



Validation of a Paradigmatic Model of the Relationship Between Human Resource Planning and Productivity: The Mediating Role of Knowledge Management at Kerman University of Medical Sciences

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Abstract

Introduction: This study aimed to validate a paradigmatic model designed to address the relationship between human resource planning and productivity, considering the mediating role of knowledge management at Kerman University of Medical Sciences.

Methods: The research population in this analytical cross-sectional study consisted of employees working at Kerman University of Medical Sciences (educational, clinical, and research units). Using stratified sampling, 278 individuals were selected as the study sample. Data were collected through a researcher-developed questionnaire based on the paradigmatic model, whose validity and reliability were confirmed. Data analysis was conducted using structural equation modeling (SEM) in SmartPLS software.

Results: The findings indicated that the proposed conceptual model had a good fit. The values of the statistical indices GOF (0.83), SRMR (0.06), and R² (0.63) were reported at desirable levels. These indices demonstrate that causal, contextual, intervening, and strategic variables significantly influence human resource productivity. Moreover, the mediating role of knowledge management in strengthening this relationship was confirmed.

Conclusion: The results showed that developing and implementing competency-based human resource planning, integrated with an effective knowledge management system, leads to enhanced productivity, increased job satisfaction, improved clinical processes, and reduced human resource costs.

Keywords: Human resource planning, Human resource productivity, Knowledge management, Paradigmatic model, University of Medical Sciences

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Introduction

In a world where knowledge forms the foundation of organizational power and institutional capability, human capital has emerged more than ever as a core component of development and progress. Organizations that can effectively harness their human capacities gain a sustainable competitive advantage. Among the determinants of such advantage, human resource productivity stands as a key indicator of organizational performance, reflecting the quality of human resource management (1). Productivity is not achieved solely through supervision and performance evaluation; rather, it requires strategic planning for the recruitment, development, and retention of personnel. Universities of medical sciences, due to the multifaceted nature of their missions across education, research, and health services, require an integrated and forward-looking approach to human resource management (2). Workload pressures, budget limitations, and shortages of

specialized staff are among the challenges undermining the performance capacity of these institutions.

Human resource planning, as a strategic process within human resource management, involves identifying the organization's future needs, analyzing skill gaps, and designing corrective actions to align human resources with organizational missions (3). The absence of such an approach in service-oriented institutions can lead to job burnout, reduced job satisfaction, and diminished service quality (4). Siah Kamari (5) and Mourad (6) demonstrated that adopting a strategic and data-driven approach in human resource planning improves financial performance and employee satisfaction. Similarly, Karimi et al. (7) identified indicators that enhance productivity in the Welfare Organization, confirming the role of targeted planning in improving service quality. Nevertheless, this relationship is often influenced by mediating factors that facilitate or moderate the interaction between human



resource policies and organizational outcomes.

One such critical mediating factor is knowledge management, defined as the systematic process of creating, storing, sharing, and applying intraorganizational knowledge (8). Numerous studies have emphasized the mediating role of knowledge management in the relationship between human resources and organizational performance. For instance, Nazem et al. (9) demonstrated that the implementation of knowledge management significantly increases human resource productivity, while Gholipour et al. (10) found that knowledge sharing enhances employees' sense of self-efficacy and psychological empowerment.

International studies further reinforce the importance of this connection. Alemu (11), Malik and Nguyen (12), and Siddiqui et al. (13) demonstrated that linkages among knowledge management, innovation, and high-performance work systems contribute to sustainability and efficiency in health-sector organizations. Likewise, Alboliteh et al. (14) found that knowledge management is a strong predictor of sustainable performance across economic, social, and environmental dimensions in Saudi Arabian hospitals. These findings underscore that knowledge management is not merely a technological approach but a critical strategic lever for enhancing human resource efficiency and organizational sustainability.

In academic settings, particularly universities of medical sciences, professional and experiential knowledge plays a fundamental role in the quality of educational and clinical services. The absence of effective knowledge management infrastructures exposes organizations to issues such as repeated errors, weakened organizational learning, and poor team coordination. Moreover, structural challenges such as centralization, financial constraints, and limitations in recruiting specialized personnel highlight the growing need for innovative approaches to human resource planning.

Kerman University of Medical Sciences likewise faces challenges such as limited financial resources, geographical dispersion, and high workload pressures. These conditions heighten the need to reassess human resource planning models and to design effective knowledge management systems. Accordingly, the present study aims to validate a paradigmatic model in which knowledge management functions as a mediating variable that explains the relationship between human resource planning and productivity. The innovation of this study lies in its systems-based approach, examining the complex and multidimensional interactions among the three core components—human resource planning, knowledge management, and productivity—within the real operational context of Kerman University of Medical Sciences. This approach provides a foundation for proposing practical strategies to improve human resource performance.

Methods

This study was applied in purpose and descriptive-

analytical in nature, employing a correlational approach and structural equation modeling (SEM). The primary aim was to validate a paradigmatic model explaining the relationship between human resource planning and productivity, with knowledge management serving as the mediating variable in Kerman University of Medical Sciences. The model was initially designed based on grounded theory and subsequently tested using the partial least squares structural equation modeling (PLS-SEM) approach.

The research population comprised all employees working in the educational, research, clinical, and administrative units of Kerman University of Medical Sciences in 2025. Stratified sampling proportional to population size was used, and based on Cochran's formula, a sample size of 278 participants was determined.

The data in this study were collected using a structured questionnaire developed according to the paradigmatic model. The measurement instrument addressed three main constructs: Human Resource Planning (HRP) was assessed through 15 items across two subscales, causal factors and intervening factors, addressing job-person fit, skills, scientific foundations of HR policies, and environmental and legal conditions influencing planning. Knowledge Management (KM) was measured through 43 items across contextual factors and individual, organizational, and inter-organizational strategies, covering competency-based management, performance evaluation, training, organizational learning, and knowledge creation and application processes. Employee Productivity (EP) was assessed using 18 items addressing domains such as motivation, empowerment, service quality, efficiency, effectiveness, and attainment of organizational goals. All items were rated on a five-point Likert scale (from 1=strongly disagree to 5=strongly agree). Scores for each construct were derived from the sum of its corresponding item scores. Face and content validity were confirmed through expert review and evaluation by academic supervisors. Reliability was assessed using Cronbach's alpha and composite reliability (CR), both of which exceeded 0.8 for all constructs. Convergent validity was evaluated using the Average Variance Extracted (AVE), with all values above 0.5, thus confirming acceptable convergent validity (Table 1).

In the data analysis section, descriptive statistics were first calculated using SPSS, and subsequently, SmartPLS was employed to test the conceptual model. The evaluation of both the measurement model and the structural model was conducted using various fit indices. Accordingly, the Goodness of Fit (GOF) index was used to assess the overall quality of the model, with values above 0.36 indicating strong model fit. The Standardized Root Mean Square Residual (SRMR) was utilized to measure the discrepancy between the observed and estimated covariance matrices, where values below 0.08 represent a desirable model fit. Furthermore, the Normed Fit Index (NFI) was applied to evaluate the relative adequacy of the model, with values greater than 0.90 denoting acceptable fit. Moreover, the

Table 1. The validity and reliability of the variables

Latent Variable	AVE	CR (Composite Reliability)	Interpretation
Causal	0.824	0.802	Confirmation of acceptable convergent validity
Intervening	0.894	0.815	Confirmation of acceptable convergent validity
Contextual	0.801	0.805	Confirmation of acceptable convergent validity
Outcome	0.821	0.845	Confirmation of acceptable convergent validity
Strategy	0.865	0.823	Confirmation of acceptable convergent validity

d_ULS (Unweighted Least Squares Discrepancy) and d_G (Geodesic Discrepancy) indices were used to examine the extent of deviation between the structural model and the empirical data, such that lower values reflect a more favorable model fit. Accordingly, the combination of these indices, alongside the path coefficients, coefficients of determination (R^2), and t-statistics, formed the basis for assessing the final model fit and validating the relationships among the key variables of the study. The coefficient of determination (R^2) indicates the percentage of variance in an endogenous latent variable explained by its predictor variables and is regarded as one of the most important model fit criteria in the PLS-SEM approach. Values of 0.19, 0.33, and 0.67 represent weak, moderate, and strong explanatory power, respectively. The t-statistic is used to test the significance of the structural paths, with absolute values greater than 1.96 indicating significance at the 0.05 level.

Results

Descriptive Findings

The data indicated that among the 278 participants in the study, the largest proportion belonged to individuals aged 40 years and below, comprising 54% of the sample, while 46% of the participants were over 40 years old. Moreover, 61.2% of respondents were female, and 38.8% were male, indicating a higher level of female participation in the study. Regarding educational attainment, 69.8% of the employees held a bachelor's degree or lower, whereas 30.2% possessed a master's degree or higher (Table 2):

Structural Equation Modeling (SEM) Results

The analytical findings were examined using the partial least squares structural equation modeling (PLS-SEM) approach to assess the structural model. The structural model was tested to evaluate the causal relationships among latent variables. A fundamental assumption of structural equation modeling is that there should be no severe multicollinearity among the predictor variables of any latent variable. The presence of multicollinearity can lead to instability in the path coefficients and produce inaccurate results in the analysis. Thus, the Variance Inflation Factor (VIF) test was conducted. In the present model, only the latent variable "Outcome" is predicted by two variables, "Cause" and "Strategy," while other latent variables have only a single predictor. Nevertheless, for greater clarity, the VIF was calculated for all paths. The VIF values for all paths were below 3.3, and specifically less than 5, which is considered a key criterion for assessing

Table 2. The demographic characteristics of the participants

Variable	Category	Frequency	Percentage
Age	40 years and below	150	54%
	Above 40 years	128	46%
Gender	Female	170	61.2%
	Male	108	38.8%
Education Level	Bachelor's degree or lower	194	69.8%
	Master's degree and above	84	30.2%

the absence of multicollinearity in structural equation models. Low VIF values indicate that the independent variables in each path do not exhibit excessive overlap or correlation with one another, and the effect of each variable on the dependent variable can be measured independently (Table 3, Figure 1).

The bootstrapping data indicated that all t-statistics exceeded 1.96, demonstrating the statistical significance of all path effects within the model (Figure 2).

All R^2 values for the variables exceeded 0.67, indicating the model's very high predictive capability in explaining these variables. The latent variable "Outcome" was most effectively explained by its predictor variables ("Cause" and "Strategy"), with an R^2 value of 0.891. The variables "Cause," "Strategy," and "Mediator" also exhibited high R^2 values (above 0.70), clearly indicating that the model demonstrates excellent structural fit (Table 4; Figure 2).

In the partial least squares structural equation modeling (PLS-SEM) approach, assessing discriminant validity is critical, as it indicates whether different constructs in the model are well distinguished from one another. One of the most precise indicators for evaluating discriminant validity is the Heterotrait-Monotrait (HTMT) ratio. This index represents the ratio of the average correlations between constructs to the correlations within constructs. All HTMT values among latent variables were below 0.90, indicating that the model's constructs are distinct and that each construct reflects a unique concept within the study model. The HTMT value between "Cause" and "Mediator" was 0.632. The highest HTMT value was observed for the "Outcome-Strategy" relationship (0.792), which remains below the 0.90 threshold (Table 5).

All model fit indices demonstrated acceptable or excellent values. The GOF value of 0.831 indicates a strong overall fit for both the structural and measurement models. The SRMR value of 0.062 is well below the critical threshold of 0.08, suggesting negligible differences between the model-implied correlations and the empirical data. The NFI value of 0.928 confirms that the structural

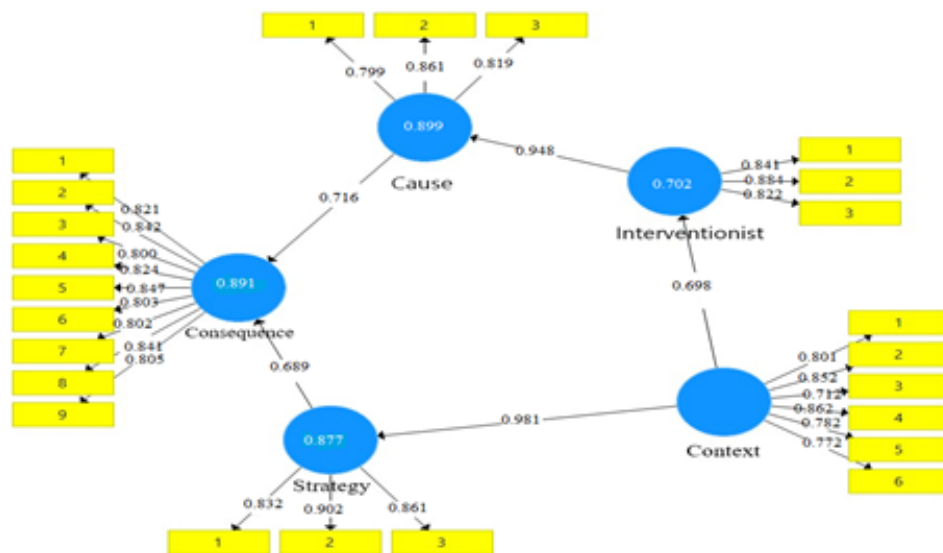


Figure 1. Factor Loadings of the Model Variables

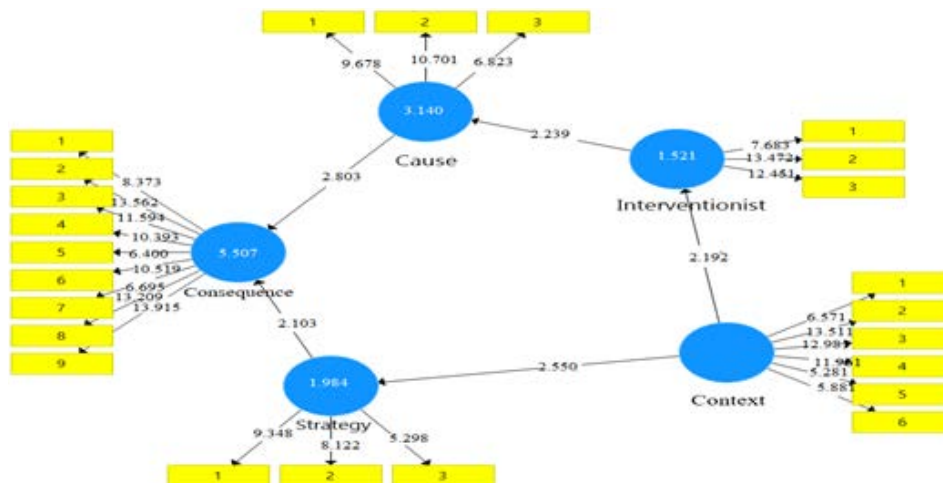


Figure 2. Bootstrapping coefficients of the model

Table 3. Path multicollinearity test

Path	VIF Value
Causal → Mediating	1.98
Outcome → Causal	2.12
Mediating → Contextual	1.87
Strategy → Contextual	2.34
Outcome → Strategy	2.01

Table 4. R² Values

Variable	R ² Value
Outcome	0.891
Strategy	0.877
Contextual	0.702
Mediating	0.702

model exhibits acceptable fit relative to the baseline model. Low d_{ULS} and d_G values further corroborate the model's precision in representing the covariance matrices (Table 6).

Discussion

The present study aimed to validate a paradigmatic model examining the relationship between human resource planning and productivity, with the mediating role of knowledge management, at Kerman University of Medical Sciences. The findings indicated that the proposed conceptual model demonstrated an appropriate fit, and the causal, contextual, mediating, and

strategic variables exerted significant effects on human resource productivity. Furthermore, the mediating role of knowledge management in strengthening this relationship was confirmed as statistically significant. Statistical indices, including GOF (0.83), SRMR (0.062), and R^2 (0.63), were reported at highly satisfactory levels. These findings align with previous studies. Siah Kamari(5) demonstrated that strategic human resource planning in private companies is positively and significantly associated with improved financial performance, and companies that adopted forward-looking, data-driven processes exhibited higher profitability and return on investment. Mourad(6) emphasized that health-oriented human resource management, encompassing

Table 5. HTMT criterion

Variables	Causal	Mediating	Contextual	Outcome	Strategy
Causal	—	0.632	0.588	0.693	0.605
Mediating	—	—	0.661	0.710	0.643
Contextual	—	—	—	0.755	0.718
Outcome	—	—	—	—	0.792
Strategy	—	—	—	—	—

transparency, training, and participation, provides a foundation for enhancing employee satisfaction and organizational productivity. Karimi et al. (7) found that human resource productivity indicators in health sector organizations were above average and helped identify weaknesses and opportunities for performance improvement. These findings are consistent with results reported by Malik and Nguyen(12), Siddiqui et al.(13), and Alboliteh et al. (14). No contradictory results were observed. In explaining these findings, it can be argued that robust human resource planning either recruits suitable personnel into the organization or trains existing employees. These individuals, as carriers of knowledge, pave the way for the effective creation, storage, sharing, and utilization of knowledge within the organization. When knowledge is effectively managed (e.g., successful experiences are recorded and shared across departments), employees make decisions more rapidly, errors decrease, and processes are optimized, which directly enhances productivity(7). Causal factors, including improved person-job fit, professional knowledge enhancement of human resources, and the effective implementation of human resource management systems, revealed that aligning employees' expertise and competencies with their job positions is a fundamental prerequisite for the effectiveness of human resource planning. These factors indirectly influence organizational productivity by enhancing organizational justice and job satisfaction through increased transparency and professionalism in recruitment processes.

Contextual factors, such as competency-based training and empowerment, targeted recruitment, and retention of qualified personnel, played a key role in enhancing the stability and sustainability of human capital. This finding aligns with studies such as Moudi (2023), which demonstrated that health-oriented approaches in human resources lead to increased productivity and employee satisfaction(6). Mediating variables, including employment regulations, environmental changes, and employees' demographic characteristics, were identified as barriers or moderators of human resource system performance. This is consistent with the findings of the study by Fallahi and Sojoudi (2011), who reported that environmental and legal factors are among the most critical barriers to human resource productivity in Iranian organizations (15). The three-level strategies proposed in this model serve as operational tools to address challenges and strengthen productivity. Individual-level strategies, such as enhancing motivation and providing effective

Table 6. Model fit indices

Fit Index	Obtained Value	Interpretation
GOF	0.831	Excellent
SRMR	0.062	Desirable (<0.08)
NFI	0.928	Acceptable (>0.90)
d_ULS	0.219	Low and acceptable
d_G	0.167	Low and acceptable

feedback; organizational-level strategies, such as career path systems and performance evaluations; and supra-organizational strategies, such as reforming macro-level policies, all contribute to improving the dynamism and coordination of human resources (15).

Knowledge management, as a mediating variable, played a pivotal role in transmitting the effect of human resource planning to productivity. Mechanisms such as documenting employee experiences, updating information systems, and providing specialized training facilitated knowledge flow and enhanced organizational learning. In line with this finding, Saeedipour and Mohammadipour (2017) reported that the implementation of knowledge management significantly contributes to increasing human resource productivity. Thus, it can be concluded that designing and implementing competency-based human resource planning, integrated with an effective knowledge management system, leads to improved productivity, increased job satisfaction, enhanced healthcare processes, and reduced human-related costs (9).

This study was conducted with certain limitations. The participants were employees working at Kerman University of Medical Sciences, and caution should be exercised in generalizing the findings to other populations. Moreover, the research variables are multifaceted constructs, making precise measurement challenging. Researchers may have to rely on simplified indicators (e.g., production volume or revenue) or subjective measures (e.g., perceived productivity questionnaires), which may reduce the external validity of the study. Accordingly, future studies should be conducted among employees of medical universities in other provinces and incorporate interviews for data collection.

Given the importance of aligning employee competencies with job requirements, it is recommended that medical universities design their recruitment and selection systems based on competency models. Such systems may include competency-based interviews, situational tests, and multidimensional assessments to ensure that only individuals with appropriate skills, commitment, and capabilities enter the system. To strengthen the mediating role of knowledge management, it is recommended to develop a comprehensive system with an intuitive and accessible interface for documenting and storing experiences, successful solutions, common errors, and operational guidelines. This knowledge repository should allow easy access, continuous updates, and robust search functionality, supporting decision-making, training of

new employees, and error prevention. Given the findings of the study on the importance of performance evaluation, performance assessments should be conducted more frequently, in a goal-oriented and evidence-based manner. Providing clear and timely feedback not only enhances job satisfaction but also fosters continuous learning and performance improvement. To promote organizational learning and employee motivation, individualized development plans should be designed for each employee, including career growth paths, required training, promotion opportunities, and organizational support. This initiative encourages employees to take an active role in their development while increasing their sense of belonging and motivation.

Conclusion

Designing and implementing competency-based human resource planning, integrated with an effective knowledge management system, enhances productivity, job satisfaction, organizational innovation, and healthcare processes. The use of three-level strategies and organizational knowledge management is key to sustainable development and performance improvement in universities and health sector organizations, exerting both direct and indirect effects on human resource productivity.

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Competing Interests

The authors declare no competing interests.

Ethical Approval

The present study was conducted with the approval of the Research Ethics Committee of Islamic Azad University, Kerman Branch, under the ethics code: IR.KMU.REC.1402.019

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