partner rather than the old transactional support service. The incorporation of AI in the recruitment, training, performance management, compensation, and employee services improves not only operational efficiency but also changes fundamental aspects of work and employee experience, decision-making, and the entire purpose of HR [2].

In spite of a lot of enthusiasm in real life, research that comes from the academic world around AI-HRM is still in its beginnings. Most studies mainly focus on the micro-level effects, fairness, and ethical problems related to certain AI applications like resume screening algorithms or chatbots, adopting the so-called "tool view" [3]. But the impact of AI tech on HRM is overall substantial; what matters is the transformation of the

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whole human resource system in enterprises. Although some research begins to address the issue from the macro point of view, it looks at the change caused by a single variable or factor, such as technological characteristics or leadership attitude, in a linear way, which neglects the interaction between different internal and external organizational conditions to bring about different results of change. Neglecting multiple conjunctive causes is the most fundamental difference between the real world and managerial practice.

To address the above gap, the answer to the following research question: How can the technological, organizational sandwich and date-enclosing effect change this organization at a high level in artificial intelligence wrapped inside the human resources department? Specifically, this is to look at how technology embedding, the cross-discipline of HR functions, the support structure for the org, and the data governance maturity all affect the transformation outcome. The importance of this research differs from other research because it gives up the linear, single-factor explanation approach and gives a configurational view, which is more complex as the causality of AI-HRM. It's to expand on cross-border innovation theory into the HRM basis and to better seize the hold the innovation-enabling technology has on an organization. Practically, it gives managers several different ways to make AI-HRM change work well, so they can change their plans to fit their own workplaces and things they have.

2. Theoretical analysis& research framework

2.1. Cross-border integration of AI technology embedding and human resource management

AI tech embedded in HRM is about deep integration of digital tech to traditional management workflow so that it can bring a fundamental shift to what we have, such as structure, output, etc. Not just a techno slapover, but rather a technological "cross-border" innovation involving technology, process, people and strategy [3]. Enkel and Gassmann [3] believe cross-industry innovation is the process of incorporating external, heterogeneous knowledge into internal innovation. Correspondingly, the AI-HRM is to integrate different technological knowledge, such as data science, and machine learning, into the center of the HRM field with both interpersonal management and institutional construction. This integration crosses over the original technical, knowledge, and process boundaries of HR functions, such as Zhang et al., so the HR department will need to build a close working relationship with the IT department, business department and even the outside technical suppliers, creating an "internal cross-border innovation alliance" [4].

To achieve successful cross-border integration, one must solve multidimensional "closeness" and adjustment problems [5]. From the perspective of AI-HRM, it is the effective integration of technical proximity, organizational relationship proximity, and cognitive proximity that becomes the basic premise of the organization's change driven by the use of AI technology.

2.2. Multidimensional manifestations of organizational change effects

AI tech on HRM org. change is many-sided: This article summarizes the literature [6] into three aspects (1) operational efficiency transformation: improving efficiency and accuracy through automating transactional work; (2) shift in decision mode: moving from experience-based to data- and algorithm-driven predictive and personalized decisions; (3) strategic role transformation: From being an administrative supporter to a Strategic Partner and Employee Experience Designer, the HR department transforms into a data analytics-based org.

2.3. Preconditions and configuration framework

Based on the cross-border innovation theory and the technology execution framework [7], this paper puts forward four important antecedent conditions that will form an organizational change effect configuration together.

Condition 1: Technology Embedding Depth (TED) refers to the complexity and systematic usage of AI technology in HRM. Shallow embedding, such as an intelligent question answering robot, just replaces repeatable tasks. Deep embedding, like machine learning-based talent inventory & turnover prediction, involves more complexity in decision-making, data & model integration, and requires more training for algorithms [2]. Deep embedding can bring about fundamental changes better.

Condition 2: Cross-disciplinary breadth of HRM functions (FCB): The extent and degree of collaboration between the HR department and other units within or outside the organization (such as IT, data analysis departments, and business departments) during the introduction and implementation of AI. A large amount of cross-border collaboration can obtain technological resources. It can understand businesses and it can achieve better knowledge transfer. This is the main way to make technology implementation successful [8].

Condition 3: OSS stands for Organizational Support Structure. OSS refers to the institutional support offered by the organizations for AI-HRM projects, including strategic commitment from senior leadership, resource investment, and creation of cross-functional governance teams (such as joint project teams). The strong organizational support is the guarantee to overcome the resistance to change and ensure the alignment of projects and strategies [9].

Condition 4: Data Governance Maturity (DGM) is the degree of capability an enterprise has when it comes to the standardization and integration, data security, privacy, and standardization of data quality. High-quality, approachable, and compliant HR data is the "fuel" that powers the operation of AI models, and its level of maturity is directly related to the depth and authenticity of the AI application [10].

This study shows that there is no single condition of being deeply alone for the appearance of organizational change outcomes, but rather a linkage and combination of the above four links for the effect of organizational change. All sorts of condition mixes would result in high transforming paths. Based on the above, the research framework of this article is as follows, as shown in Figure 1.

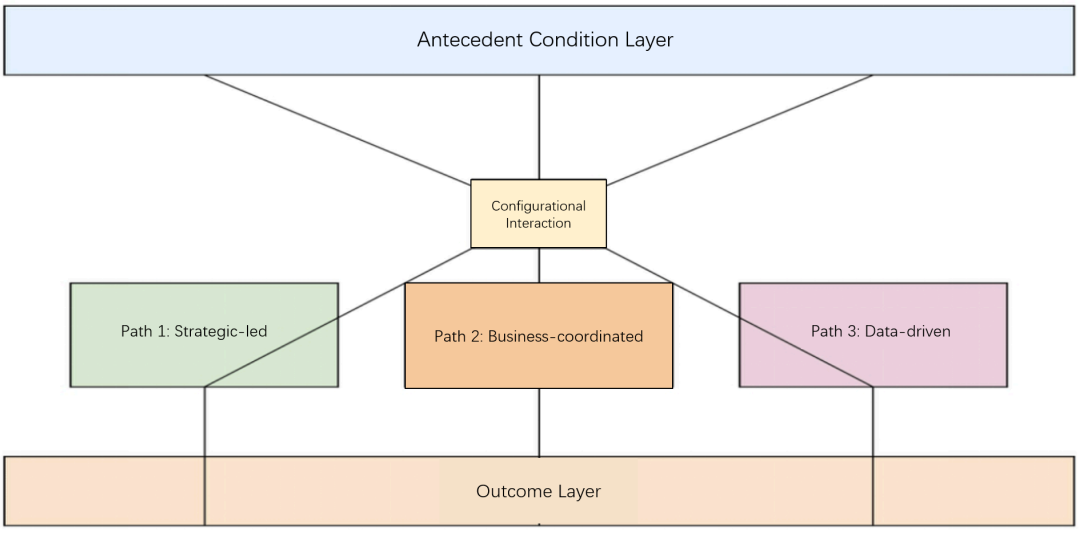

Figure 1. Configuration analysis framework for AI-HRM organizational change effects

3. Research design

3.1. Method selection

This study aims to explore the complex causal combination of multiple antecedent conditions, which is suitable for using qualitative comparative analysis methods. Because it can ensure the continuity of differences in the degree of conditions, handle partial membership situations, and more accurately measure the degree of membership of cases in the set of conditions and results.

3.2. Case selection and data collection

Following the principle of theoretical sampling and maximizing diversity, six enterprises that have systematically implemented AI-HRM for at least two years in four industries, namely manufacturing, finance, Internet and retail, were selected as research cases. The cases cover different ownership, scale, and AI application stages, ensuring the heterogeneity and representativeness of the samples (see Table 1).

Table 1. Basic information of case enterprises

Case code	Industry	Scale	Main applications of AI-HRM	Implementation time
A	Smart Manufacturing	Large-scale	Intelligent scheduling, skill profiling, safety behavior recognition	4 years
B	Internet finance	Medium-sized	Intelligent recruitment, personalized learning recommendations, emotion recognition	3 years
C	retail e-commerce	Large-scale	Customer service agent intelligent assistance, manpower demand forecasting, employee turnover warning	5 years
D	traditional finance	Super large	Resume screening, compliance training robot, salary data analysis	3 years
E	High-tech manufacturing	Medium-sized	AR/VR skills training, engineer knowledge graph, intelligent matching of project teams	2 years
F	Fast Moving Consumer Goods (FMCG)	Large-scale	Mobile intelligent HR assistant, social media employer brand analysis, sales performance prediction	4 years

3.3. Variable measurement and calibration

To transform each condition and result into a fuzzy set, it is necessary to define three anchor points: fully subordinate (1), intersection point (0.5), and completely non-subordinate (0).

From the dimensions of operational efficiency, decision-making mode, and strategic role, a 5-point Likert scale was used to independently score by the research team experts and take the average. Calibration: A score ≥ 4.5 indicates complete membership (1), 3.0 indicates intersection (0.5), and ≤ 2.0 indicates complete non-membership (0).

Condition 1: Depth of Technology Embedding (TED). According to the decision support level (transaction processing < predictive analysis < strategic insight) and system integration score of the application scenario. Calibration: Deep strategic insights and full process integration (1); mixed mode and partially integrated (0.5); only transaction automation (0).

Condition 2: Cross-disciplinary breadth of HRM functions (FCB). Evaluate the quantity and intensity of establishing formal collaboration mechanisms between HR, IT, business departments, etc. Calibration: There

is a permanent cross-functional team and close collaboration (1); there is a temporary project team and the collaboration is average (0.5); there is basically no formal collaboration (0).

Condition 3: Organizational Support Structure (OSS). Evaluate the level of executive public support, adequacy of resource allocation, and clarity of governance structure. Calibration: Strong promotion by CEO, abundant resources, and a dedicated governance committee (1); middle-level support, limited resources, and loose governance (0.5); lack of high-level attention and scarce resources (0).

Condition 4: Data Governance Maturity (DGM). Evaluate the quality, standardization, platform integration, and privacy compliance level of HR data. Calibration: Enterprise-level data warehouse, high quality, strong compliance (1); partial system integration, inconsistent quality, basic compliance (0.5); data silos, poor quality, and high compliance risks (0).

4. Data analysis and discovery

4.1. Univariate necessity analysis

Firstly, use fsQCA 3.0 to confirm that one single condition is sufficient to obtain a strong Organizational Change Effectiveness (OCE). Usually, the consistency threshold above 0.9 will be a sufficient condition. The analysis results show that the consistency of organizational support structure is 0.92 and the coverage is 0.85, which means that good organizational support is nearly necessary to produce large changes, but it is not enough. Other individuals have a consistency lower than 0.9 and thus are unable to result in a high OCE by themselves.

4.2. Analysis of sufficiency of conditional configuration

Set the original consistency threshold at 0.8 and the case frequency threshold at 1, then do a conventional analysis. The result is produced by complex solutions, simple solutions and intermediate results. We report mainly on intermediate solutions, including logical leftovers, but keep with a theoretical orientation [11]. Finally, it was determined that there are three config paths that drive a high OCE (Table 2):

Table 2. Configuration analysis results of driving high organizational change effects

Condition/Configuration	Path 1: Strategic Leading Deep Transformation	Path 2: Business Collaborative Agile Evolution	Path 3: Data-driven progressive optimization
Depth of Technology Embedding (TED)	●	●	⊗
Cross-disciplinary breadth of HRM functions (FCB)	●	●	●
Organizational Support Structure (OSS)	●	●	●
Data Governance Maturity (DGM)	●	⊗	●
Consistency	0.93	0.89	0.91
Raw Coverage	0.42	0.38	0.35
Unique Coverage	0.15	0.11	0.10
Overall Solution Consistency	0.90		
Overall Solution Coverage	0.68		
Typical Case	A, C	B, E	D, F

Note: ● indicates the presence of core conditions, ⊗ indicates the absence of core conditions, and spaces indicate that conditions can exist or be absent. Bold means this is present in all configurations and is the main driving force.

Configuration 1 (Strategic leading change): good relationship, high basic. OSS is promoted by the company. Enterprises also want to deeply embed TED and build FCB on a large scale. DGM is an important guarantee of it. This is usually seen in companies that have the will to do digital transformation (such as Case A, C) and have a lot of resources. To view it as an investment of strategic importance led by top leaders, breaking down departmental silos, and working together on high-level construction of technology and data to produce comprehensive and deep-level changes in personnel functions.

Configuration 2 (Business Collaborative Agile Evolution): "Technology and business are like two wheels of a cart, and data is replenished right away". Although the Data Governance Maturity (DGM) is not yet fully mature, with the Organizational Support Structure (OSS), the departments that require urgent business application (such as internet and R&D departments) are working hand-in-hand with the HR and IT departments (high FCB) for in-depth application (TED) on specific business pain (such as personalized learning pain in case B, and team pain in case E. They adopt an agile, iterative way to get and manage the needed data swiftly in order to realize the climbing upward effect on change.

Configuration 3 (Cooked Protein Pewey Deiation Phased Process): Re-write: These types of enterprises (such as some traditional-industry large-enterprises, case D, and F) have good historical data accumulation and governance foundations (high DGM), and have built effective cross-department collaboration mechanisms (high FCB) with steady Organizational Support Structure (OSS). But at first, they can take a safe position in Technology Embedding Depths (TED) in order to control risks or due to cognitive limitations, and they will focus on using simple AI tools such as chats and basic analysis. A strong data and collaborative foundation can easily make such "lightweight" applications much more productive and build up latent potential for deeper embedding, bit by bit.

5. Conclusion

This study performed a multi-case configuration analysis on how AI technology fosters organizational change in human resource management, resulting in four key findings. First, the organizational support structure forms the essential foundation for attaining advanced transformative impacts in AI-HRM. In all pathways, senior management commitment, sufficient resources, and cross-functional governance mechanisms act as essential initiators, highlighting leadership's crucial role in organizational change. Second, several equivalent pathways can lead to substantial transformation [9]. Enterprises can choose methods that fit their contexts: strategic leadership is ideal for resource-rich organizations; business collaboration suits units needing quick results; and data-driven approaches provide risk-managed paths for organizations with solid data infrastructures. Third, a strategic complementarity is present between the depth of technology embedding and cross-boundary HR functions. Deep embedding and extensive collaboration mutually reinforce each other. Notably, when technology integration is shallow, extensive cross-boundary collaboration and strong data governance can compensate, still yielding significant transformational impacts. Fourth, the maturity of data governance shows situational relevance. It can drive profound transformation, be temporarily set aside in business-driven contexts, or act as stabilizing ballast during cautious implementation. This research theoretically offers a configurational model to understand AI-driven organizational change, expands cross-border innovation theory into HRM [3], and shows that successful transformation occurs through various equivalent pathways rather than a single optimal solution. Concerning limitations, although the six-case sample meets QCA requirements, future studies should increase the sample size and use longitudinal tracking

to observe dynamic processes. Future research should also examine potential negative outcomes linked to various configurations.

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