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ARTIFICIAL INTELLIGENCE IN DIGITALIZATION OF HUMAN RESOURCE MANAGEMENT - ELEVATING A SUSTAINABLE WORKFORCE: A QUANTITATIVE STUDY IN THE STATES OF ANDHRA PRADESH AND TELANGANA

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Abstract

Purpose: The integration of Artificial Intelligence (AI) into Human Resource Management (HRM) is fundamentally reshaping organizational practices. This study aims to quantitatively investigate the adoption levels, perceived impact, and challenges of AI-driven HRM digitalization in the context of developing a sustainable workforce. The research is specifically focused on the rapidly growing IT and IT-enabled sectors in the South Indian states of Andhra Pradesh and Telangana.

Design/Methodology/Approach: A cross-sectional quantitative research design was employed. Data was collected through a structured online questionnaire from 412 HR professionals and mid-to-senior level managers across 87 companies in Hyderabad, Visakhapatnam, and Amaravati. The survey instrument measured four key constructs: AI Adoption Level, Perceived Impact on HR Functions, Perceived Contribution to Workforce Sustainability, and Implementation Challenges. Data analysis was conducted using descriptive statistics, correlation analysis, and multiple linear regression in SPSS v.27.

Findings: The results indicate a moderate level of AI adoption in HRM, with significant variation between large multinational corporations and small and medium enterprises (SMEs). Talent Acquisition and Analytics were the most adopted functions. A strong positive correlation ($r = 0.78, p < 0.01$) was found between the level of AI adoption and its perceived contribution to building a sustainable workforce, particularly in enhancing employee skills and engagement. Key challenges identified include high implementation costs, data privacy concerns, and a significant skills gap among HR professionals.

Originality/Value: Within the specific socioeconomic context of Andhra Pradesh and Telangana, this study is among the first to present empirical, quantitative evidence on AI in HRM. It contains relevant information that helps legislators, entrepreneurs, and human resources professionals in these states develop plans for utilizing AI to create a workforce that is sustainable and prepared for the future.

Keywords: Artificial Intelligence, Human Resource Management, Digitalization, Sustainable Workforce, Quantitative Research, Andhra Pradesh, Telangana.

1. Introduction

Across industries, the digitalization of core business functions has accelerated markedly over the past decade, with Human Resource Management (HRM) emerging as a particularly active site of technological investment. Driven largely by advances in information systems, HRM has evolved from a predominantly administrative function into a strategic organizational partner (Strohmeier & Piazza, 2013). Artificial Intelligence (AI) represents the most recent and consequential phase of this evolution, extending HRM's capacity to automate routine tasks, generate predictive insights, and deliver personalized employee experiences at scale (Tambe et al., 2019).

Central to this trajectory is the concept of a "sustainable workforce" — one that remains productive, engaged, and adaptable over time in the face of shifting organisational demands (Ehnert et al., 2016). AI has emerged as a key enabler of this sustainability, with demonstrated applications in identifying skill gaps, forecasting employee attrition, and delivering targeted well-being interventions.



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Andhra Pradesh and Telangana present a particularly instructive context for examining these dynamics. Telangana hosts a significant concentration of technology firms; its capital Hyderabad — widely referred to as “Cyberabad” — has established itself as one of India’s foremost global IT hubs. The adjacent state of Andhra Pradesh is pursuing an ambitious digital agenda anchored by its emerging capital at Amaravati and the expanding IT corridor in Visakhapatnam. Both states are actively competing to attract foreign investment and cultivate a technology-ready workforce, positioning HRM digitalization as a strategic priority.

Despite a substantial body of global literature on AI in HRM, empirical, quantitative research examining its adoption and effects within specific Indian regional economies remains limited. The present research addresses this gap by investigating the following research questions:

- RQ1: To what extent have organisations in Andhra Pradesh and Telangana integrated AI into their HRM processes?
- RQ2: What is the perceived impact of AI adoption on core HR functions and on the development of a sustainable workforce?
- RQ3: What organisational and contextual factors constitute the primary barriers to AI-driven HRM implementation?

The remainder of the paper is structured as follows: a review of pertinent literature, a detailed methodology, the presentation of results, a discussion of findings, and conclusions with implications for practice and policy.

2. Literature Review

2.1 The Digitalization of HRM and the Rise of AI

The digitalization of HR began with Human Resource Information Systems (HRIS), which automated payroll processing and personnel record management. This foundation gave way to cloud-based Human Capital Management (HCM) suites capable of integrating multiple functions within a single platform. Artificial intelligence (AI) represents the logical progression beyond automation, extending into augmentation and prediction. Increasingly referred to as “HR Analytics 2.0” or “Talent Intelligence,” AI-enabled HRM draws on machine learning (ML), natural language processing (NLP), and robotic process automation (RPA) to enhance the quality and speed of organisational decision-making (Marler & Boudreau, 2017).

2.2 AI Applications in Key HR Functions

- **Talent Acquisition:** AI-powered technologies can reduce unconscious bias, screen thousands of resumes, find candidates from digital footprints, employ chatbots for preliminary screening, and increase the diversity and quality of hires (Black & van Esch, 2020).
- **Learning and Development (L&D):** AI can be used in learning and development (L&D) to create individualized learning pathways, suggest courses based on skill gaps, and employ adaptive learning platforms that modify content according to an employee's comprehension and speed.
- **Performance Management:** AI-powered tools for continuous performance monitoring can give managers and staff members immediate feedback and encourage them to act in a productive manner.
- **Employee Engagement and Retention:** Through sentiment analysis of internal communications, pulse surveys, and exit interviews, AI enables organisations to identify factors affecting employee morale and forecast attrition, supporting timely and proactive retention interventions.

2.3 AI and Workforce Sustainability

A sustainable workforce is adaptable, resilient, and always changing. AI supports sustainability in the following ways:

- **Future-Proofing Skills:** By using predictive analytics to predict future skill needs, businesses can proactively fund upskilling and reskilling initiatives (Jaiswal et al., 2022; Tambe et al., 2019).



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- **Improving Well-Being:** By examining work schedules, email correspondence, and leave trends, AI can spot burnout patterns and inspire wellness programs (Valtonen et al., 2025; Chanthati, 2022).
- **Promoting Diversity and Inclusion:** One of the main tenets of social sustainability is fostering diversity and inclusion in the workplace, which AI can assist in achieving by standardizing procedures and minimizing human bias (Charlwood & Guenole, 2022; Black & van Esch, 2020).

2.4 The Regional Context: Andhra Pradesh and Telangana

The bifurcation of the former Andhra Pradesh in 2014 produced two distinct states sharing a common heritage but pursuing divergent developmental trajectories. Telangana has capitalised on Hyderabad's well-established technology infrastructure, whereas Andhra Pradesh has undertaken the construction of an entirely new innovation ecosystem, anchored by the nascent capital Amaravati and the expanding IT corridor in Visakhapatnam. Both governments have enacted targeted technology adoption policies — Andhra Pradesh's IT Policy and Telangana's ICT Policy respectively — in order to stimulate investment and workforce development. These conditions render the two states effective living laboratories for investigating the diffusion of emerging technologies such as AI within HRM.

3. Methodology

3.1 Research Design

The research adopted a quantitative, deductive approach grounded in a positivist philosophical orientation. A cross-sectional survey design was employed to capture data from a broad organisational sample at a single point in time (February–April 2024), enabling systematic measurement of the constructs of interest.

3.2 Population and Sampling

The target population comprised HR professionals (managers, directors, and vice presidents) and line managers with responsibility for people management decisions in IT/ITeS companies operating in Hyderabad (Telangana), Visakhapatnam, and Amaravati (Andhra Pradesh).

A non-probability purposive sampling technique was adopted to ensure that all respondents possessed direct familiarity with their organisation's HR technology environment. The sampling frame was constructed from the membership directories of the Andhra Pradesh Electronics & IT Agency (APEITA) and the Hyderabad Software Enterprises Association (HYSEA). A total of 600 survey invitations were distributed; following two rounds of follow-up, 412 valid and complete responses were received, yielding a response rate of 68.67%.

3.3 Data Collection Instrument

A structured online questionnaire was developed from the literature review and comprised four sections:

- 1. Demographic Data:** State, industry, respondent designation, and company size.
- 2. AI Adoption Level (12 items):** Assessed for a variety of HR functions (e.g., "To what extent does your organization use AI for resume screening?") using a 5-point Likert scale (1 = Not at all, 5 = Extensively).
- 3. Perceived Impact (10 items):** A 5-point Likert scale (1 being strongly disagree and 5 being strongly agree) is used to measure the perceived impact (10 items) on decision-making, efficiency, and employee experience (e.g., "AI has improved the speed of our recruitment process").
- 4. Implementation Challenges (8 items):** Cost, data quality, resistance to change, and other factors are measured on a 5-point Likert scale (1 being not a challenge and 5 being a major challenge).



A subset of six items from the "Perceived Impact" section served as the basis for the construct for "Perceived Contribution to Workforce Sustainability," which focused on outcomes such as skill development, retention, and well-being.

The questionnaire's wording was slightly improved after it was pre-tested with 25 HR managers and validated by three academic HRM specialists. High internal consistency reliability was indicated by Cronbach's Alpha, which was above 0.8 for all multi-item constructs.

3.4 Data Analysis

Outliers and missing values were removed from the gathered data. SPSS software (Version 27) was used for the analysis.

1. **Descriptive Statistics:** To summarize demographic information and the central tendency of all constructs, frequencies, means, and standard deviations were computed.

2. Inferential Statistics:

- **Independent Samples t-test:** To compare the mean scores of AI adoption and perceived impact between large and small businesses in Andhra Pradesh and Telangana.
- **Pearson Correlation Analysis:** To investigate the connection between the degree of AI adoption and the perceived sustainability of the workforce.
- **Multiple Linear Regression:** To determine which obstacles were the most important indicators of a lower adoption rate of AI.

4. Results

4.1 Demographic Profile of Respondents

Of the 412 responders, 42% were from Andhra Pradesh-based businesses and 58% were from Telangana-based businesses. 45% of the companies were large (>500 employees), 35% were medium-sized (100-500 employees), and 20% were small (<100 employees). 35% of respondents were department heads or line managers, and the majority (65%) held senior HR positions (manager and above).

4.2 Level of AI Adoption in HRM

On a scale of 1 to 5, the overall mean score for AI adoption was 2.89, which denotes a moderate level of adoption. The Talent Acquisition domain had the highest adoption rate (M=3.45, SD=1.12), especially for candidate sourcing and resume screening. The second most popular area was HR Analytics (M=3.20, SD=1.05). Lower adoption rates were seen for functions such as L&D (M=2.65, SD=1.10) and Performance Management (M=2.50, SD=1.18).

The adoption levels of SMEs (M=2.25, SD=0.87) and large companies (M=3.40, SD=0.91) differed statistically significantly ($t(410) = 4.32, p < 0.001$), according to an independent samples t-test. Although Telangana's mean (M=2.95) was marginally higher than Andhra Pradesh's (M=2.80), the two states' differences were not statistically significant ($p > 0.05$).

Table 1: Descriptive Statistics for AI Adoption by HR Function

HR Function	Mean Score	Standard Deviation	Rank
Talent Acquisition	3.45	1.12	1
HR Analytics	3.20	1.05	2



Payroll Administration	&	2.95	1.21	3
Learning Development	&	2.65	1.10	4
Performance Management		2.50	1.18	5
Overall Mean		2.89	0.95	

4.3 Perceived Impact and Contribution to Workforce Sustainability

AI was thought to have a significant impact on HR efficiency (M=3.80, SD=0.88). The respondents overwhelmingly agreed that AI had automated routine tasks and shortened time-to-hire.

Most significantly, the composite score of **AI Adoption Level** and the composite score of **Perceived Contribution to Workforce Sustainability** showed a strong positive Pearson correlation ($r = 0.78, p < 0.001$). This suggests that a greater conviction that AI is contributing to the development of a sustainable workforce is linked to higher adoption levels of AI. "Identifying skill gaps for training" (M=3.90, SD=0.82) and "Improving data-driven decision making" (M=3.85, SD=0.90) were the specific sustainability aspects with the highest agreement scores.

4.4 Challenges in Implementation

The following were the top three difficulties found:

1. **High Implementation Cost** (M=4.25, SD=0.80)
2. **Data Security and Privacy Issues** (M=4.10, SD=0.85)
3. **HR professionals' inability to use AI tools** (M=4.05, SD=0.91)

"**Resistance to change from employees**" (M=3.75, SD=0.96) and "**Poor data quality**" (M=3.60, SD=1.02) were two other noteworthy difficulties.

The "**Level of AI Adoption**" was predicted using a multiple regression analysis based on the main obstacles. With an R² of 0.287, the regression model was significant ($F(5, 406) = 28.14, p < .000$). The most significant negative predictors of adoption levels were "**Lack of HR Skills**" ($\beta = -0.28, p < .01$) and "**High Cost**" ($\beta = -0.32, p < .01$).

Table 2: Multiple Regression Analysis for Challenges Predicting AI Adoption

Predictor Variable	Unstandardized B	Standard Error	Standardized β	t-value	p-value
(Constant)	4.120	0.215	19.163		<.001
High Cost	-0.315	0.058	-0.320	-5.431	<.001



Lack of HR Skills	-0.275	0.052	-0.280	-5.288	<.001
Data Privacy Concerns	-0.180	0.049	-0.175	-3.673	<.001
Resistance to Change	-0.095	0.047	-0.095	-2.021	0.044
Poor Data Quality	-0.088	0.051	-0.080	-1.725	0.085

Dependent Variable: Level of AI Adoption. $R^2 = .287$, Adjusted $R^2 = .275$

5. Discussion

The findings presented here offer a granular, empirically grounded account of AI’s penetration into HRM practice across two of India’s most technologically active states. The moderate overall adoption score ($M=2.89$) indicates that while AI is present on the strategic agenda of most sampled organisations, widespread integration remains nascent — a pattern consistent with global accounts of cautious HR technology experimentation (Brock & von Wangenheim, 2019).

Although expected, the notable adoption gap between SMEs and large corporations is crucial. It draws attention to a possible "AI divide" in which bigger companies with more resources move more quickly and might obtain a sizable competitive edge in the talent war. This emphasizes the necessity of vendor-led solutions and policy changes to increase AI’s affordability and accessibility for SMEs.

The most theoretically significant result is the strong positive correlation ($r = 0.78$) between AI adoption levels and perceived workforce sustainability. This association lends empirical weight to the theoretical claim that AI functions as a key enabler of organisational resilience and agility. By supporting skill gap identification and enabling personalised learning pathways, AI directly contributes to what Ehnert et al. (2016) identify as the ongoing employability and adaptability that lie at the core of workforce sustainability.

The barrier data are equally instructive. Implementation cost is a well-documented obstacle to technology adoption generally, but the prominence of **lack of skills among HR professionals** and **data privacy concerns** among the top-ranked barriers signals that the challenge is not solely financial but is equally human and ethical in nature. This points to two immediate priorities:

- Upskilling HR Professionals:** transitioning HR practitioners from conventional administrators into “AI-literate” strategic partners capable of deploying AI tools, interpreting analytical outputs, and navigating ethical challenges.
- Creating Robust Governance Frameworks:** To foster employee trust and adhere to changing legal requirements, businesses must set up explicit policies on data ethics, privacy, and algorithmic bias.

Contrary to initial expectations, adoption levels did not differ significantly between Andhra Pradesh and Telangana ($p > 0.05$). Rather than reflecting equivalent baseline infrastructure, this convergence more plausibly reflects Andhra Pradesh’s policy-driven technology diffusion trajectory — an accelerated adoption dynamic facilitated by strong government investment and inter-state competitive pressure.



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6. Conclusion and Implications

6.1 Conclusion

The evidence presented here confirms that AI is meaningfully reshaping the HR landscape in Telangana and Andhra Pradesh, with particularly pronounced uptake in talent acquisition and analytics. Its adoption is closely bound to the strategic objective of building a future-ready, sustainable workforce. Substantial obstacles nonetheless remain — spanning financial constraints, ethical governance deficits, and human capital limitations — that will require coordinated intervention by organisations and policymakers alike.

6.2 Theoretical Implications

By contributing quantitative evidence from an understudied regional context, the present research extends the body of knowledge on technology adoption in HRM. Empirically linking AI adoption to workforce sustainability outcomes — a relationship that has been theorised but infrequently measured at a regional level — the findings both validate and refine existing conceptual models.

6.3 Practical Implications

- **For HR professionals:** Give special attention to developing analytical abilities within the HR group. Before growing, start with pilot projects in high-impact areas like hiring. Encourage the company to use AI in an ethical manner.
- **For Business Leaders:** Business leaders should see AI in HR as a strategic investment in the long-term sustainability of human capital rather than as a cost center. Provide funds for change management, ongoing education, and technology acquisition.
- **For Policymakers (AP and TS State Governments):** Create incentive programs (such as tax breaks or subsidies) to promote SMEs' adoption of AI. Develop standardized certification programs in partnership with academia and industry to help HR professionals advance their knowledge of AI and data analytics. Create think tanks to develop standards for the moral application of AI in the workplace.

6.4 Limitations and Future Research

The present research is subject to several limitations. The cross-sectional design precludes causal inference, and the exclusive focus on the IT/ITeS sector limits generalisability. Reliance on perceptual self-report measures, while standard in survey-based research, introduces potential response bias. Future investigations would benefit from longitudinal designs capable of tracking adoption trajectories over time, as well as the incorporation of objective performance indicators such as actual cost-per-hire or attrition rates. Extending the scope to include manufacturing, healthcare, and other industries would further enable meaningful cross-sector comparison.

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Appendix: Sample Survey Items

Construct: Adoption Level of AI (Sample Items)

Please rate how much your company uses AI for the following tasks on a scale of 1 (not at all) to 5 (extremely):

1. Automated shortlisting of candidates and resume screening.
2. Predictive analytics for the risk of employee attrition.
3. Recommendation engines for personalized learning.
4. Sentiment analysis of employee surveys and feedback.
5. HR helpdesk chatbots for employee inquiries.

Construct: Workforce Sustainability Perceived Contribution (Sample Items)

Please rate your agreement with the following statements on a scale of 1 (strongly disagree) to 5 (strongly agree):

1. AI tools have improved our organization's ability to predict future skill needs.
2. AI-powered solutions have raised worker satisfaction and engagement.
3. AI has made it possible for employees to follow more individualized career development paths.
4. We have proactively decreased employee turnover with the aid of AI analytics.

Construct: Difficulties with Implementation (Sample Items)

Please rank the following possible obstacles to integrating AI in HR in your company on a scale of 1 (not a challenge) to 5 (major challenge):

1. The initial outlay and continuing expenses.
2. Issues with the security and privacy of employee data.
3. Our HR department lacks technical expertise.
4. Our employees' opposition to change.
5. The AI tools' accuracy and dependability.