

Role of AI in Workforce Planning: Review and Implications

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Abstract

The business world and organizations are at a crucial point in time, undergoing a series of transformations in how they operate as artificial intelligence (AI) is becoming more prevalent. The utilization of artificial intelligence in organizational operations has doubled since 2017, mainly due to its ability to meet specific organizational needs (McKinsey & Company, 2022). The rapidly evolving labor market is increasing the pressure on companies to align their business operations with the latest technological advances to stay competitive. Specifically, spreadsheet-driven workforce planning proves no longer sufficient in the dynamic and distributed nature of modern human resource (HR) management, characterized by hybrid work models, the gig economy, and rising employee expectations that all pose significant challenges for HR departments (Vitale & Oluwagbade, 2024).

The utilization of AI in workforce planning has grown over several decades, with pioneering work in the 1970s laying the foundation for today's advancements. Sally McClean's (1976) doctoral dissertation, "Stochastic Models of Manpower Planning Applied to Several British and Irish Firms," was among the first to use computational methods for workforce modeling. Although not AI in the contemporary sense, the study paved the way for future explorations of AI in workforce planning. Later in the 1990s, the U.S. military Dynamic Analysis and Replanning Tool (DART) implemented AI to optimize logistics and personnel deployment, serving as an example of the application of AI in workforce-related strategy.

Today, AI offers a range of applications for strategic workforce planning, from automation of repetitive tasks to predictive analysis of workload, improved employee engagement, and higher retention rates. For example, Natural Language Processing (NLP) tools now assist HR specialists in the early stages of recruitment, reducing their administrative burden (Kaminski et al., 2023). As AI grows more sophisticated and is integrated into HR functions, there is a growing need for a comprehensive analysis of the current literature to understand the current phase of the field and potential pathways for future studies.

This systematic literature review examines the current academic literature to answer the following question: What opportunities and challenges does AI introduce in revolutionizing workforce planning within HR? By analyzing 13 academic publications from 2017 to 2025, this study attempts to answer the above question and provides an extensive overview with prospects for future application and exploration.