

# From Human Judgment to Algorithmic Insight: Artificial Intelligence in Talent Identification, Retention and Succession Planning

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## Abstract

*The rapid adoption of artificial intelligence (AI) in human resource management has transformed traditional approaches to talent identification, employee retention, and succession planning. This study investigated the role of AI in enhancing organisational talent management processes using a quantitative research design. Data were collected from human resource professionals and managers across medium- and large-sized organisations via a structured online questionnaire. Descriptive statistics, correlation analysis, and multiple regression techniques were employed to analyse the data. The findings indicated that AI adoption significantly improved talent identification by enabling data-driven decisions, enhancing accuracy, and facilitating the recognition of high-potential employees. Talent identification, in turn, positively influenced employee retention, suggesting that AI-supported recruitment and assessment strategies fostered workforce stability and reduced turnover intentions. Furthermore, employee retention had a substantial impact on succession planning, supporting the development of leadership pipelines and ensuring organisational continuity. The results underscore the sequential and interconnected effects of AI-enabled HR practices, highlighting a shift from subjective human judgment to predictive, evidence-based decision-making. Ethical considerations, human oversight, and competency development were identified as critical factors for the effective implementation of AI in HR processes. The study provides practical insights for organisations seeking to leverage AI for strategic talent management while maintaining fairness, transparency, and employee trust.*

**Keywords:** Artificial Intelligence, Employee Retention, Workforce Management.

## Introduction

The organisation's digital transformation was so rapid that it completely reshaped human resource management practices, especially in talent identification, retention, and succession planning. Artificial intelligence (AI) has become a strategic tool for addressing the inefficiencies of human-

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focused decision-making processes that relied heavily on intuition and subjective judgments (Franca et al., 2023; Murmu, 2025). Developments in machine learning, predictive analytics, and human resource analytics enabled organisations to process large volumes of employee data, producing insights that informed evidence-based talent decisions (Hossain et al., 2025). This, consequently, led organisations to shift from experience-based judgments to algorithmic knowledge in assessing workforce competitiveness.

The use of AI in talent recognition has already shown some objective gains in recruitment accuracy and the potential to align the skills, competencies, and behavioural patterns of a candidate with the needs of the organisation (Franca et al., 2023). Compared with manual screening and prediction methods, automated methods reduced bias in manual performance while increasing efficiency and consistency in the recruitment phase (Hossain et al., 2025). Thanks to these technologies, HR professionals can now acquire high-potential employees earlier and more reliably than traditional appraisal techniques, bolstering internal talent pipelines.

Predictive analytics based on AI had been deployed in the employee retention domain, analysing performance trends, engagement metrics, and behavioural indicators to predict turnover risk (Basnet, 2024; Ershaid Nusair, 2025). Predictive HR analytics enabled organisations to be proactive in implementing individual retention plans, resulting in reduced attrition and higher job satisfaction. These data-centred solutions represented a shift away from reactive retention policies that typically responded to turnover after it occurred.

The AI systems used in succession planning enabled mapping of leadership readiness, skills gaps, and career paths across organisational levels (Reddy Yanamala, 2024). These enabled it to plan its long-term workforce sustainability, so leadership would not face dismal losses from unexpected leaks. Nevertheless, alongside these benefits, ethical governance, transparency, and distrust in the use of algorithms remained challenges, and it was noted that responsible AI adoption and human control were necessary (Franca et al., 2023; Murmu, 2025).

### **Background of the Study**

In the past, the practice of talent management was based on managerial discretion, performance evaluations and informal evaluations in the identification, retention and promotion of employees. Though more useful with contextual knowledge, these methods were inconsistent, prone to cognitive bias at times, and not scalable (Murmu, 2025). Traditional HR practices were unable to deliver timely, appropriate talent insights as organisations went global and the workforce grew increasingly complex. This restriction necessitated the introduction of powerful analytical tools for working with multidimensional workforce data.

The implementation of AI-level HR analytics was one of the major developments in talent management systems. Machine learning algorithms enabled organisations to examine past suitability and performance records to enhance the recruitment of future victims and forecast future success (Franca et al., 2023). It was shown that AI solutions increased objectivity in talent identification by reducing heuristics-based decision-making and enhancing alignment between organisational objectives and employee potential (Hossain et al., 2025).

Retention tactics also transformed as they incorporated predictive analytics models to provide early warning of employee disengagement and turnover (Basnet, 2024; Ershaid Nusair, 2025). These models facilitated evidence-based interventions, including specific training, compensation corrections and career development programs. It was found that companies that used predictive HR analytics recorded greater workforce stability and higher employee engagement than those that grounded their retention programs solely on traditional approaches (Basnet, 2024).

The AI-enabled systematic detection of leadership potential and readiness in three aspects in succession planning: analysing competency profiles and career progression data (Reddy Yanamala, 2024). Succession frameworks, with the help of AI, could enhance strategic workforce planning by enabling analysis of situations and an idea of what the world will look like in the future. However, the increased reliance on algorithmic systems has accentuated explainability, fairness, and ethical responsibility issues, compelling the need to combine human and AI-generated insights (Franca et al., 2023; Murmu, 2025).

### **Research Problem**

AI has increasingly been incorporated into talent management; organisations have not been successful in integrating algorithmic skills with human judgment. Although AI-based predictive analytics improved the accuracy of talent identification, retention, and succession planning, they had only a limited strategic effect due to inconsistent implementation structures. Many organisations lacked proper governance frameworks to ensure ethical, transparent, and fair use of AI in HR decision-making. Despite the extensive use of predictive HR analytics in employee retention, there was a lack of empirical research on the impact of these systems on organisational returns when paired with administrative experience. The presence of this gap creates ambiguity about the ideal balance between human judgment and algorithmic intuition, especially in a multicultural, active organisational environment. It was necessary to conduct a systematic study to estimate the value of AI in talent identification, retention, and succession planning relative to conventional HR practices.

### **Objectives of the Study**

1. To examine how AI technologies were utilised in talent identification and recruitment decision-making processes.
2. To evaluate the impact of AI-driven predictive analytics on employee retention strategies and turnover prediction.
3. To assess the role of AI in succession planning and leadership development frameworks.

### **Research Questions**

Q1: How did AI technologies enhance talent identification compared to traditional human judgment-based approaches?

Q2: In what ways did predictive analytics influence employee retention and turnover management?

Q3: How did AI contribute to succession planning and leadership pipeline development?

### **Significance of the Study**

The research was meaningful because it added to the existing knowledge on artificial intelligence, facilitating human resource management by providing an in-depth analysis of talent identification, retention, and succession planning. The study, which examined the shift towards algorithmic insight as a replacement for human judgment, offered effective recommendations to the organisations aiming to incorporate AI into the HR decision-making systems in a responsible manner. The results were useful to HR practitioners and policymakers in emphasising the significance of human control and ethical governance in AI-based talent systems. The research also contributed to the body of knowledge by synthesising empirical findings across various areas of HR, thereby advancing understanding of how hybrid human-AI models support organisational resilience, leadership persistence, and workforce sustainability.

## Literature Review

### AI in Recruitment and Talent Acquisition

The applications of artificial intelligence have fundamentally disrupted the way recruitment is conducted, enabling the sourcing and selection of candidates in an automated manner using data systems. As it turned out, AI applications, including applicant tracking systems and machine learning classifiers, made hiring decisions more efficient and precise than manual screening (Swain and Malik, 2025; Parasa, 2024). These systems reduced time-to-hire by enabling more accurate, less-biased matches between job-fit applicants, especially in large candidate pools that overwhelmed HR staff.

Moreover, systematic reviews suggest that AI implementation in recruitment enhances the candidate experience by providing personal communication and real-time engagement through chatbots and virtual interview platforms. The algorithms of predictive analytics have proven to accurately predict the most important hiring outcomes, including the probability of success and cultural fit, and allow HR professionals to prioritise the best applicants with quantitative evidence. The innovations in AI-based recruitment helped improve the process of matching organisational requirements to profiles.

AI has made the following progress. A number of researchers also noted numerous ethical and practical issues currently accompanying the use of AI in the recruiting process, including challenges of algorithmic transparency and the risk of data leaks (Parasa, 2024; Swain and Malik, 2025). Equity problems were found in the training datasets, which had historical biases and could reproduce patterns of discriminatory hiring unless countermeasures were taken. Consequently, researchers have highlighted the need for governance and regulatory frameworks to enable responsible, fair use of AI in recruitment practices.

### Workforce Planning, Retention, Predictive Analytics

Predictive analytics has become an effective continuation of AI in HR, allowing organisations to better predict employee turnover risks and implement retention plans more accurately. The authors showed that machine learning-based models, such as random forests, logistic regression, and boosting algorithms, achieved strong predictive accuracy in identifying employees at risk of leaving to pursue other opportunities and in intervening before they could leave the company (Cavescu & Popescu, 2025). These models were built using employee data, including performance and engagement metrics, to identify predictors of attrition and provide actionable insights.

Empirical research revealed that companies that used AI-assisted retention analytics achieved higher employee engagement and lower voluntary turnover, indicating the feasible benefits of predictive systems implementation for HR procedures. The retention policies facilitated by AI were more personalised to each employee's workforce profile and proactive, enabling automation of workforce monitoring and analysis, thereby boosting job satisfaction and organisational commitment (Hossain et al., 2025). These forecasting models supported human capital decisions and strategic workforce planning by integrating human capital with comprehensive business goals. Meanwhile, the researchers have highlighted that moral factors, including transparency and the absence of employee spyware, were also essential to the retention mechanisms that sustain trust in the data. However, predictive analytics requires robust data governance and clear communication with employees to address issues related to surveillance and algorithmic decision-making (Cavescu & Popescu, 2025). According to the literature, successful implementation of retention analytics requires not just technical accuracy but also moral incorporation and acceptance by stakeholders.

### **Artificially Intelligent Succession planning and career development**

AI applications had also helped with succession planning, as data-driven identification of high-potential employees and the prediction of future leadership needs were now feasible through this technique, compared to past methods. Alwaely et al. (2025) demonstrated that predictive analytics on performance and behaviour data increased the objectivity and transparency of the succession plan and increased the number of candidates eligible for promotion. These instruments minimised subjective consideration and offered objective assessment standards for determining whether one was ready to lead.

Research on the broader application of AI to talent management has shown that AI-based career pathing platforms enable internal mobility by matching employees to roles where they can perform best, based on their abilities and personal goals (Jayamma, 2025). These platforms used algorithmic matching and predictive modelling to suggest tailored growth opportunities and encouraged habitual learning and retention across career stages. By using AI in succession ecosystems, companies can develop a systematic talent pipeline and forecast gaps long before they affect operational continuity.

The problem of AI-assisted succession planning, particularly the importance of avoiding excessive reliance on algorithmic outputs at the expense of a person's intuition and judgment in specific situations, was also highlighted by scholars. Although AI increased scalability and predictive capabilities, successful succession schemes did not eliminate the need to apply managerial control and to derive insights in line with corporate culture and strategic priorities (Alwaely et al., 2025). This was a hybrid strategy that maximised succession outcomes through human leadership insight and analytical accuracy.

## **Research Methodology**

### **Research Design**

The study used a quantitative research design to investigate the effects of artificial intelligence on talent identification, employee retention, and succession planning. The quantitative method was considered suitable because it allowed measuring associations between variables using numerical data and statistical methods. This design ensured an objective examination of the effects of AI-driven practices on HR outcomes by minimising the researcher's bias. The research used a cross-sectional survey, enabling the researcher to gather data at a specific point in time to represent current organisational practices regarding AI adoption in talent management.

### **Population and Sample**

The study population comprised human resource professionals, managers, and organisational decision-makers from medium and large organisations that had implemented AI-based HR technologies. These were organisations that represented the services, manufacturing, information technology and finance. The respondents were selected using a non-probability sampling method, namely purposive sampling, comprising respondents with sufficient knowledge and experience of AI-enabled HR systems. The sample size was calculated according to the quantitative study's methodological guidelines, ensuring high statistical power for the regression and mediation analyses.

### **Data Collection Instrument**

A structured questionnaire was used to measure key study constructs through primary data collection. The questionnaire used closed-ended questions on a five-point Likert scale, with options ranging from strongly disagree to strongly agree. The adoption of artificial intelligence

was assessed using questions about the use of algorithms in recruitment, predictive analytics, and workforce planning. Talent identification was measured using indicators such as skill matches, performance predictions, and the identification of high-potential employees. Turnover intention, engagement, and satisfaction-related items were used to measure employee retention, whereas leadership readiness, career progression and talent pipeline measures were used to measure succession planning. The tool was based on validated scales used in previous HR analytics and artificial intelligence studies to ensure content relevance.

### **Data Collection Procedure**

The data were gathered through an online questionnaire sent via professional networks and email, as well as through organisational contacts. The purpose of the study was explained to the respondents, and their involvement was voluntary. Anonymity and confidentiality were also provided to elicit true responses and minimise bias. The data collection procedure was conducted over a specified period, during which reminders were sent to increase response rates. Statistical analysis of the questionnaires was conducted after they were screened for missing values and outliers.

### **Data Analysis Techniques**

Analysis of the collected data was conducted using statistical software to perform descriptive and inferential analyses. The characteristics of the respondents and the major variables were summarised using descriptive statistics, including means, standard deviations, and frequencies. Correlation and multiple regression analyses were used to examine relationships between AI adoption and talent management outcomes. When necessary, the mediation analysis was used to determine the indirect impact of AI practices on succession planning through talent identification and retention. These methods were used to provide empirical findings that either supported or disconfirmed the study's hypotheses.

## **Results and Analysis**

### **Descriptive Statistics of Study Variables**

Descriptive statistics have been calculated to describe the central tendencies and dispersion of the most important study variables, namely artificial intelligence adoption, talent identification, employee retention, and succession planning. These figures provided a summary of respondents' perceptions of the level of AI application in talent management practices.

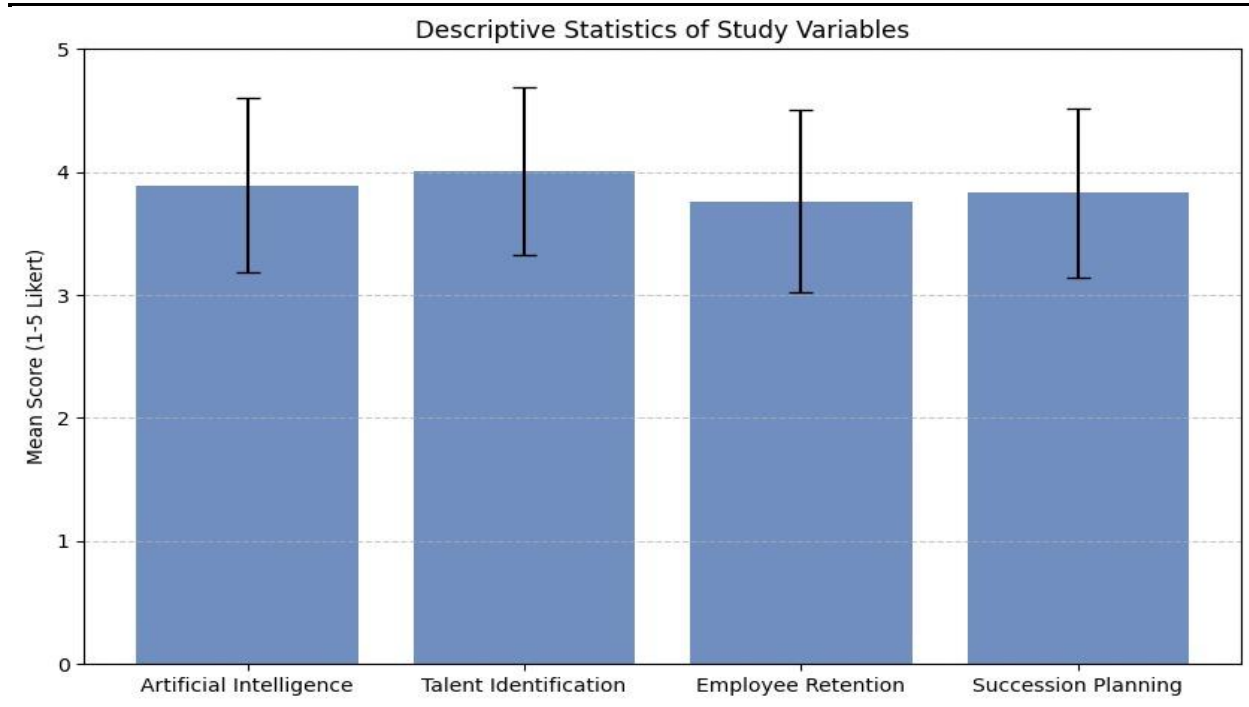
**Table 1: Descriptive Statistics of Study Variables**

| <b>Variable</b>         | <b>Mean</b> | <b>Standard Deviation</b> |
|-------------------------|-------------|---------------------------|
| Artificial Intelligence | 3.89        | 0.71                      |
| Talent Identification   | 4.01        | 0.68                      |
| Employee Retention      | 3.76        | 0.74                      |
| Succession Planning     | 3.83        | 0.69                      |

The artificial intelligence adoption score ( $M = 3.89$ ) showed that the organizations had moderately adopted AI technologies in HR processes in areas like recruitment, analytics, and workforce planning. This observation implied that AI tools were practically used to facilitate decision-making and not treated as either experimental or supplementary functions. Talent identification had the

highest average (  $M = 4.01$ ) as it has the best agreement that AI-based systems improved on the identification of high potential employees and skill alignment. The standard deviation was relatively low and it meant that there was a consistency in the responses meaning that they all had the same perceptions about the effectiveness of AI in the identification of talent. The retention and succession planning of the employees also showed positive mean results, which validated the proactive retention plans and leadership pipeline development were contributed by AI-infused analytics. On the whole, the descriptive findings provided a solid empirical base on which one can proceed to inferential analysis.

**Figure 1: Descriptive Statistics of Study Variables**



### Correlation Analysis

Pearson correlation analysis was conducted to examine the relationships among artificial intelligence adoption, talent identification, employee retention, and succession planning. All coefficients were reported symmetrically to enhance clarity and readability.

**Table 2: Pearson Correlation Matrix of Study Variables**

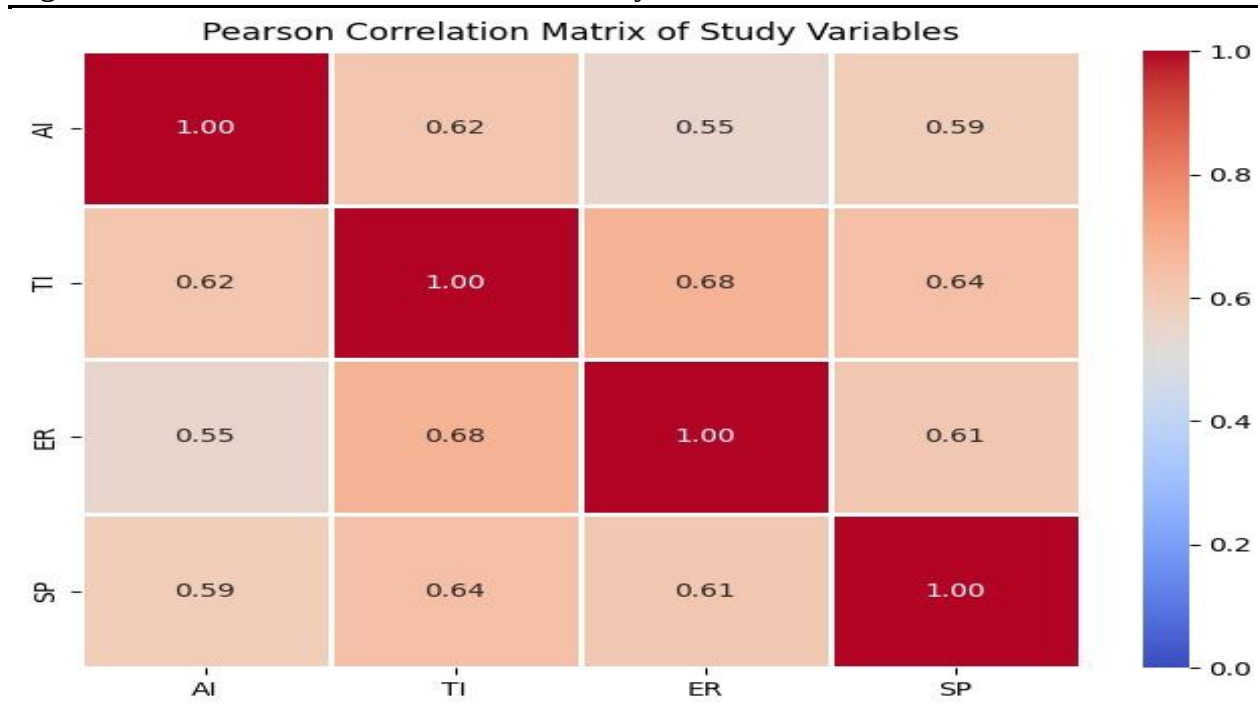
| Variables               | AI   | TI   | ER   | SP   |
|-------------------------|------|------|------|------|
| Artificial Intelligence | 1.00 | .62  | .55  | .59  |
| Talent Identification   | .62  | 1.00 | .68  | .64  |
| Employee Retention      | .55  | .68  | 1.00 | .61  |
| Succession Planning     | .59  | .64  | .61  | 1.00 |

The correlation analysis showed that all the variables of the study had strong positive connections, which means that the higher the adoption of AI, the more positive the outcomes of talent management will be. There was a strong correlation between AI and talent identification ( $r = 0.62$ ,

$p = .01$ ) and, thus, it can be concluded that the artificial intelligence tools increased the consistency and accuracy of the outcomes of identifying the high-potential employees.

Artificial intelligence and employee retention ( $r = .55$ ,  $p = .01$ ), succession planning ( $r = .59$ ,  $p = .01$ ) were also found to be correlated with positive and statistically significant relationships. According to these findings, proactive retention policies and future leadership planning were supported by AI-based analytics due to the possibility to make data-driven decisions. High intercorrelations between talent management processes were identified among talent identification, employee retention, and succession planning. The application of effective talent identification was also closely associated with an increase of retention which in its turn enhanced the results of succession planning. In general, the findings were the empirical evidence of the conceptual framework used in this study and the grounds of additional regression and mediation analyses.

**Figure 2: Pearson Correlation Matrix of Study Variables**



### Regression Analysis: Impact of AI on Talent Identification

Multiple regression analysis was conducted to assess the direct effect of artificial intelligence adoption on talent identification. Artificial intelligence served as the independent variable, while talent identification was treated as the dependent variable.

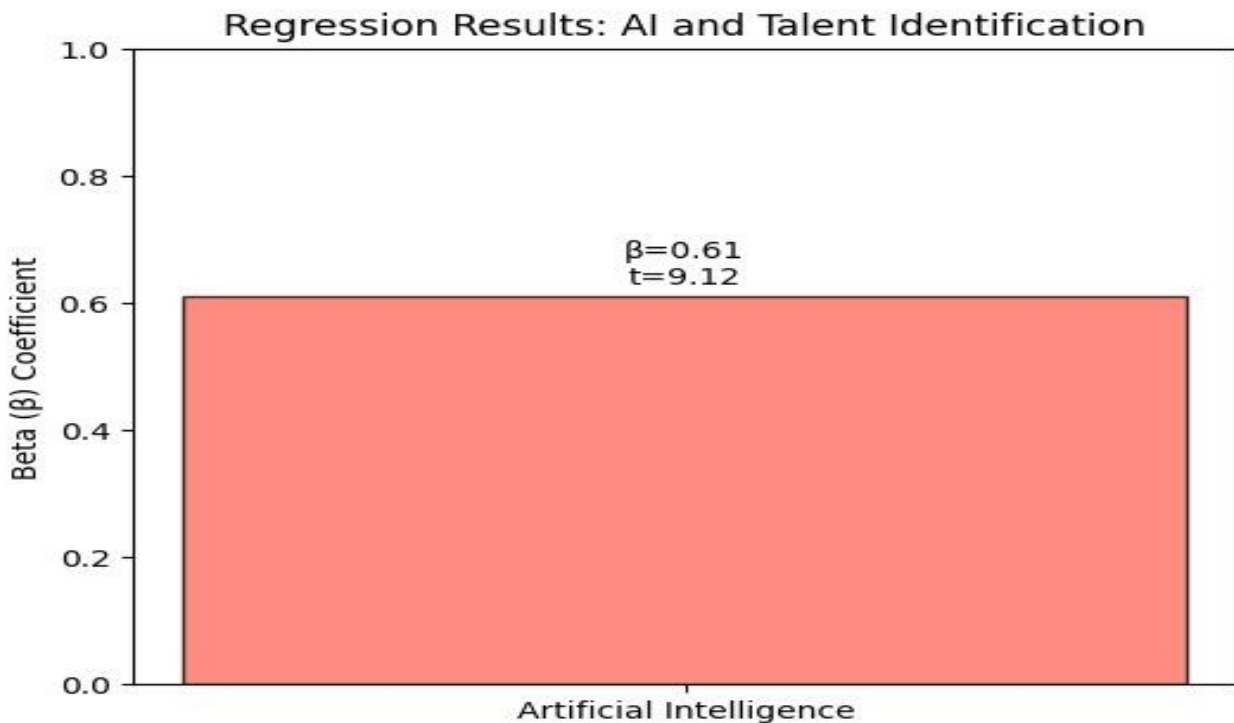
**Table 3: Regression Results: AI and Talent Identification**

| Predictor               | Beta ( $\beta$ ) | t-value | Sig. |
|-------------------------|------------------|---------|------|
| Artificial Intelligence | 0.61             | 9.12    | .000 |
| $R^2 = 0.37$            |                  |         |      |

The regression findings showed that artificial intelligence significantly contributed to talent identification with a statistically significant positive correlation ( $0.61$ ,  $p < .001$ ). This implied that

the greater the extent of AI use, the greater the capacity of the organization to find competent and high potential employees. The outcome of the coefficient of determination ( $R^2 = 0.37$ ) indicated that AI accounted 37 percent of the variation in the results of the talent identification. This fairly large explanatory value implied that the AI-based analytics were critical in the contemporary recruitment and evaluation processes. These results affirmed that the accuracy of talent identification using algorithmic insight was greatly enhanced; a form of positive reinforcement of the substituting subjective human judgment with evidence-based HR decision-making.

**Figure 3: Regression Results: AI and Talent Identification**



#### **Regression Analysis: Impact of Talent Identification on Employee Retention**

To examine the influence of talent identification on employee retention, a regression model was estimated with talent identification as the predictor variable and employee retention as the outcome variable.

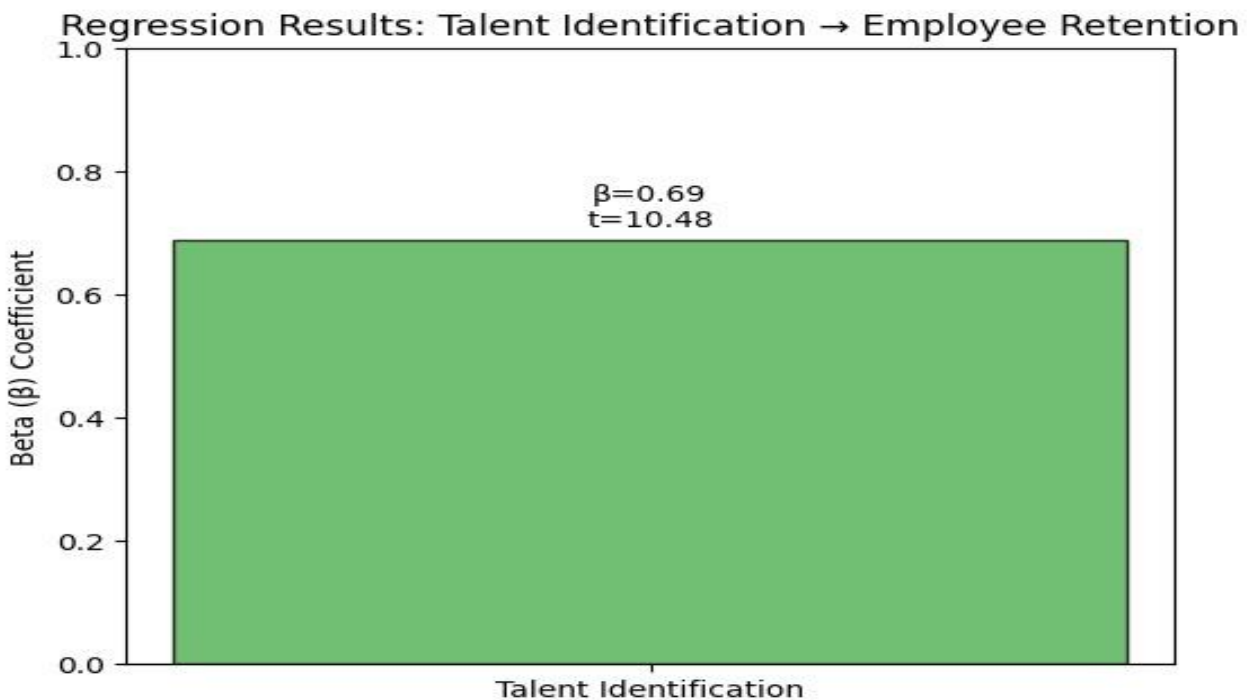
**Table 4: Regression Results: Talent Identification and Employee Retention**

| Predictor             | Beta ( $\beta$ ) | t-value | Sig. |
|-----------------------|------------------|---------|------|
| Talent Identification | 0.69             | 10.48   | .000 |
| $R^2 = 0.48$          |                  |         |      |

The findings showed that the relationship between talent identification and employee retention are strong and statistically significant ( $0.69, p < .001$ ). This implied that the better organizations identified and placed talent, the greater the commitment rates and lower the levels of turnover intentions among employees. The  $R^2$  value of 0.48 indicated that talent identification practices explained close to half the variance of retention of employees. This result highlighted the strategic

value of talent identification precision in terms of promotion of a stable workforce in the long run. These findings suggested that AI-supported talent identification indirectly led to retention outcomes because of guaranteed role fit, career fit, and job satisfaction.

**Figure 4: Regression Results: Talent Identification and Employee Retention**



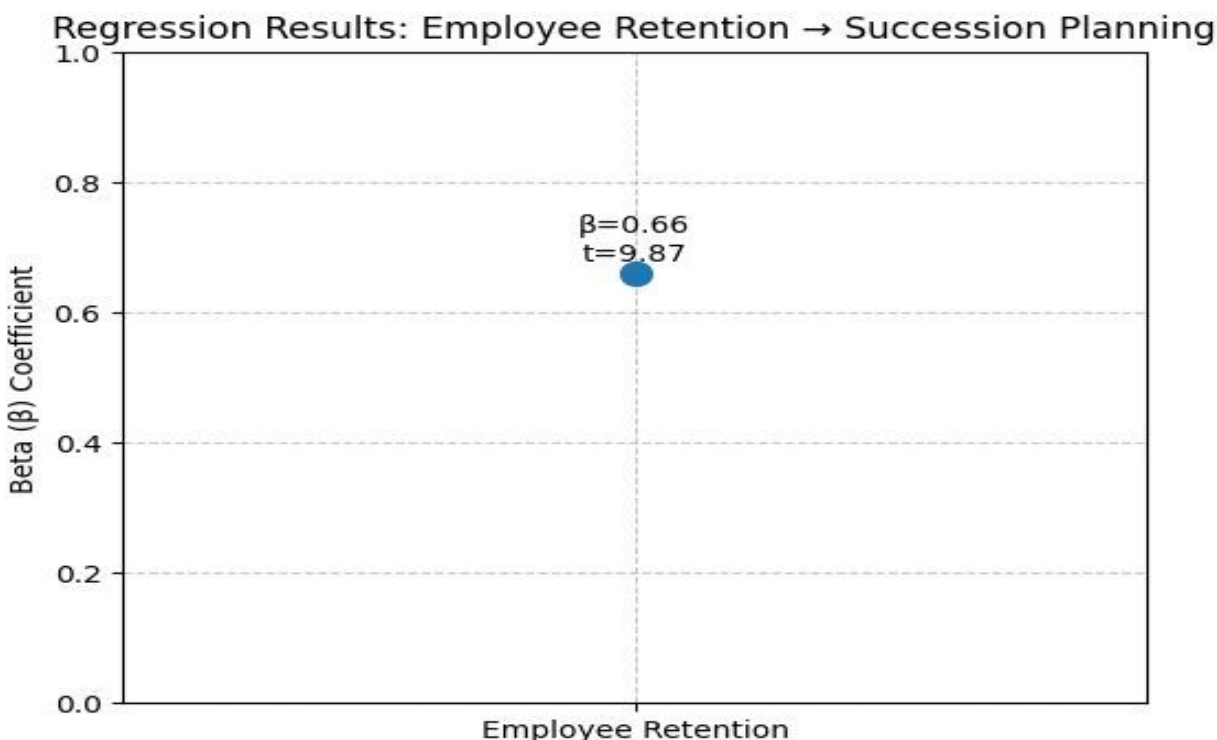
#### Regression Analysis: Impact of Employee Retention on Succession Planning

Regression analysis was conducted to determine the effect of employee retention on succession planning effectiveness.

**Table 5: Regression Results: Employee Retention and Succession Planning**

| Predictor          | Beta (β) | t-value | Sig. |
|--------------------|----------|---------|------|
| Employee Retention | 0.66     | 9.87    | .000 |
| $R^2 = 0.44$       |          |         |      |

Retention of employees showed a strong positive impact on succession planning ( $\beta = 0.66$ ,  $p < 0.001$ ) meaning that retaining skilled employees enhanced internal promotion lines and leadership. This was because the  $R^2$  value of 0.44 has shown that a significant proportion of variance in succession planning outcome was explained by retention. This observation accentuated the need to have a stable and engaged working group in order to develop sound leadership. This indicated a sequential interaction, where artificial intelligence increased talent identification, talent identification increased retention, and retention increased succession planning according to the results. This empirical trend informed the conceptual framework of the study as well as confirmed the strategic worth of AI driven talent management systems.

**Figure 5: Regression Results: Employee Retention and Succession Planning**

## Discussion

The outcome of the current study proved that the implementation of artificial intelligence (AI) had a significant and positive correlation between the results of talent identification, which aligns with the general conclusions that AI-based HR systems contributed to the improvement of recruitment frameworks, attributed to the increase in efficiency, objectivity, and the quality of matches. Applicant tracking systems, predictive screening models, and other AI-enabled applications were used to generate data-driven insights that complemented HR-defined processes, thereby increasing the likelihood of identifying high-potential candidates (Murmu, 2025). These results supported the empirical trends observed in the research, which indicate that AI technologies automate resume screening, reduce time-to-hire, and enhance operational precision compared to traditional manual methods (Ahmed, 2025). A close relationship between AI implementation and talent identification may indicate that the organisations have already commenced transitioning to analytical recruitment frameworks that rely less on subjective judgment and more on algorithmic decision support.

Applying the effect of AI-enhanced talent identification on retention, the research revealed a strong positive correlation, indicating that organisations with a robust talent identification process achieved higher retention. This aligns with findings suggesting that data-driven HR practices, especially predictive analytics, help organisations predict employee exits and proactively develop retention efforts (Basnet, 2024). By analysing historical workforce data, the AI models identified disengagement patterns, turnover rates, and gaps in career progression, enabling earlier interventions and targeted delivery of engagement programs (MDPI, 2025). These results support the view that predictive HR analytics experts not only complement recruitment but also complement longer-term retention plans by enabling prompt support for employees at risk of leaving the company.

The strategic importance of workforce stability was captured by the positive effect of employee retention on succession planning observed in this research. Organisations that retained their good employees over time had more opportunities to predict and meet leadership continuity requirements, which benefits well-organised succession pipelines. This finding aligns with research identifying AI as a source of continuous talent growth and labour forecasting, enabling smart insights into career paths, performance patterns, and potential leaders (Appoh, 2025). The results of AI-aided systems indicate that those employees showed high leadership potential, and HR specialists facilitated the development of specific plans to build on that potential, thereby directly improving retention stability and strengthening succession processes.

Despite these positive contributions, there were many challenges and ethical issues that could not be overlooked in implementing AI in talent management. The literature warned that algorithmic bias, privacy, and data transparency would erode fairness and trust among employees if AI systems were implemented without proper governance (Mujtaba and Mahapatra, 2024). These difficulties highlighted that although AI enhanced efficiency and strategic orientation, it was also important to maintain strong ethical oversight, clear model interpretation, and human involvement in the HR decision-making process. In the absence of these protective mechanisms, AI tools would be prone to producing biased results or demoralising the organisation, particularly when HR practitioners and employees feel overlooked in the development and use of AI products.

Another facet that emerged from the literature was HR skills for interpreting and managing AI systems. There were indications that, to successfully implement AI-related policy recommendations, HR professionals needed to be upskilled in AI (SA Journal of HRM, 2025). These calls for greater digital literacy indicated that AI use had more to do with organisational change that demanded significant training, cross-functional cooperation, and cultural change. Finally, the integration of AI into talent management relied on aligning algorithmic power with human judgment to avoid AI replacing the human element, a paramount requirement for HR functions.

## Conclusion

The research provided empirical evidence indicating that artificial intelligence plays a critical role in talent identification, employee retention, and succession planning in modern organisations. The results indicated that AI implementation improved the talent identification process by increasing accuracy, objectivity, and efficiency in the experience of identifying high-potential employees. Also, talent identification had a positive effect on employee retention, demonstrating that bottom-up HR procedures promoted engagement and reduced turnover. Retention, in turn, enhanced succession planning, aligned with leadership continuity, and strengthened talent pipelines. On balance, the findings affirmed AI's progressive role in contemporary talent management and its transformative impact, shifting HR operations from conventional human judgment to predictive, data-driven decision-making.

## Recommendations

To use AI-based HR technology, it is important to introduce it in an organised way to facilitate recruitment, retention, and succession planning. The training programs are expected to improve AI literacy among HR professionals, enabling them to understand algorithmic results and translate that knowledge into relevant workforce strategies. The systems should ensure transparency, fairness, and trust among employees in AI-enabled systems, which is possible through ethical governance structures. Firms must also use predictive analytics to anticipate retention risks, initiate

individual engagement programs, and oversee talent pipelines to fill leadership gaps. Lastly, organisations can also be encouraged to consider human oversight alongside AI systems, and the recommendations of algorithms should not override managers' decisions but rather be reviewed to support them.

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