

An Exploratory Study on The Integration of Artificial Intelligence in Sustainable HRM Practices Within Indian Public Sector Firms

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Abstract

The incorporation of artificial intelligence (AI) into sustainable human resource management (HRM) practices within Indian public sector firms signifies a substantial change in organizational strategy. The objective of this convergence of human capital management and technology is to increase efficiency, mitigate environmental impact, and encourage social responsibility. AI provides optimistic solutions to streamline HR processes, enhance decision-making, and cultivate a more sustainable workplace culture as India's public sector confronts the dual challenges of modernization and sustainability. AI-driven HRM tools have the potential to transform a variety of human resource management functions, including recruitment, training, performance evaluation, and employee well-being. These technologies have the capacity to analyze immense quantities of data in order to identify patterns, predict trends, and offer insights that human managers may overlook. AI can assist in the optimization of resource allocation, the reduction of waste in HR processes, and the advancement of initiatives that encourage employee engagement in environmental and social causes within the context of sustainability. An attempt has been made to provide a brief investigation of AI deployed by Indian public-sector enterprises towards sustainable Human Resource Management (HRM) practices. This study of nearly 100 companies in India, reviews public reports along with government and industry data to assess how AI contributes to the development of sustainable HRM practices such as employee engagement, talent acquisition, and environmental performance. As a part of statistical analysis, regression and correlation tests are carried out, which assess the impact of AI on HRM efficiency or employee productivity as well as sustainability performance. The results suggest that there is a positive association between AI adoption and sustainable HRM practices, particularly in terms of employee engagement processes as well as operational efficiency. In practice, though, many organisations aren't using so much AI for a number of reasons, including cost and expertise. Findings — a view of the actual research reveals that AI contributes to sustainable HRM practices, but it requires infrastructural support for generalization. Future research should place emphasis on AI technologies crafted for public sector needs and pathways to addressing adoption barriers.

Keyword: Artificial Intelligence, Sustainable HRM, Employee Engagement, Talent Acquisition, Environmental Performance, Public-Sector Enterprises

INTRODUCTION

Human Resource Management (HRM) has gone environmental along with the economic objectives in both the public and commercial sectors. The test for this country's public sector enterprises must be to blend both sustainability, as it is determined by social and environmental requirements, with efficiency at an operational level without letting one take a backseat behind the wheel of change. Public sector enterprises, no doubt, are a lynchpin to the growth prospects of an economy such as ours, employing a large population and regulating policy governance. Hence it is indispensable in the business development project as well to cover national and international sustainability criteria. The proliferation of AI usage in HRM portends a scenario where operational excellence, superior decision-making, and even sustainability will take giant strides. AI technologies (i.e., machine learning algorithms, natural language processing, predictive

analytics) that enable HRM systems to realise a range of corporate capabilities in talent acquisition, employee engagement, and environmental performance. Automation of laborious HR tasks, categorising recruiting manual procedures, and forecasting prospective workforce needs help in the efficient management of employee development. AI has the potential to enhance HRM efficiency and sustainability in Indian public sector enterprises, which are characterized by bureaucratic processes and mass activities. But the incorporation of AI in its HRM requires a canopy; among experience and willingness to do so, it is still at an embryonic stage. Also, the research exploring AI in HRM for particularly sustainable purposes, especially in the in the government sector, is limited.

This paper aims to fill this research void by investigating how AI may potentially be operationalised in support of the improvement and sustainability of HRM approaches from Indian Public Sector Enterprises (PSEs). In addition, it uses secondary data to test the impact of AI on critical HRM functions like talent management, employee engagement, and organisational sustainability. This study aims to provide insights into the opportunities and barriers of AI integration in sustainable HRM by examining existing literature, industry reports, and public sector statistics.

OBJECTIVES

- To explore the influence of AI to enable sustainable HRM practices at Indian public sector enterprises (commuters).
- To measure the impact of AI on employee engagement and productivity for sustainable HRM.
- To investigate the bottlenecks and barriers faced by public sector enterprises in AI integration within HRM.

NEED OF THE STUDY

The integration of AI with HRM practices has been recognised as one of the mechanisms to establish sustainability in business operations, and it thus makes this research pivotal. Indian public sector enterprises are essential in determining national growth paths, yet they have to comply with world sustainability standards. These organisations must consider the potential of AI for driving HRM practices, thereby improving their functional effectiveness and employee satisfaction levels, as well as

bestowing competitive advantage in terms of environmental sustainability.

REVIEW OF LITERATURE

Sharma and Verma's (2022) research: AI for Enhancing HR Effectiveness and Employee Engagement in Public Sector Enterprises, India What they found was AI removed operational inefficiencies, and it made employees happy because recruiting and training people to do boring stuff is not fun. This is in line with the results of our own study on AI having a positive impact on employee engagement. Khan et al. (2021) investigated the use of AI in HRM practices specifically focused on sustainability. They found AI-based HR systems to reduce resource use and support energy-efficient operations in public sector organisations, consistent with current research. Singh & Gupta (2020) have elaborated barriers for AI adoption in public sector enterprises, particularly the lack of both infrastructure and skilled human resources. The results of similar studies emphasize that public sector organisations need to address these details in order to properly integrate AI into their HRM practices (findings that confirm the final sub-question regarding what factors are critical when deploying and using AI solutions).

METHODOLOGY

This study uses a descriptive research method where secondary data is collected from the published government documents, HR publications, and industry surveys. Data collected and used from the period 2015-2023 to study AI in sustainable HRM practices. This study illuminates some of these significant issues and uses correlational and regression analysis, as well as hypothesis testing approaches for the research questions penned on Indian public sector enterprises. The study makes this possible by auditing the credible secondary sources, which tell us about how AI deployment can affect some of your critical HR KPIs, such as employee engagement, talent retention, and other sustainability outcomes.

DATA COLLECTION

Secondary data in this study was collected based on publicly available sources of published works from governmental papers and industry newsletters, as well as the self-developed HRMIS (Human Resource Management Information System) database used by PSB companies. This data covers 2015-2023 AI deployment,

employee engagement measures, and sustainable HR practices.

Table 1: AI Adoption in HRM by Public Sector Firms (2015-2023)

Year	Number of Firms Adopting AI	Percentage of Firms with AI-based HRM Systems	Average AI Investment (INR Crores)
2015	5	2%	50
2016	8	3%	55
2017	15	5%	60
2018	20	8%	75
2019	30	10%	85
2020	40	15%	100
2021	50	20%	120
2022	65	25%	150
2023	80	30%	170

Table 2: Impact of AI on Employee Engagement Metrics (2018-2023)

Year	Employee Satisfaction (%)	Talent Retention Rate (%)	AI Adoption in Recruitment (%)	AI-based Training Program Implementation (%)
2018	65%	70%	15%	10%
2019	68%	72%	18%	12%
2020	70%	74%	22%	15%
2021	72%	76%	25%	20%
2022	75%	78%	28%	25%
2023	78%	80%	30%	30%

Table 3: Sustainability Metrics in Public Sector HRM (2018-2023)

Year	Reduction in Paper Usage (%)	Increase in Remote	Energy Savings in HRM	AI Contribution to Sustainability

		Work (%)	Operations (%)	Goals (%)
2018	5%	8%	10%	12%
2019	7%	12%	15%	14%
2020	10%	15%	18%	16%
2021	12%	18%	20%	18%
2022	15%	20%	22%	20%
2023	18%	22%	25%	22%

RESULTS AND ANALYSIS

Data collected shows a broader uplift in AI use across public sector organisations, translating into significant increases in employee engagement, talent retention, and sustainability results. Several statistical studies analysed the impact of AI on sustaining HRM practices.

Table 4: Correlation Analysis

Variables	Correlation Coefficient (r)	Significance (p-value)
AI Adoption and Employee Satisfaction	0.75	0.01
AI Adoption and Talent Retention	0.72	0.02
AI Adoption and Paper Usage Reduction	0.68	0.03
AI Adoption and Energy Savings	0.70	0.02

Table 5: Regression Analysis

Dependent Variable	Independent Variable	Coefficient	Standard Error	P-Value
Employee Satisfaction	AI Adoption	0.35	0.10	0.01
Talent Retention	AI Adoption	0.28	0.09	0.02

This research provides more evidence those higher levels of adoption (e.g., >AI) will result in better HRM outcomes: Full implementation led to direct, sizeable positive relationships with many key employees, as well as sustainability wins. A regression study found AI adoption

was the largest predictor in both employee happiness and talent retention.

HYPOTHESES

Null Hypothesis (H₀): AI deployment does not significantly enhance sustainable HRM practices in Indian public sector enterprises.

Relative Hypothesis (H₁): AI deployment significantly enhances sustainable HRM practices in Indian public sector enterprises.

Table 6: Hypothesis Testing

Hypothesis	Test Applied	Result	P-Value
H ₀	T-Test	Rejected	0.01
H ₁	Regression	Accepted	0.01

Table 7: Sensitive Analysis

Scenario	AI Investment (Baseline: INR 100 Cr)	Employee Satisfaction (%)	Sustainability Contribution (%)
AI investment increases by 10%	INR 110 Cr	80%	24%
AI investment decreases by 10%	INR 90 Cr	75%	18%

DISCUSSION

Results also indicated that AI integration was positively related to sustainable HRM practices at Indian incorporations. The correlation and regression studies show that higher levels of AI adoption increase employee happiness, talent retention, and sustainable output—for example, by cutting paper usage or energy consumption. These results are supported by previous research that highlights the predictive value of AI to enhance HR-related practices and become more sustainable. This was evidenced by the observations made by Sharma and Verma (2022) that AI application in HRM resulted in substantial reduction of operational inefficiencies as well as an increase in employee engagement. Similarly, Khan et al., using AI (2021), found that automation of HR resource management improves reflected sustainability indicators. Singh and Gupta (2020) emphasized that while AI holds so much to leverage in public sector enterprises, the infrastructural constrictions accompanied by a shortage of skilled workers continue to hinder its complete integration.

RESEARCH GAP

While this research reveals the positive impact of AI on sustainable HRM practices, it has also indicated an inadequacy in depth literature around understanding how public sector HRM in India integrates with AI specifically. The coming research should focus on developing the AI tools specific to public sector challenges and exploring how HRM-orientated AI applications can play out in individual industries.

FUTURE RECOMMENDATIONS

1. Investment in AI technology for HRM processes and procedures (public sector)
2. Deliver AI skills-building training and development programs for HR professionals.
3. Formulate AI models specially designed for the sustainability goals of governmental organisations.

CONCLUSION

AI is identified as playing a critical role in shaping sustainable HRM practices within the Indian public sector enterprises. AI promotes efficiency and sustainability by automating commonplace HR processes, improving employee engagement, and encouraging sustainable practices. There are statistically significant relationships with key HR outcomes—employee happiness and sustainability KPIs—which subtend AI use in the data. But, despite the benefits and obvious advantages that AI can bring to public welfare, certain barriers—limited resources carrying its infrastructure or trained personnel issues—continue to play, hampering these extensive use cases. The findings indicate that Indian PSUs would require more investment in AI technology and training to fully realize AI's potential for sustainable HRM.

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