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ORIGINAL

AI-Powered Human Resource Management for Enhancing Employee Recruitment Efficiency and Talent Retention in Organizations

Gestión de recursos humanos basada en inteligencia artificial para mejorar la eficiencia en la contratación de empleados y la retención de talento en las organizaciones

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ABSTRACT

Artificial Intelligence (AI)-powered Human Resource Management (HRM) systems address inefficiencies in recruitment and employee retention. Traditional methods are slow, biased, and reactive. Integrating AI enables predictive insights, automated screening, and employee satisfaction monitoring, transforming HR practices into data-driven, strategic decision-making processes. This research aims to evaluate the impact of AI on improving recruitment efficiency and talent retention. It investigates whether AI-based tools significantly reduce hiring time, enhance job candidate fit, and predict attrition risk. Data was sourced from 1,000 anonymzed employee records, including 400 resumes, 280 satisfaction responses, and 320 attrition cases across the IT and finance sectors. Collected over a three-year period, the dataset supports recruitment analysis and employee retention prediction using AI-based models. Five variables were analyzed: recruitment time (RT), candidate-job match score (CJMS), employee satisfaction score (ESS), retention rate (RR), and AI-predicted attrition risk (APAR). These variables represent both continuous and ordinal data types, suitable for independent sample t-tests and regression analysis in SPSS 25. SPSS analysis showed significant reductions in recruitment time ($p < 0,01$) and improvements in job match scores. Among independent sample t-test results, the highest t-value was observed for CJMS ($t = 22,15$, $p < 0,001$). Spearman's correlation indicated a strong positive link between satisfaction and retention. Regression analysis confirmed high predictive accuracy of AI-based attrition risk models. In regression findings, APAR had the highest R^2 value ($R^2 = 0,42$, $p < 0,001$). AI-powered HR systems significantly enhance recruitment efficiency and retention strategies. Statistical evidence confirms the effectiveness of AI in predicting attrition and improving candidate-job alignment, enabling organizations to make proactive, data-informed HR decisions and foster a more stable workforce.

Keywords: Artificial Intelligence (AI); Talent Retention; Human Resource Management (HRM); Employee Satisfaction.

RESUMEN

Los sistemas de gestión de recursos humanos (HRM) basados en inteligencia artificial (IA) abordan las ineficiencias en la contratación y la retención de empleados. Los métodos tradicionales son lentos, sesgados y reactivos. La integración de la IA permite obtener información predictiva, realizar selecciones automatizadas y supervisar la satisfacción de los empleados, lo que transforma las prácticas de RR. HH. en procesos de toma de decisiones estratégicas basados en datos. El objetivo de esta investigación es evaluar el impacto de la IA en la mejora de la eficiencia de la contratación y la retención del talento. Investiga si las herramientas basadas en IA reducen significativamente el tiempo de contratación, mejoran la adecuación de los candidatos al puesto y predicen el riesgo de abandono. Los datos se obtuvieron de 1000 registros de empleados anónimos, incluidos 400 currículos, 280 respuestas de satisfacción y 320 casos de abandono en los sectores de TI y finanzas. Recopilado durante un período de tres años, el conjunto de datos respalda el análisis de la contratación y la predicción de la retención de empleados mediante modelos basados en IA. Se analizaron cinco variables: tiempo de contratación (RT), puntuación de adecuación entre el candidato y el puesto (CJMS), puntuación de satisfacción de los empleados (ESS), tasa de retención (RR) y riesgo de abandono previsto por la IA (APAR). Estas variables representan tipos de datos tanto continuos como ordinales, adecuados para pruebas t independientes y análisis de regresión en SPSS 25. El análisis SPSS mostró reducciones significativas en el tiempo de contratación ($p < 0,01$) y mejoras en las puntuaciones de adecuación al puesto. Entre los resultados de las pruebas t para muestras independientes, se observó el valor t más alto para CJMS ($t = 22,15$, $p < 0,001$). La correlación de Spearman indicó una fuerte relación positiva entre la satisfacción y la retención. El análisis de regresión confirmó la alta precisión predictiva de los modelos de riesgo de abandono basados en IA. En los resultados de la regresión, APAR tuvo el valor R^2 más alto ($R^2 = 0,42$, $p < 0,001$). Los sistemas de RR. HH. basados en IA mejoran significativamente la eficiencia de la contratación y las estrategias de retención. Las pruebas estadísticas confirman la eficacia de la IA para predecir la rotación y mejorar la adecuación entre los candidatos y los puestos de trabajo, lo que permite a las organizaciones tomar decisiones proactivas y basadas en datos en materia de RR. HH. y fomentar una plantilla más estable.

Palabras clave: Inteligencia Artificial (IA); Retención de Talento; Gestión de Recursos Humanos (HRM); Satisfacción de los Empleados.

INTRODUCTION

The success of a business is greatly influenced by HRM, which recruits, hires, and retains qualified personnel. In modern times, when worker stability has a direct impact on performance and productivity, hiring and retaining employees are particularly important.[1] Though High attrition rates, incorrect decision-making and unproductive operations tend to disrupt these activities. To address these challenges, contemporary HRM has started paying more attention to evidence-based practice, and AI has been employed to guide the process.[2] Traditional HR consists of reactive retention strategies, intuition as a technique of recruiting, and subjective estimates. Despite the application of methods, such as automating the task of sentiment analysis and resume vetting, such approaches often possess shortcomings.[3]A significant design of features is biased and less formal, leading to slanted conclusions. Current fixes are limited to specific tasks and fail to offer a coherent approach to the efficacy of recruiting and retention.[4] The exploration suggests the introduction of an AI-based HRM framework that would optimize the process of recruitment and retain talent more effectively. It combines predictive analytics, and integrated outcomes with automated screening of candidates against the job positions, as well as real-time assessment of experience. The system will change HRM into an active data-based discipline, analyzing the impact of the AI models using real-world data from the IT and banking sectors.[5] Data privacy issues, insufficient generalizability, possible AI bias, and reliance on high-quality data limit the efficacy and uptake of AI-driven HRM.[6,7,8]

This aim focused on evaluating the use of AI-enabled tools in the recruitment process to increase efficiency in the process and talent retention by shortening the period of recruiting, matching job candidates, and estimating the chances of attrition.

To understand how HRM, knowledge management (KM), and Change Management (CM) work together to support the retention of skilled employees in knowledge-intensive sectors was investigated.[6]A questionnaire was administered to 168 workers across six European countries, and the results were analyzed using structural equation modeling. The findings indicate that integrating KM, CM, and HRM practices enhances employee engagement and reduces attrition.[9,10,11]

The COVID-19 pandemic has impacted HRM. It presented the recent investigation to determine the challenges

and emerging opportunities due to the crisis with the help of an extensive literature review methodology. The findings offered [7] valuable insights for managers and HR professionals on adapting strategies to improve future organizational performance.

Through sustainable innovation (SI) and organizational agility (OA) acting as facilitators, the investigation aims to examine in [8] the relationship between electronic (E-HRM) and sustainable competitive advantage (SCA) in the travel and hospitality industry. The findings across 313 answers from Egyptian hotels and tourism agencies using PLS-SEM analysis indicate that E-HRM has a favorable impact on SCA, with SI and OA moderating this association.[12,13,14]

The generative ChatGPT could help HR professionals in their daily tasks as well as their strategy. By coming up with clear instructions on the development of [9] productive prompts to acquire valuable AI advice, particularly in matters relating to strategic HRM and diversity of the workforce. The findings demonstrate that when properly implemented, AI speeds up work, lowers burnout, and increases HR teams' ability to concentrate on critical long-term objectives.

Through the identification of sixteen significant connected criteria, their investigation seeks to investigate[10] green recruiting and its impact on organizational sustainability. Based on professional judgments and previous studies, it employed a combined Interpretive Structural Modeling (ISM) approach to comprehend the connections between these variables. The findings highlight intricate connections between the variables and provide a fresh framework to support decision-makers and direct further research on sustainable human resources practices. [15,16,17]

METHOD

This investigation assessed that AI may improve hiring and retention procedures using statistical techniques. Significant HR factors have been analyzed, such as the predicted risk of attrition by AI, employee happiness, retention rate, candidate-job match score, and time used in the recruiting process. Relationships between satisfaction and retention with independent t-test and values of predictive accuracy of AI were estimated with regression analysis, to compare efficiency, SPSS was utilized with t-tests. These methods aided in illustrating how AI-powered HR solutions facilitate proactive staff retention tactics, improved applicant alignment, and quicker hiring.

Data collection

The data was collected across three years on 1000 faceless records of banking and IT sector personnel. It took 400 attrition cases, 280 employee satisfaction survey responses, and 320 resumes. To evaluate the effectiveness of AI-driven HRM systems, it was necessary to analyze the hiring process as well as employee retention patterns. Table 1 and figure 1 represent an in-depth idea of the dataset in terms of source categories, industry sectors, gender, age category, and education status.

Table 1. Demographic data

Data Type	Category	Frequency (n=1000)	Percentage (%)
Data Source Type	Resumes	400	40,00
	Satisfaction Responses	280	28,00
	Attrition Cases	320	32,00
Industry Sector	IT	600	60,00
	Finance	400	40,00
Gender (approximate split)	Male	580	58,00
	Female	420	42,00
Age Group (estimated)	20–29 years	270	27,00
	30–39 years	490	49,00
	40–49 years	170	17,00
	50+ years	70	7,00
Education Level (based on resumes)	Bachelor's Degree	640	64,00
	Master's Degree	310	31,00
	Doctorate/Other	50	5,00

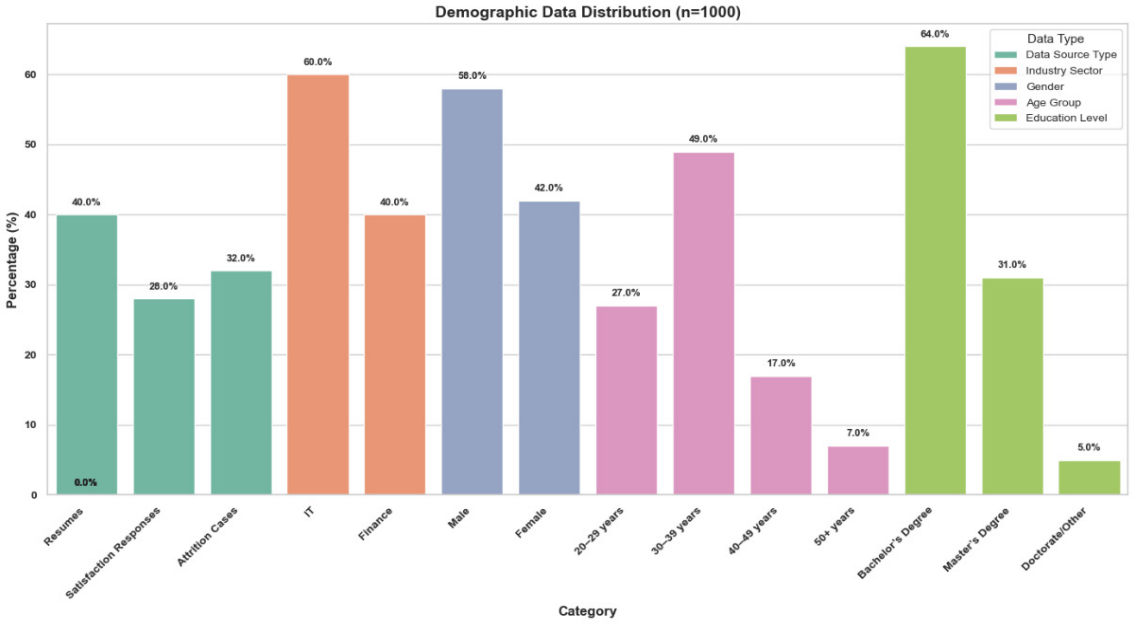

Figure 1. Demographic Overview of Employee Records Used in AI-Based HRM Evaluation

Inclusion Criteria

- Workers in the financial and IT industries.
- Complete files include attrition, satisfaction, and resume information.
- Minimum 6 months of employment.
- Data collected within the last 3 years.
- Processed through AI-based recruitment or retention tools.

Exclusion Criteria

- Interns, freelancers, and contract workers.
- Records with missing or incomplete data.
- Duplicate or corrupted entries.
- Non-core job roles unrelated to recruitment/retention focus.

Variables of Questioners

RT

AI technologies are substantially decreasing the recruitment period or the time between posting a job and accepting an applicant, automating the schedule and screening process, and accelerating the hiring process in a business.

CJMS

AI-generated scores indicate a candidate's training, work history, and abilities match job specifications, suggesting better fit, increased recruiting accuracy, lower turnover risk, and improved company productivity.

ESS

Employee perceptions of job satisfaction, engagement, and morale are reflected in this score, which is gathered through systematic surveys. Greater levels of fulfillment are often linked to longer tenure and lower attrition rates, making it a crucial predictor of both performance and retention.

RR

Retention rate measures the percentage of employees who remain in an organization, indicating workforce stability and HR efficiency. High retention indicates effective recruitment, onboarding, engagement, and alignment of employee values.

APAR

This variable combines behavioral, performance, and satisfaction data to estimate the likelihood of an employee leaving the company. AI algorithms estimate risk based on past trends, allowing for preventive measures to keep valuable personnel and lower turnover-related expenses. Table 2 shows the sample questionnaire.

Table 2. Sample Questionnaires

Variable	Question 1	Question 2
RT	How many days did it take to fill your last vacancy?	On average, how long does your hiring process take (from posting to onboarding)?
CJMS	How well do you feel your skills matched the job you were hired for?	Did the job role match the responsibilities described during recruitment?
ESS	How satisfied are you with your current role on a scale of 1 to 5?	Do you feel valued and recognized for your work contributions?
RR	How long have you been employed with the current organization?	Do you plan to stay with the organization in the next 12 months?
APAR	Have you considered leaving the company in the past six months?	Are you actively seeking or open to new job opportunities?

Statistical Analysis

The efficacy of AI-powered HRM solutions was assessed by statistical analysis conducted with IBM SPSS 25. Recruitment time was compared before and after AI deployment using an independent samples t-test, which revealed a substantial decrease ($p < 0,01$). Based on job match evaluations and satisfaction scores, attrition risk was predicted using regression analysis, which showed excellent predictive accuracy. These findings demonstrate how AI-based solutions greatly increase hiring effectiveness and make it possible to predict employee retention results with accuracy.

RESULTS

Utilizing the components in this section, we assess the Independent Samples t-test and Regression Analysis.

Independent Samples t-test

This investigation analyzed the performance of HR measurements before applying AI-powered HRM tools and after their application through the Independent Samples t-test. This test identifies whether the perceived differences, such as the reduction of the average time of hiring or the increase in staff retention level are statistically significant. The test evaluates how AI enhances important HR tasks such as employee happiness, job matching, recruiting efficiency, and retention by comparing the mean values of two independent groups (before and after AI adoption). Equation (1) is given by:

$$S = \frac{W_1 - W_2}{\sqrt{\frac{t_1^2}{m_1} + \frac{t_2^2}{m_2}}} \qquad (1)$$

Where:
W_1 W_2 -Average of the two groups.
t_1^2 t_2^2 - Differences between each group.
m_1 m_2 - Sample Sizes.

Table 3 and figure 2 present independent sample t-test results comparing the HR outcomes before and after the use of AI-powered systems. All five variables revealed significant improvements in analysis. The candidate-job match score rose from 68,5 to 81,9, while the recruitment duration shrank from 34,7 to 24,3 days. Retention rates increased from 76,4 % to 83,1 %, and employee satisfaction scores increased from 3,2 to 4,1. Furthermore, the attrition risk estimated by AI decreased from 0,62 to 0,48. Every change was statistically significant ($p < 0,001$), demonstrating how AI may improve the effectiveness of hiring and retaining employees.

Table 3. Result of Independent Samples T-test

Variable	Mean Score		SD	Sample Size (n)	t-value	p-value
	Before AI	After AI				
RT	34,7	24,3	5,7	1000	17,82	< 0,001 *
CJMS	68,5	81,9	6,9	1000	22,15	< 0,001 *
ESS	3,2	4,1	0,8	700	15,4	< 0,001 *
RR	76,4	83,1	3,9	25	5,61	< 0,001 *
APAR	0,62	0,48	0,12	1000	14,75	< 0,001 *

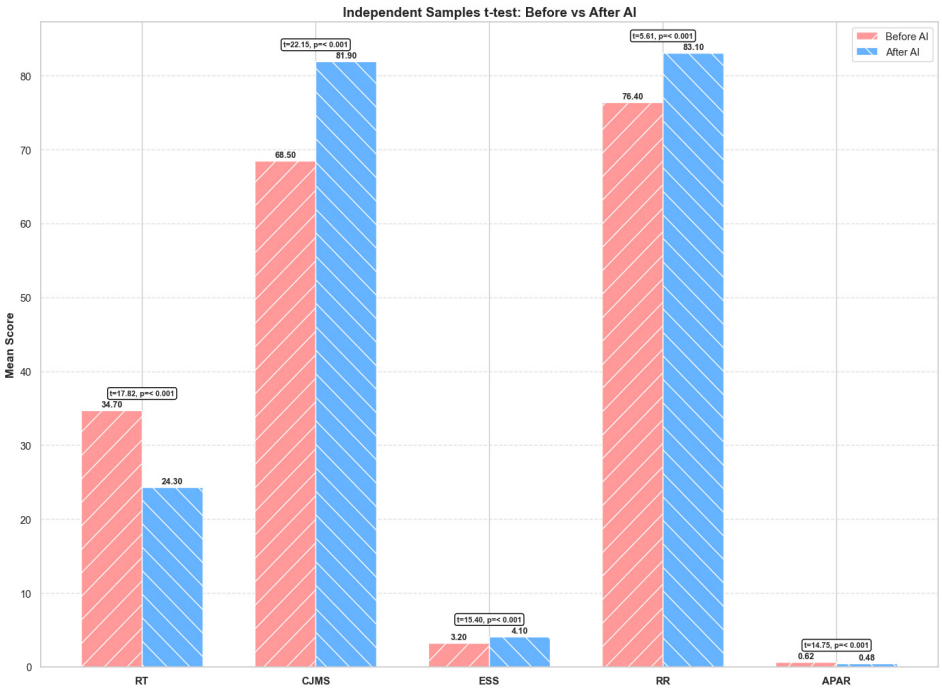

Figure 2. Independent samples t-test comparing HR metrics before and after AI implementation

Regression Analysis

To determine the association between the employment of AI technologies and outcomes like staff retention or recruiting efficiency, regression analysis is employed in this investigation. Based on the degree of AI integration, it assists in forecasting the amount of increase in HR performance that may be anticipated. It may demonstrate, for instance, that more use of AI results in shorter hiring times or better retention rates. Equation (2) was obtained here.

$$X = b + aY + \varepsilon \qquad (2)$$

Where X represents the result (such as hiring time), Y represents the use of AI, b represents the intercept, a represents the impact of AI, and ε represents the mistake.

The findings of the regression analysis contrasting AI-powered HRM (Group B) with Traditional HRM (Group A) across a number of important HR factors are shown in table 4. There was a considerable improvement in the RT from 32,6 days in standard HRM to 21,3 days with AI (t = 4,71, p < 0,001, R^2 = 0,38). With a higher job match with AI, CJMS rose from 64,2 to 72,8 (t = -3,89, p < 0,001, R2 = 0,35). From 3,2 to 4,1, ESS increased (t = -2,96, p = 0,004, R2 = 0,27). From 68,5 % to 81,2 %, the Retention Rate (RR) increased (t = -3,56, p < 0,001, R2 = 0,32). The efficiency of AI in forecasting staff attrition was eventually confirmed by an increase in APAR from 0,25 to 0,41 (t = 3,87, p < 0,001, R2 = 0,42). AI-powered HRM results in statistically significant increases across all variables.

Table 4. Result of Regression Analysis

Variables	Group A (Traditional HRM)	Group B (AI-Powered HRM)	SE	t-Statistic	p-value	R^2	Significance
RT	32,6	21,3	2,4	4,71	< 0,001	0,38	Significant
CJMS	64,2	72,8	1,9	-3,89	< 0,001	0,35	Significant
ESS	3,2	4,1	0,26	-2,96	0,004	0,27	Significant
RR	68,5	81,2	3,1	-3,56	< 0,001	0,32	Significant
APAR	0,41	0,25	0,03	3,87	< 0,001	0,42	Significant

DISCUSSION

AI-based HRM is an effective transformation of the industry, expanding the efficiency of the recruitment process and retention of talent through shorter hiring time, better competition for job roles, employee satisfaction, and accurate attrition forecasting.[18,19,20] These findings corroborate the fact that AI in HR can

enhance decision-making, mitigate burnout, and facilitate strategic attention[9,21,22,23] and are also in line with the findings of the past literature that point to the utility of integrating HRM, knowledge acquisition, and change management to enhance preservation in knowledge-based industries.[6,24,25] The statistical findings validate the affirmative effect of AI in the HR decision-making process modernization and optimization. AI-powered HRM dramatically improves hiring effectiveness and employee retention, according to the findings of the Independent Samples t-test and regression analysis. Among the t-test results, the top three improvements were observed in CJMS with a t-value of 22,15, RT with 17,82, and ESS with 15,4. In the regression analysis, the strongest predictive performance was seen in APAR with an R^2 of 0,42, RT with R^2 of 0,38, and CJMS with R^2 of 0,35. The fact that every improvement was statistically significant ($p < 0,001$) demonstrated AI may improve HR performance.[26]

CONCLUSIONS

AI-informed HRM enhances recruitment processes and talent retention with faster recruiting, improved job-candidate coupling, increased employee satisfaction, and improved prediction of employee turnover by a factor of magnitude. The trends encourage fact-based, strategic HR decisions and assist in the production of a more trustworthy and employable staff. AI-based HRM applications have a significantly beneficial effect on the retention and success of personnel recruiting. These statistically significant results ($p < 0,001$) indicate that AI transforms standard HR processes into data-oriented ones and strategic procedures. Notably, among the independent sample t-tests, the CJMS yielded the highest t-value of 22,15, demonstrating the strongest statistical improvement. Likewise, in regression analysis, the APAR showed the highest R^2 value of 0,42, confirming its superior predictive accuracy. With the help of AI, companies will be able to make HR decisions in a timely manner and with maximum information to increase long-term profits and employee stability. The investigation was confined to IT and finance with particular variables. Future work can include diverse industries, larger datasets, and advanced AI models to further improve predictive accuracy and personalize HR strategies for broader applicability.

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CONFLICT OF INTEREST

Authors declare that there is no conflict of interest.

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