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Integrating Artificial Intelligence with Human Resource Management: A tool for enhancing job performance and developing human capital" Algeria's banking sector as a model

khalissa ZAOUAOUI
University of soukahras
khalissazazou@yahoo.fr

Razika BELLATRECHE
University of Médéa
Bellamaster2015@gmail.com

Abstract:
Recent decades have witnessed an unprecedented digital revolution that has deeply affected the business environment, where artificial intelligence (AI) has emerged as a strategic tool capable of reshaping human resource management practices, this article aims to study the extent of the contribution of artificial intelligence with human resource management in improving job performance and human capital development, focusing on the banking sector in Algeria as an applied case The study covered 19 banks between foreign and Algerian banks, relying on the theoretical framework related to human capital, job performance with the integration of AI with human resource management, as well as a review of previous studies, in addition to the review of previous studies.

Keywords: *Artificial intelligence, human resource management, job performance, human capital.*

Intégrer l'intelligence artificielle dans la gestion des ressources humaines : un outil pour améliorer les performances professionnelles et développer le capital humain Le secteur bancaire algérien comme modèle

Résumé :
Les dernières décennies ont été marquées par une révolution numérique sans précédent qui a profondément bouleversé l'environnement commercial, où l'intelligence artificielle (IA) est apparue comme un outil stratégique capable de remodeler les pratiques de gestion des ressources humaines. Cet article vise à étudier l'ampleur de la contribution de l'intelligence artificielle à la gestion des ressources humaines dans l'amélioration des performances professionnelles et le développement du capital humain, en se concentrant sur le secteur bancaire en Algérie comme cas d'application. L'étude a porté sur 19 banques étrangères et algériennes, en s'appuyant sur le cadre théorique lié au capital humain, aux performances professionnelles avec l'intégration de l'IA dans la gestion des ressources humaines, ainsi que sur une revue des études précédentes.

Mots clés : *intelligence artificielle, gestion des ressources humaines, performances professionnelles, capital humain.*

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Introduction

Contemporary organizations, especially financial institutions, are facing increasing pressure to keep pace with technological shifts and achieve a sustainable competitive advantage. The human element is one of the most important factors of excellence, making human resource management a strategic function. In this context, artificial intelligence (AI) is emerging as a tool capable of automating tasks, providing accurate analytics, and enhancing the employee experience.The Algerian banking sector is currently undergoing a major digital transformation, driven by the efforts of public and private banks to provide modern digital financial services, which requires reconsidering how to manage and develop their human capital.

Research problem:

Through the above, this article will address the following research question: What is the extent of the impact of artificial intelligence integrated with human resource management in improving job performance and developing human capital, the banking sector in Algeria as a model?

Methodological framework of the study:

- **Importance of the research:** This research derives its importance from the radical transformations witnessed by the business world, where artificial intelligence has become a decisive factor in achieving competitive advantage, the main importance lies in the following:

- Bridging the knowledge gap: Despite the increasing use of AI, there is still a gap in the theoretical and practical understanding of how to effectively integrate it into human resource management, especially in the context of the banking sector.
- -Enhancing organisational performance: The research demonstrates how AI can increase the efficiency and effectiveness of key HR processes, such as recruitment, training, and performance appraisal, leading to an overall improvement in organisational performance.
- -Human Capital Development: The research focuses on the role of AI in providing personalised training and development opportunities, which directly contributes to upskilling employees and increasing their productivity and innovation.

Research Objectives :

This research seeks to achieve the following objectives:

The main objective:

To build a comprehensive theoretical framework that clarifies the mechanisms of integration between AI and HRM to improve job performance and human capital development.

Sub-objectives :

- Analyse the role of AI in improving recruitment and selection processes in the banking sector.

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- Identify how AI can be used to personalise training and professional development programmes for employees.
- Examine the impact of AI on performance appraisal.
- Identify the extent to which AI and HRM contribute to the development of human capital in the banking sector.
- Provide practical recommendations for financial institutions to adopt AI techniques in human resources functions.

Previous studies :

Many international studies have shown that artificial intelligence has become a strategic lever in human resource management:

- Theoretical studies: These studies focused on the conceptual framework for the use of AI in HR. For example, Davenport & Kirby (2016) discussed how intelligent machines can affect human functions, emphasising the importance of integrating human and machine capabilities.
- Applied studies: Tambe et al (2021) showed that the use of AI in recruitment reduces human biases and increases the efficiency of the process, and Cascio & Montealegre (2016) noted that AI enables data-driven decision-making in areas such as performance appraisal and rewards.
- AI and human resources: Buddha and Singh (2021) suggest that AI applications enhance the effectiveness of recruitment, training, and evaluation, while reducing bias, and Cascio and Montealegre (2016)

explain that the use of big data analytics improves individual and organisational performance by providing accurate and real-time insights into employee behaviours. The literature review shows that there is a research gap in Arabic studies in general and Algerian studies in particular on the integrative relationship between AI, HR, and job performance. Most research in this context remains theoretical or focuses on developed countries, which calls for field studies in a local environment to understand how these technologies are applied and their actual impact.

Research hypotheses and methodology

Based on the theoretical framework and previous studies, we propose the following hypotheses that will be tested in the context of the Algerian banking sector:

Hypothesis 1: There is a positive impact of using AI applications in human resource management

Hypothesis 2: There is a positive impact regarding the extent to which AI applications integrated with HRM contribute to human capital development in the Algerian banking sector.

Hypothesis 3: There is a positive impact on the extent to which AI applications integrated with HRM contribute to improving job performance in the banking sector in Algeria.

Methodology: The questionnaire was used as the main tool to collect quantitative data from a sample of bank employees (19 banks) Algerian and foreign. The questionnaire was carefully designed to include themes that measure the independent variables (artificial intelligence applications in human resource management) and dependent variables (job

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performance, human capital development). A five-point Likert scale was used to evaluate the answers, and in terms of data analysis, SPSS software was used to validate the hypotheses through statistical analysis, regression analysis and descriptive analysis.

1. The theoretical framework of the study:

1.1. Artificial Intelligence Applications in Human Resource Management in the Banking Sector

- ***Artificial Intelligence (AI)*** Artificial Intelligence (AI) is defined as the ability of computer systems to perform tasks that normally require human intelligence such as learning, reasoning, natural language processing, and decision-making (Russell & Norvig, 2021). The concept has evolved to include multiple areas including Machine Learning, which focuses on developing algorithms that allow systems to learn from data and identify patterns without explicit programming, and Deep Learning, which is a subset of Machine Learning that uses multi-layer artificial neural networks to process massive amounts of data, making it effective for tasks like image and speech recognition (Goodfellow et al., 2016), and analysing big data, making it a revolutionary business tool (Haenlein & Kaplan, 2019).

Artificial Intelligence (AI) has become one of the most influential technological innovations in the field of human resource management, reshaping the way we attract, select, manage and motivate talent (Meijerink et al., 2021). AI is defined in this context as the use of intelligent systems capable of analyzing and learning from employee data to support human resource decisions (Tursunbayeva et al.,

2018) that directly contribute to the achievement of organisational goals. From a theoretical perspective, this integration of AI into HRM functions is seen as a natural evolution of automation but goes beyond it with the ability to learn, predict, and make complex decisions. The theoretical frameworks that explain this integration are derived from the fields of management science, technology, and organisational psychology, which will be summarised below:

- ***Resource-Based View (RBV)*** One of the main theoretical frameworks that can be applied in this context is the Resource and Capabilities Theory (RCT), which argues that an organisation's internal resources and capabilities are a primary source of competitive advantage (Barney, 1991). (Sahoo, 2021), (Kumar) These resources are big data of employees, AI algorithms, and technological infrastructure, translated into Dynamic Capabilities, where smart algorithms help analyse CVs, evaluate candidates, and predict their compatibility with vacancies (Upadhyay & Khandelwal, 2018)., which allows the organisation to hire the best talent, which positively affects the operational effectiveness of the company, by injecting new efficiency within the organisation, and also helps to analyse the performance of employees accurately (Bhaduri & Hossain, 2020), by adopting analytical tools that give us detailed and accurate results on the performance of each individual, which works to identify the knowledge gap of employees and this helps greatly in determining the training needs accurately, which contributes to developing the capabilities of its employees in a way that competitors cannot easily imitate, giving it a sustainable competitive advantage.

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- **Systems Theory (Systems Théorie)** Systems theory provides a comprehensive framework for understanding how AI interacts with HR functions as a whole, where the organisation is considered an open system consisting of interconnected parts that interact with each other and the external environment (Faliagka & Tsadiras, 2021). Inputs are candidate data, performance data, and employee information, while processes are AI algorithms that process these inputs, such as CV screening systems or Sentiment Analysis software to analyse and sort CVs automatically, saving time and effort for recruiters (Russell, & Norvig, 2020) , performance management through analytical tools that monitor individual and group performance indicators (Meijerink et al,2021).As for the performance management function within the organisation, the outputs are faster recruitment decisions, low employee turnover, and immediate reports regarding the level of performance, all of this fast and accurate information supports and improves management decisions, and the use of AI increases the efficiency and effectiveness of these processes, enhancing consistency between different HR functions such as recruitment, training, and performance evaluation (Strohmeier, 2020).The use of AI increases the efficiency and effectiveness of these processes.

- **Technology Acceptance** Model **(**TAM) is an essential framework for understanding how employees and HR managers interact with new AI tools (Davis, 1989). According to this theory, technology adoption is influenced by two main factors: **Perceived Ease of Use and Perceived Usefulness.**in the context of **HRM**, this theory is

particularly important when integrating AI tools such as intelligent recruitment systems, machine learning platforms for training, or performance analytics applications. The more employees and HR managers realize that these tools are easy to use and contribute to their efficiency, the more likely they are to adopt them and use them to improve administrative and functional processes.

- **Organisational Learning Theory** is one of the most important theories that can be employed. It believes that the organization as a whole is able to learn and adapt through the processes of collecting information, analyzing it, and applying the acquired knowledge. This learning requires individuals and teams to share their experiences and transform them into organizational knowledge .

When AI is incorporated, this process takes on new dimensions:

Collect and analyse data: AI systems enable the collection and analysis of vast amounts of performance, training, and engagement data like never before, enabling organisations to learn from their employees' behaviours and identify skills gaps faster and more accurately (Meijerink et al., 2021).

Personalisation and individual learning: AI can create personalised learning paths for each employee based on their performance and needs, which enhances the effectiveness of the learning process. This is in line with the Self-Directed Learning Theory, which emphasises that adults learn best when they have control over their learning path (Knowles, 1980).

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1.2. Job performance

Job performance is one of the most pivotal concepts in the field of human resource management, as it represents the basic criterion by which the extent of an individual's contribution to achieving the organization's goals is measured. Job performance refers to the set of behaviours and activities that an employee performs while performing his/her tasks that contribute to the achievement of the organisation's goals (Borman & Motowidlo, 1993) and differs from just the final results of work, as it focuses on the processes and behaviours that lead to those results.Researchers have categorised job performance into key dimensions, most notably: Task Performance relates to direct job-related activities such as quality of work, productivity, and the ability to complete basic tasks, and Contextual Performance (Contextual Performance): It includes voluntary behaviours such as cooperation, organisational commitment, and initiative that contribute to improving the organisational environment (Organ, 1997) in addition to Adaptive Performance: It reflects an employee's ability to adapt to technological and organisational changes and is considered increasingly important in modern work environments (Pulakos et al., 2000).

Several theories contribute to the understanding of human capital from different angles and these theories can be categorised into two main groups: Individual-centred theories, including the Ability and Motivation Theory, which suggests that an employee's performance depends on three factors: **Ability (Ability)** which includes knowledge and skills**, Motivation (Motivation)** which is the willingness to exert effort, **and Opportunity (Opportunity**): (Blumberg

& Pringle, 1982).**Organizational Justice Theory** shows that an employee's perception of fairness in the workplace affects their behavior and performance (Adams, 1965) When an employee perceives that rewards and decisions are made fairly, they tend to exert more effort. Job performance is a complex phenomenon that requires multidimensional analysis, as it cannot be understood in isolation from individual factors (ability and motivation) and contextual factors (justice and leadership). Understanding these dimensions and components enables HR managers to design effective strategies to assess, motivate and develop performance. In light of digital transformations, job performance is not only measured by traditional work outputs, but also by the ability of the employee to interact with modern technology tools such as artificial intelligence systems, which reinforces the importance of linking job performance to theoretical frameworks such as technology acceptance theory (TAM), resource and capability theory (RCT).

1.3. Human Capital

Human capital is one of the most important intangible assets that organizations possess, as it represents the knowledge, skills, abilities, and expertise of individuals, which is a key driver for achieving competitive advantage and sustainability (Becker, 1993; Wright et al, (1994) Becker (1964) defined human capital as the investment of individuals in education, training and practical experiences that increase their productivity and value within the organisation. This capital includes a combination of skills, knowledge and expertise that enhance performance and innovation (Lepak & Snell, 1999). **Resource** theory also

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emphasises that human capital is a rare resource that is difficult to imitate, making it the basis for building a sustainable competitive advantage.Human capital can be divided into three main components, which together constitute its real value (Nahapiet & Ghoshal, 1998)

Knowledge capital, which comprises the knowledge and expertise that employees possess and is represented by **explicit knowledge**, which is documented knowledge that can be easily transferred and stored, such as certificates, patents, and reports, **and tacit** knowledge, which is undocumented knowledge that individuals acquire through experience and practice This knowledge is difficult to transfer and is a unique source of competitive advantage, such as expertise in solving complex issues or understanding market dynamics, in addition to social capital This component refers to the relationships and networks that employees possess, which facilitate the flow of information and collaboration, can be internal, i.e. the relationship.

The role of artificial intelligence applications in human capital development Artificial intelligence has revolutionized human resource management by enabling it to invest human capital more effectively through :

Smart Hiring: AI systems use advanced algorithms to analyse CVs and candidate data, enhancing the process of selecting the most qualified employees with the skills and knowledge that best match the organisation's requirements (Upadhyay & Khandelwal, 2018), thus improving the quality of human capital from the outset.

Continuous training and development: AI-powered adaptive learning platforms deliver personalised training content aligned to the needs of each employee, continuously

enhancing their skills and expanding their knowledge. This direct investment in employees increases the value of human capital in the long term (Panagiotopoulos et al., 2022).

Performance management and motivation: AI tools help collect and objectively analyse accurate data on employee performance, providing immediate feedback to help develop weaknesses and strengthen strengths, and support fair and transparent performance-based incentive systems, which increases employee motivation and investment in self-development (Lepri et al., 2018).

Human capital is the most valuable resource in the digital economy, and AI applications in HRM offer unprecedented opportunities to optimise this resource through optimal recruitment, personalised training, fair evaluation, and strategic planning. Thus, the future success of organisations will depend on their ability to harness AI to grow their human capital and turn it into a constant source of innovation and competitive advantage.

2. Discuss and test the hypotheses in light of the results obtained and the statistical analysis

Results of testing the first hypothesis: The extent of the impact of artificial intelligence applications on human resource management in the banking sector

1. The regression results (B=1.22, R^2=32.8%) indicate a strong and statistically significant positive impact of the use of artificial intelligence on the recruitment process within banks, which means that banks rely on electronic recruitment platforms that help them quickly access competencies, in addition to expanding the candidate base to enhance the diversity of experiences, also these platforms contribute to reducing the costs and time associated with

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traditional recruitment processes, which allows directing resources to develop employee capabilities, also raising the quality of selection through filtering systems and algorithms that identify candidates

This finding is consistent with studies such as (Parry & Wilson, 2009) and (Chapman & Webster, 2003), which emphasised that AI applications in recruitment not only contribute to attracting individuals, but also enhance the long-term value of human capital.

2. The extent of the impact of AI applications on training and development within banks The results (B=1.37, R^2=38.The results indicate that the integration of AI applications in the design of training content, programme implementation and evaluation contributes effectively to the development of employees' skills and raising the efficiency of the learning experience, as we find some banks such as **BNP Paribas which has partnered with** Cornerstone Content Anytime, this partnership made the bank move away from traditional classroom training to a revolving library of electronic content, always accessible at any time, supporting technical skills, digital change, and multilingual content, and the bank has provided more than **3. 59 million hours of** training through a variety of systems such as video, blended modes **(Blended** Learning), microlearning, and more than **3.59 million hours of training** through a variety of systems such as video, Blended Learning, Micro-Learning, and virtual classrooms. Training and development leaders emphasise that the learning experience has become more personal, digital, and available as per the needs of each employee, as part of a "learning company" strategy that reflects the corporate culture towards human capital

development.To facilitate the management of training courses and content, Société Générale hired **Mandarine Academy** to implement the DiLeaP Logistic platform, which helps organise content, schedule programmes, track learner engagement and evaluate effectively, and various foreign banks have also adopted an interactive online CSR training module The training includes interactive assignments on diversity, emissions reduction, responsible investment and social roles that demonstrate the bank's commitment to social and environmental values, a trend that is important for all industries, not just the banking sector.

These findings are in line with Sha Ri Na's study (2024) which proved that the use of AI is an effective tool for enhancing training and organisational development.

3. The extent of the impact of AI applications on performance management and evaluation: The results (B=0.31, R^2=10%, statistically insignificant) indicate that the effect is weak and insignificant.This may be due to the fact that the application of AI systems in an important function such as performance management in banks such as Société Générale Algérie, BNP Paribas El Djazaïr, Natixis Algeria or Arab Algerian Bank is still limited

This is due to the fact that banks in Algeria have not reached the point of mandatory full digital transformation in human resources, especially with regard to dealing with employee data and storing it on foreign clouds, especially those that affect employee performance, appraisals, promotion plans), which makes management reluctant to move to cloud systems for fear of leaks, as well as internal resistance to change: Some employees and managers prefer traditional appraisals based on paper meetings or face-to-

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face interviews, and believe that electronic systems may lose the power or transparency of appraisal.

The absence of AI applications here is not necessarily a sign of rejection or deficiency, but rather the result of a combination of organisational, legal, technical and cultural factors. However, as the Algerian financial market evolves and opens up to financial technology (FinTech), the shift towards smart HRM will become inevitable in the coming years.

The impact of AI applications on HRM as a whole (multiple regression) The analysis showed that AI applications in recruitment (B=1.28, t=9.21) and AI applications in education (B=1.11, t=567.) are the main influences, with a high coefficient of determination (R^2=79.8%).

This is in line with what was later argued (Khan et al., 2024). that the impact of utilising AI applications in HRM can be seen in three main areas within banks: Talent attraction, employee engagement, and performance appraisal. The research showed how these technologies can help banks deal with sectoral challenges, such as accuracy in recruitment and regulatory compliance, with a focus on transparency of algorithms as a prerequisite for continued trust.

The results of testing hypothesis two: There is a positive impact on the extent to which AI applications integrated with HRM contribute to human capital development in the Algerian banking sector.

The results of the multiple regression analysis showed that AI applications in HRM had a differential impact on human capital development in the banking sector, it was

found that AI applications in training and development achieved the highest impact as the regression coefficient (B=1.28 at the level of statistical significance (Sig=0.This reflects the role of technologies such as intelligent learning systems, virtual simulation, and predictive analytics in enhancing the capabilities of bank employees and refining their skills in line with the requirements of banking digitisation, as these applications allow them to learn at any time according to the specific needs of each employee, which contributes significantly to the development of human capital, which is in line with the results of Margherita (2021) who confirmed that AI enables financial institutions to build continuous learning strategies that enhance the competitiveness of human capital.

It was also found that there is a significant impact of AI applications in recruitment, as the regression coefficient (B=1.06) at a statistical significance level (Sig=0.This indicates that improving AI-supported recruitment mechanisms such as automated candidate screening systems and competency prediction algorithms, which directly contribute to attracting qualitative competencies and enhancing the quality of human capital in banks, and helps to realise the direct goal of HRM, which is to put the right person in the right place, and this not only helps in carrying out job tasks but also developing and rebuilding the position, this result was supported by the study of Vrontis et al. (2022), which showed that AI contributes to minimizing the skills gap by selecting candidates that are more compatible with the requirements of future jobs.

In contrast, there was no statistically significant effect of AI applications in performance management and evaluation (B=0.11, Sig=019.). This can be explained by the fact that

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Algerian banking systems are still at an initial stage of adopting smart performance evaluation tools, as the evaluation criteria are still mostly traditional and rely on direct interviews and manual reports, which limits their actual reflection on human capital development. This contradicts the findings of Strohmeier & Piazza (2015) who indicated that the success of electronic or AI-enabled appraisal systems depends on the readiness of the technological structure and organizational culture to adopt these tools.

The value of the coefficient of determination (R^2=0.79), which means that about 79% of the variance in human capital can be explained by the integration of AI in the recruitment and training processes, which reflects the importance of digital transformation in the banking sector as a strategic tool to enhance human competencies.

Overall, these results indicate that the success of banks in Algeria, such as Société Générale or Gulf Bank, in enhancing human capital depends to a large extent on the exploitation of AI applications in recruitment and continuous training, while in terms of performance management, more integrated policies linking big data and intelligent performance analytics need to be developed to ensure the effectiveness of these tools.

Discuss the results of testing the third hypothesis: There is a positive impact on the extent to which AI applications integrated with HRM contribute to improving job performance in the Algerian banking sector.

The results of the study indicate that there is a positive and significant impact of AI applications integrated with HRM on improving job performance in the studied banks,

the value of F = 67.08 is significant at the level of (Sig = 0.000), which proves the suitability and reliability of the statistical regression model in explaining the relationship between the two variables, and the value of t = 8.19 at the level of significance (0.000) showed that AI applications represent a critical factor in improving job performance.

Given the value of the regression coefficient B = 1.16, it is clear that an increase in the level of reliance on AI by one unit leads to an increase in job performance by (1.16) units, in addition, the value of the coefficient of determination R^2 = 0.462, i.e. 46.2% of the variance in job performance is due to AI applications, as the adoption of AI in recruitment processes contributes to attracting the right person for the job in terms of the required knowledge and experience, which contributes significantly to increasing the job performance of the position effectively, also AI can match new employees with more experienced Mentors based on their interests and skills. The adoption of AI in training and development also allows employees to adopt adaptive training according to their needs, which helps to provide employees with the required skills quickly and in a timely manner, which reflects positively on job performance, and this result is consistent with the study of Jain & Singh (2023). Singh (2023), which highlighted the direct positive relationship between AI and job performance. Exploiting the results obtained from AI applications helps decision makers to enhance employees' cognitive abilities and strengthen their social networks. By focusing on personalisation and accuracy, AI can help transform human resources into a driving force for innovation and growth in organisations.

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Key findings from the study

- **Optimise the recruitment and hiring process:** AI algorithms can analyse thousands of CVs and data from multiple sources (e.g. LinkedIn) to identify the most suitable candidates for the job with accuracy and speed beyond human capabilities, and **reduce unconscious bias** in the early stages of recruitment by focusing on objective skills and qualifications.
- **Personalise training and development programmes:** AI's ability to analyse employee performance and identify skills gaps on an individual basis means that organisations can design **customised training programmes** that meet the needs of each employee, increasing the effectiveness of learning and accelerating human capital development.
- **Improve performance management:** AI tools make it possible to **continuously monitor performance** and provide immediate feedback to employees, instead of relying on traditional annual appraisals, this helps in faster course correction and motivates employees to continuously improve their performance, unfortunately this has not been adopted in banks in Algeria.
- **Increase employee satisfaction and improve the employee experience:** By providing immediate support via chatbots, facilitating access to information, and personalising career development paths, AI creates a more responsive and supportive work environment, leading to **increased employee engagement and job satisfaction**.

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