

Workforce planning optimization utilising AI to improve firm performance: a systematic literature review using VOSviewer

Febri Egasmara, Agus Rahayu, Lili Adi Wibowo, Rofi Rofaida,
Alfira Sofia and Azizah Fauziyah
Indonesia University of Education, Bandung, Indonesia

Abstract

Purpose – Workforce planning is a crucial component of strategic human resource management (HRM) to ensure organisations have the right talent at the right time to achieve strategic goals. The rapid development of artificial intelligence (AI) offers new opportunities to optimise workforce planning by enabling data-driven and analytical decision-making, as well as improving efficiency, accuracy and responsiveness. At the same time, AI adoption raises human-centric concerns such as employee well-being, job security and data ethics. This study aims to explore the dual role of AI in workforce planning by examining both its contributions to firm performance and its implications for employees.

Design/methodology/approach – A systematic literature review (SLR) following PRISMA (identification, screening, eligibility, inclusion). Literature was collected from Scopus, Web of Science, IEEE Xplore and Google Scholar for English-language studies (2014–2024) on AI in workforce planning and its links to firm/organisational performance. After deduplication and screening, 50 articles were analysed in depth. Bibliometric mapping (VOSviewer) was combined with thematic coding.

Findings – The results reveal five dominant themes: demand forecasting, workforce scheduling, skill gap analysis, recruitment and employee retention. Across these areas, AI enhances predictive accuracy, resource allocation and organisational flexibility. However, emerging concerns include algorithmic bias, job insecurity, labour relations and employee well-being. This indicates that AI adoption represents not only a technical improvement but also a socio-organisational transformation.

Originality/value – Unlike earlier reviews that primarily emphasised efficiency, this study highlights the shift towards human-centric issues, including fairness, ethics and labour governance. It also contributes methodologically by combining bibliometric mapping with thematic coding to quantify theme prevalence and validate findings.

Keywords Workforce planning, Artificial intelligence (AI), Firm performance, Employee well-being

Paper type Literature review

1. Introduction

In a competitive and dynamic business world, workforce planning is one of the strategic aspects that determine the success of a company (Bassi and McMurrer, 2016). Workforce planning includes the process of identifying, managing and optimising human resources to meet current and future business needs (Minbaeva, 2020). The effectiveness of workforce planning greatly affects a company's operational efficiency, productivity and ability to achieve its strategic goals (Stone *et al.*, 2015). However, the challenges of workforce planning have become more complex in the digital era, especially with market uncertainty, changing skill requirements and the limitations of traditional tools in predicting labour needs (Manyika *et al.*, 2017). To address these challenges, artificial intelligence (AI) has emerged as a technology



that can optimise the workforce planning process (Brynjolfsson and McAfee, 2017). AI has the ability to analyse large amounts of data, predict workforce needs and provide data-driven solutions that are faster and more accurate than traditional methods (Davenport and Ronanki, 2018). Studies show that the application of AI in workforce planning can improve the quality of strategic decisions, operational efficiency and organisational flexibility (Zhang and Liu, 2020; Naim and Lenka, 2017). AI enables companies to project workforce needs based on market trends, identify skills gaps and optimise workforce scheduling (Huang and Rust, 2021; Paschen *et al.*, 2020). This not only helps companies respond more proactively to change but also directly contributes to improved firm performance, including profitability, innovation and customer satisfaction (Kaplan and Haenlein, 2019; Wilson *et al.*, 2017). Alongside these benefits, organisations must also recognise the human-centric challenges of AI adoption, including employee well-being, job security and ethical use of workforce data. Workforce planning strategies need to address not only efficiency but also the social and psychological implications for employees.

This article conducts a systematic literature review (SLR) to explore the utilisation of AI in workforce planning and its contribution to enhancing firm performance. By analysing relevant literature, this study aims to identify the primary roles of AI in workforce planning, its impact on organisational performance and the challenges and opportunities in its implementation. Through the SLR approach, this article offers a comprehensive understanding of how AI can serve as a strategic tool to help businesses achieve competitive advantage in the digital era. This approach also emphasises the importance of integrating AI technology with human resource management (HRM) practices to build organisations that are more adaptive, efficient and sustainable in the future.

2. Literature review

Workforce planning has long been recognised as a strategic human resource management (HRM) tool to align talent with organisational goals (Bassi and McMurrer, 2016; Minbaeva, 2020). Traditional workforce planning, however, faces challenges in predicting labour needs amid volatile markets and shifting skill demands (Stone *et al.*, 2015). AI has emerged as a transformative enabler by offering predictive analytics, workforce scheduling optimisation and skill gap identification (Davenport and Ronanki, 2018; Zhang and Liu, 2020). Recent studies show that AI systems enhance the accuracy of workforce projections and allow organisations to adopt more agile HR strategies (Huang and Rust, 2021; Paschen *et al.*, 2020). These capabilities directly support organisational competitiveness and resilience in dynamic business environments.

The integration of AI into HRM practices contributes significantly to firm performance. Research highlights that AI adoption reduces operational costs, improves productivity and fosters innovation (Wilson *et al.*, 2017; Kaplan and Haenlein, 2019). AI-driven workforce planning systems provide real-time insights, enabling firms to respond swiftly to market changes and resource constraints (Brynjolfsson and McAfee, 2017). Furthermore, AI's role in enhancing employee retention has been noted, with organisations using AI analytics to monitor satisfaction and engagement levels (Zhang and Liu, 2020). Studies also emphasise that firms leveraging AI in strategic HR functions report higher adaptability and competitiveness compared with those relying on traditional HR tools (Wamba-Taguimdje *et al.*, 2020).

While much of the literature emphasises efficiency and performance, scholars and practitioners increasingly highlight the human-centric implications of AI in workforce planning. Concerns include employee resistance, job insecurity and the ethical use of personal data (Stone *et al.*, 2015; Chen *et al.*, 2014). Recent studies underscore the importance of balancing AI's efficiency benefits with workforce well-being and mental health (Naim and Lenka, 2017). Union perspectives are also becoming more prominent; for instance, in Australia, labour unions have demanded job security assurances prior to AI adoption (Kudina

and van de Poel, 2024). Moreover, sociotechnical system theories provide a useful lens to understand how technology and human factors interact within organisations (Zhang et al., 2025). These perspectives suggest that AI’s long-term success in workforce planning depends not only on technological sophistication but also on careful management of employee relations and ethical considerations.

3. Methodology

This study employs a SLR approach guided by the PRISMA protocol to ensure transparency and rigor (Moher et al., 2009). The review process consisted of identification, screening, eligibility and inclusion stages. Literature was collected from leading academic databases such as Scopus, IEEE Xplore, Web of Science and Google Scholar. To ensure relevance, only articles published in English between 2014 and 2024 focusing on AI in workforce planning and its effect on firm performance were included, while non-empirical or overly broad studies were excluded. The review was designed to address three research questions: RQ1: How can AI be used to optimise workforce planning? RQ2: How does the implementation of AI in workforce planning impact firm performance? RQ3: What are the challenges and opportunities in implementing AI for workforce planning? An initial search yielded 3,000 articles, which were narrowed down to 997 after duplication removal and keyword filtering using *Publish or Perish* (Harzing, 2007). Further screening and full-text review identified 155 relevant studies, of which 50 were analysed in depth to answer the research questions. Data extraction focused on research objectives, methodology, key findings and implications. To enhance validity, the process was peer-reviewed internally and cross-checked to avoid omissions. Finally, VOSviewer was applied to visualise research trends, keyword relationships and thematic density across the selected studies (Van Eck and Waltman, 2010). As shown in Figure 1, the PRISMA extraction process illustrates the four main stages of identification, screening, eligibility and inclusion followed in this study.

4. Results and findings

4.1 Data collection and screening

This section presents the results of the SLR. A total of 997 articles that met the initial research criteria were retrieved, forming the dataset for analysis. The annual distribution of these publications is shown in Table 1, which demonstrates a consistent increase over the past decade. This trend highlights the growing scholarly interest in the intersection of AI, workforce planning and firm performance.

The data in Table 1 reveal a clear upward trend in research output. From only a few publications in 2014–2016, the number of studies began to grow more significantly from 2018 onward, with sharp increases in 2019 (62 publications), 2020 (99 publications) and particularly between 2021 and 2023, peaking at 264 publications in 2023. Although there is a slight decline in 2024 (190 publications), the overall pattern reflects a strong and sustained rise in academic interest in the role of AI in workforce planning and firm performance. This growth aligns with global developments in digital transformation and increased adoption of AI in business and HRM practices.

From this dataset, descriptive information such as authors, titles, publication years, citation counts and publishers was compiled. Table 2 presents the top 20 most cited publications, ordered in descending order of citation counts, reflecting their influence and significance in



Figure 1. Extraction process. Source: Authors’ own elaboration

Table 1. Publication data per-year with keywords “workforce planning”, “artificial intelligence”, “firm performance”

Year of publication	Total of publication
2014	1
2015	3
2016	5
2017	5
2018	25
2019	62
2020	99
2021	146
2022	197
2023	264
2024	190
Total	997

Source(s): Authors’ own dataset and analysis

this research domain. A full reference list for all 50 studies is provided in [Supplementary File S1](#).

Building on these descriptive findings, further analysis using VOSviewer was conducted to map keyword relationships and identify thematic clusters. The following visualisations ([Figures 2–4](#)) illustrate the network, temporal evolution and density of research topics across the selected literature.

4.2 Data visualisation using VOSviewer

Network visualisation, as seen in [Figure 2](#), is used to display the relationships between keywords such as workforce planning, AI and firm performance, with nodes representing the keywords and lines indicating the strength of the connection between them. Additionally, the size of the node represents the frequency of occurrence, while the thickness of the line shows the strength of the relationship.

[Figure 2](#) shows that AI and firm performance form the strongest cluster of keywords, indicating that much of the literature directly links AI adoption with competitive outcomes such as productivity and innovation. The connection between AI and workforce planning appears as a smaller but still significant cluster, suggesting that while the link is established, it has received less focus compared to performance outcomes. This pattern supports our finding that the performance dimension of AI adoption has been studied more extensively than its integration into workforce planning processes.

Importantly, although employee retention does not appear as a dominant node in the visualisation, it consistently emerges in the literature as a secondary but highly significant outcome of AI implementation. This discrepancy highlights that retention is less visible in keyword-based mapping but more prominent in full-text analysis, underscoring the need to balance efficiency-driven outcomes with practical concerns of retention and employee well-being.

The overlay visualisation in [Figure 3](#) presents the temporal evolution of research keywords, where colours indicate the average year of publication. Earlier studies concentrated on automation, productivity and firm performance, whereas more recent studies increasingly address ethical AI, human-centric workforce management and digital transformation. This shift indicates a growing recognition that people-related outcomes are inseparable from organisational performance. However, employee retention – though increasingly present –

Table 2. Publication data with the keywords “workforce planning”, “artificial intelligence”, “firm performance”

No	Authors	Title	Year	Cites
1	Dwivedi, Y.K., <i>et al.</i>	Artificial intelligence (AI): multidisciplinary perspectives on emerging challenges, opportunities and agenda for research, practice and policy	2021	2,674
2	D Vrontis, M Christofi, V Pereira, S Tarba	Artificial intelligence, robotics, advanced technologies and human resource management: a systematic review	2023	1,035
3	SL Wamba-Taguimdje, SF Wamba	Influence of artificial intelligence (AI) on firm performance: the business value of AI-based transformation projects	2020	986
4	Brynjolfsson, E. and McAfee, A.	The rapid adoption of data-driven decision-making	2016	570
5	Tambe, P., Cappelli, P. and Yakubovich, V.	Artificial intelligence in human resources management: challenges and a path forward	2019	464
6	Brock, J.K.-U. and von Wangenheim, F.	Demystifying AI: what digital transformation leaders can teach you about realistic artificial intelligence	2019	304
7	Oluwaseun Kolade, Adebowale Owoseni	Employment 5.0: The work of the future and the future of work	2022	155
8	S Mishra, MT Ewing, HB Cooper	Artificial intelligence focus and firm performance	2022	114
9	Nawaz, N., <i>et al.</i>	The adoption of artificial intelligence in human resources management: implications for productivity and turnover	2024	85
10	P Jain, V Tripathi, R Malladi. . .	Navigating the Paradigm Shift in HRM Practices Through the Lens of Artificial Intelligence: A Post-pandemic Perspective	2023	78
11	Li, P., <i>et al.</i>	How does artificial intelligence impact human resources management?	2023	72
12	Parry, E. and Battista, V.	AI technologies and the future of managerial work: a sociotechnical perspective	2019	72
13	U Lichtenthaler	An intelligence-based view of firm performance: profiting from artificial intelligence	2019	68
14	EJ Chukwuka, KE Dibie	Strategic role of artificial intelligence (AI) on human resource management (HR) employee performance evaluation function	2024	64
15	KR Samarasinghe, A Medis	Journal of Open Innovation: Technology, Market and Complexity	2020	57
16	Pauliina Rikala, Greta Braun, Miitta Järvinen, Johan Stahre, Raija Hämmäläinen	Understanding and measuring skill gaps in Industry 4.0 – A review	2024	55
17	Horodyski, P., <i>et al.</i>	Applicants’ perception of artificial intelligence in the recruitment process	2023	41
18	Fenwick, A.	The critical role of HRM in AI-driven digital transformation	2024	38
19	K Chang	Artificial intelligence in personnel management: the development of APM model	2020	37
20	Bujold, A., <i>et al.</i>	Responsible artificial intelligence in human resources management: an empirical review	2024	34

Note(s): Please see [Supplementary File S1](#) for the full reference list of all 50 articles

Source(s): Authors’ own dataset and analysis

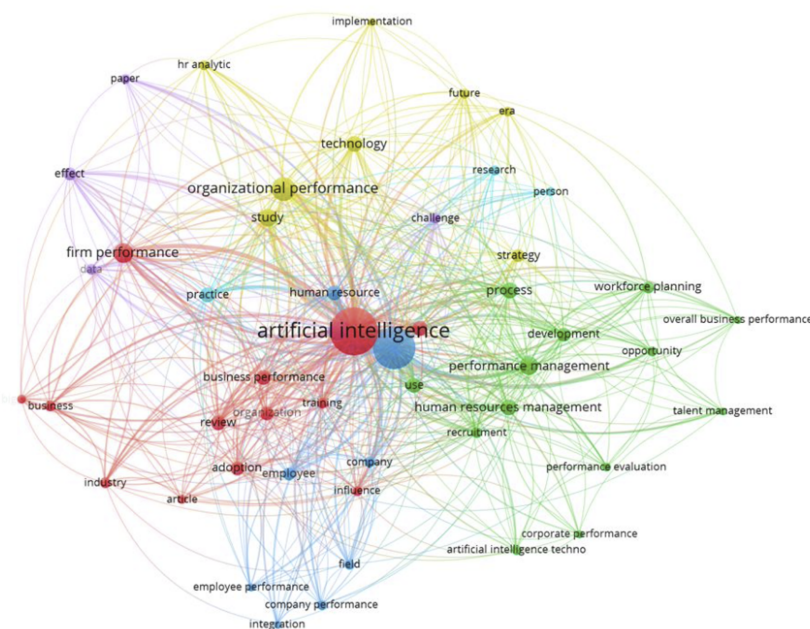


Figure 2. Network visualisation of keywords related to “artificial intelligence”, “workforce planning” and “firm performance” (node size = frequency; edge thickness = co-occurrence strength). Source: Authors’ own elaboration using VOSviewer software ([Van Eck and Waltman, 2010](#))

remains less visible in keyword mapping, reinforcing the need to examine it more directly in future research.

The density visualisation in [Figure 4](#) highlights the concentration of research themes, with bright zones indicating areas of greatest attention. AI and firm performance dominate the densest regions, reinforcing the established link between technology adoption and organisational competitiveness. Workforce planning and employee-related outcomes appear in less dense zones, reflecting that while these issues are present in the literature, they have not attracted comparable scholarly focus. This imbalance signals that while firms and researchers prioritise performance, the equally vital challenge of retention and workforce stability remains underexplored, even though it is critical for long-term AI adoption success.

4.3 Results and key findings

The findings show that the 50 selected articles converge on several recurring themes concerning the role of AI in workforce planning and firm performance. These themes were identified through thematic coding of each study's objectives, methodologies and outcomes (see Section 2.7). Importantly, the themes also aligned with the keyword clusters revealed by the VOSviewer visualisations (Figures 2–4), ensuring consistency between the bibliometric mapping and the narrative synthesis.

4.3.1 Prediction of workforce demand. One of the most common themes, reported in 18 of the 50 studies, is the application of AI to forecast workforce demand. This aligns with a central cluster in the VOSviewer maps, where keywords such as *workforce planning* and *demand forecasting* appear with high density. The findings show that AI models enable firms to anticipate both short-term and long-term staffing requirements by analysing historical data and

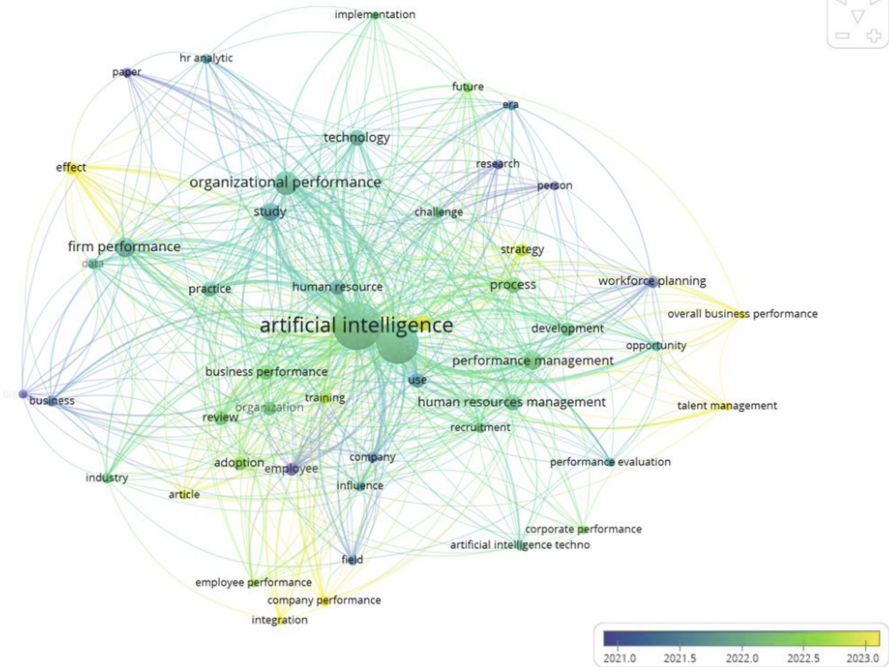


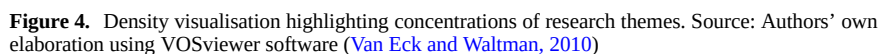
Figure 3. Overlay visualisation showing temporal evolution of keywords (lighter colours = newer studies). Source: Authors’ own elaboration using VOSviewer software (Van Eck and Waltman, 2010)

market trends. For instance, [Zhang and Liu \(2020\)](#) documented in a case study that AI reduced planning time and costs by 30–40%. While this figure applies only to that single context, other studies also confirm efficiency improvements, though with varied magnitudes depending on sector and data quality.

4.3.2 Workforce scheduling and optimisation. A second prominent theme, found in 12 studies, is the optimisation of workforce schedules. The VOSviewer network map highlights “scheduling” as a strong co-occurrence keyword linked with AI applications. The findings show that AI-based scheduling systems help firms minimise idle time, balance workloads and account for employee preferences. [Manyika et al. \(2017\)](#), for example, emphasised productivity improvements and reduced absenteeism resulting from AI-driven scheduling. Although outcomes differ across contexts, the consistent appearance of this theme indicates that scheduling is a widely studied and impactful application of AI.

4.3.3 Skill gap analysis and training needs. AI’s role in skill assessment and reskilling emerged in 10 studies, corresponding to VOSviewer clusters around *training, skills* and *human capital*. The findings show that AI tools help organisations identify current skills gaps and anticipate future training needs, enabling targeted reskilling and upskilling programmes. This theme is especially relevant in industries undergoing rapid digital transformation, where workforce adaptability is critical.

4.3.4 Recruitment and talent acquisition. Recruitment applications of AI were discussed in nine studies, linked to keyword clusters such as *recruitment* and *talent acquisition* in the bibliometric analysis. The findings show that AI-assisted tools improve candidate screening, competency assessment and even interview transcript analysis. These tools shorten hiring cycles and improve candidate–job matches. At the same time, several studies raise ethical



4.3.5 Employee performance evaluation and retention. Finally, seven studies explored AI in employee performance management and retention. This corresponds to the VOSviewer clusters around *employee retention* and *performance evaluation*. The findings show that predictive models support continuous monitoring of productivity, engagement and satisfaction, while also identifying employees at risk of leaving. Firms can then act proactively to retain key talent. However, scholars also caution that automated evaluations must be balanced with human oversight to maintain trust and fairness.

Beyond technical and financial barriers, AI adoption in workforce planning also faces significant human-centric challenges. Employee resistance often stems from concerns about job security, increased surveillance or fear of displacement, which may undermine trust in AI-driven systems (Stone *et al.*, 2015; Naim and Lenka, 2017). Labor unions have been vocal about these risks; for instance, in Australia, unions have demanded job security guarantees before employers deploy AI to increase productivity. Additionally, psychological stress and uncertainty related to AI implementation can negatively affect employee engagement and

retention, reducing the effectiveness of workforce planning (Giuntella *et al.*, 2025). Addressing these challenges requires transparent communication, proactive reskilling initiatives and strong organisational change management to ensure that AI adoption enhances both organisational efficiency and employee well-being.

Overall, the findings indicate that AI has great potential to enhance the effectiveness of workforce planning and contribute significantly to firm performance. However, successful implementation requires thorough planning, investment in technological infrastructure and policies that support privacy and employee data security.

5. Discussion

The findings presented in Section 4, including the descriptive overview of 997 articles, the analysis of highly cited studies (Table 2) and the bibliometric visualisations (Figures 2–4), provide the basis for this discussion. Thematic synthesis of the 50 selected articles revealed recurring patterns around demand forecasting, scheduling optimisation, skill gap analysis, recruitment and employee retention. In this section, these results are interpreted in relation to the existing literature, showing where they confirm established findings and where they extend knowledge with new insights. Particular attention is given to the shift from efficiency-focused outcomes, which dominated earlier studies, towards more recent emphases on ethics, fairness and employee well-being. This interpretation highlights both the contributions of this study and its implications for research, practice and policy.

5.1 Interpretation of major findings

This review confirms and extends prior knowledge on how AI shapes workforce planning and firm performance. Consistent with earlier studies, the findings demonstrate that AI improves efficiency, accuracy and speed in critical human resource and operational processes. Wamba-Taguimdje *et al.* (2020) highlighted the business value of AI transformation projects, particularly in enhancing predictive accuracy and optimising resource allocation. Manyika *et al.* (2017) similarly argued that AI can drive productivity by enabling more efficient scheduling. Our results reinforce these conclusions: across the reviewed studies, AI is consistently associated with improved decision-making in workforce planning, from demand forecasting to recruitment and retention.

5.1.1 Workforce demand forecasting. One of the most prominent themes in the review is the use of AI to predict workforce demand. This aligns with existing literature that emphasises the importance of predictive analytics in strategic HR planning (Lichtenthaler, 2019). Several studies in our dataset confirm that AI models are able to anticipate both short- and long-term workforce needs with greater precision than traditional statistical methods. For instance, Zhang and Liu (2020) reported a 30–40% reduction in planning time and costs in their case study. While this dramatic efficiency gain was context-specific, the pattern across other studies indicates that predictive analytics consistently strengthens organisational agility by aligning staffing with fluctuating market conditions. This not only validates earlier findings but also underscores AI's growing role in proactive workforce management.

5.1.2 Workforce scheduling and optimisation. Scheduling is another area where our findings converge with prior work. The reviewed studies show that AI systems create more balanced and efficient schedules, reducing idle time and better distributing workload. Manyika *et al.* (2017) suggested that these gains translate into measurable productivity improvements. Several of the articles reviewed here echo this, noting reductions in absenteeism and improvements in employee satisfaction when AI-driven scheduling incorporates worker preferences. However, some studies also raise challenges, including resistance from employees who perceive AI systems as overly rigid or lacking transparency. This nuance suggests that while AI supports optimisation, its benefits are maximised when combined with participatory approaches that preserve employee agency.

5.1.3 Skill gap analysis and training needs. The review also reinforces the importance of AI in identifying skill gaps and forecasting future training requirements. This aligns with studies such as [Khandelwal and Upadhyay \(2024\)](#), who highlighted the synergy between human resource development (HRD) and AI. Our analysis shows that AI helps firms align reskilling initiatives with emerging technological and strategic priorities, thereby enhancing long-term competitiveness. Notably, several studies emphasised that skill gap analysis is not just a technical exercise but a strategic one, requiring alignment with organisational culture and employee motivation. This finding advances the literature by showing that AI-enabled skill analysis can be a bridge between short- and long-term performance optimisation and long-term workforce sustainability.

5.1.4 Recruitment and talent acquisition. Recruitment is a theme where the findings partially support and partially challenge prior literature. AI-assisted recruitment tools have been praised for reducing time-to-hire and improving candidate-job matching ([Li et al., 2023](#)). Our review confirms these benefits but also highlights new concerns that have emerged in recent studies, particularly regarding fairness and algorithmic bias. [Kudina and van de Poel \(2024\)](#), for example, caution that AI recruitment system risk reproducing systemic inequalities if not carefully monitored. Several articles in our dataset echoed these concerns, noting that trust in AI recruitment remains fragile. This divergence in findings suggests that recruitment is an area where AI's promise must be balanced with strong ethical governance.

5.1.5 Employee performance evaluation and retention. The role of AI in employee evaluation and retention extends the literature in important ways. Earlier studies often focused on performance monitoring as a means of boosting productivity. Our review confirms these uses but also identifies a new emphasis on predicting turnover risk and proactively addressing employee retention (e.g. [Samarasinghe and Medis, 2020](#)). Several studies also highlight that predictive models can inadvertently erode trust if employees feel surveilled or judged solely by algorithms. [Giuntella et al. \(2025\)](#) emphasised that the social and psychological impacts of AI adoption – including stress and job insecurity – must be considered alongside efficiency gains. This represents an evolution in the literature from narrow productivity metrics toward a more holistic view of organisational health.

5.1.6 Cross-cutting insights. Beyond individual themes, this review provides cross-cutting insights that extend existing scholarship. First, the consistency of efficiency gains confirms earlier research but also demonstrates that benefits are highly context-dependent. Some studies report dramatic improvements, while others note only modest or uneven effects, suggesting that organisational readiness and data quality play decisive roles. Second, the growing emphasis on ethics, fairness and well-being illustrates a paradigmatic shift in the literature, as AI adoption is increasingly framed not just as a technological issue but also as a socio-technical transformation. Third, the underexplored dimension of labour relations – particularly the role of trade unions and regulators – points to a gap in the current literature and highlights the need for governance frameworks that balance innovation with worker rights.

Taken together, the interpretation of findings demonstrates that while AI clearly strengthens workforce planning capabilities, its adoption also raises complex organisational and ethical questions. This dual character – simultaneously enabling efficiency and challenging existing norms – defines the current frontier of research and practice in this field. Building on these findings, the following subsection outlines the implications and recommendations for theory, practice and policy.

5.2 Implications and recommendations

5.2.1 Theoretical contributions. This study extends the literature by showing that research on AI in workforce planning is shifting from a narrow focus on efficiency gains to a broader concern with socio-organisational dynamics. Our synthesis demonstrates that while earlier studies emphasised predictive accuracy and cost savings, more recent work highlights issues of ethics, fairness and employee well-being. This suggests that future research should no

longer treat AI as merely a technical tool, but as part of a socio-technical system embedded within organisational and institutional contexts. Methodologically, our integration of bibliometric and thematic analysis provides a replicable framework for systematic reviews, offering clearer visibility into the prevalence and clustering of themes.

5.2.2 Practical implications. For practitioners, the review suggests that AI adoption should be treated as both a technological and a cultural transformation. While efficiency gains in forecasting, scheduling and recruitment remain valuable, the findings show that failure to address employee trust, fairness in performance evaluation and mental health could undermine long-term sustainability. Organisations are therefore recommended to: (1) implement governance frameworks that ensure transparency and accountability in AI-driven decision-making; (2) actively engage employees in the design and evaluation of AI systems to strengthen trust and (3) balance automation with human oversight to avoid over-reliance on algorithmic judgments. These recommendations move beyond generic efficiency arguments and focus on actionable strategies that reflect the emerging concerns in the literature.

5.2.3 Policy and labour relations. An underexplored but important implication of our review is the impact of AI on labour relations and collective bargaining. The findings suggest that trade unions and worker organisations are beginning to push for stronger protections in AI-mediated environments. Policymakers and regulators are therefore recommended to consider frameworks that balance innovation with worker rights, ensuring that AI adoption contributes to both firm performance and employee well-being.

5.2.4 Future research directions. Based on these insights, we recommend that future studies: (1) investigate the long-term effects of AI adoption on employee well-being and organisational culture; (2) conduct comparative research across industries and national contexts to capture diverse regulatory and cultural environments and (3) incorporate employee perspectives to better understand how AI is experienced in practice. These directions will help advance theory and provide more nuanced guidance for practice.

6. Conclusion

This study systematically reviewed 50 articles to explore how AI contributes to workforce planning and firm performance. The review identified five major themes – demand forecasting, scheduling optimisation, skill gap analysis, recruitment and employee retention – while also showing that the literature is shifting from a narrow focus on efficiency to broader socio-technical issues such as fairness, ethics, labour relations and employee well-being.

Overall, the study demonstrates that AI can be both a driver of efficiency and a transformative organisational force. Firms that approach AI adoption as a dual challenge – optimising performance while maintaining employee well-being – will be best positioned to achieve the sustainable competitive advantage in the digital era.

Supplementary material

The supplementary material for this article can be found online.

References

- Bassi, L. and McMurrer, D. (2016), "Workforce analytics: revealing the value of workforce strategies", *Human Resource Management Journal*, Vol. 26 No. 2, pp. 175-192.
- Brynjolfsson, E. and McAfee, A. (2017), "The business of artificial intelligence: what it can—and cannot—do for your organization", *Harvard Business Review*, Vol. 95 No. 4, pp. 3-11.
- Chen, H., Chiang, R.H.L. and Storey, V.C. (2014), "Business intelligence and analytics: from big data to big impact", *MIS Quarterly*, Vol. 38 No. 3, pp. 1165-1188, doi: [10.25300/MISQ/2014/38.3.5](https://doi.org/10.25300/MISQ/2014/38.3.5).
- Davenport, T.H. and Ronanki, R. (2018), "Artificial intelligence for the real world", *Harvard Business Review*, Vol. 96 No. 1, pp. 108-116.

- Giuntella, O., Kato, H., Rotaru, P. and Schimmele, C. (2025), "Artificial intelligence at work: effects on workers' health and well-being", *Scientific Reports*, Vol. 15, 98241, doi: [10.1038/s41598-025-98241-3](https://doi.org/10.1038/s41598-025-98241-3).
- Harzing, A.W. (2007), *Publish or Perish*, Harzing.com, available at: <https://harzing.com/resources/publish-or-perish>
- Huang, M. and Rust, R.T. (2021), "Artificial intelligence in service", *Journal of Service Research*, Vol. 24 No. 1, pp. 3-13.
- Kaplan, A. and Haenlein, M. (2019), "Artificial intelligence and management analytics", *Journal of Management Analytics*, Vol. 6 No. 4, pp. 341-343, doi: [10.1080/23270012.2019.1699876](https://doi.org/10.1080/23270012.2019.1699876).
- Khandelwal, A. and Upadhyay, P. (2024), "Artificial intelligence in human resource development: identifying skill gaps and reskilling needs", *Journal of Organizational Change Management*, Vol. 37 No. 1, pp. 45-62, doi: [10.1108/JOCM-05-2023-0142](https://doi.org/10.1108/JOCM-05-2023-0142).
- Kudina, O. and van de Poel, I. (2024), "A sociotechnical system perspective on AI", *Minds and Machines*, Vol. 34 No. 3, pp. 21-44, doi: [10.1007/s11023-024-09680-2](https://doi.org/10.1007/s11023-024-09680-2).
- Li, J., Sun, R. and Wu, Y. (2023), "Artificial intelligence in recruitment: balancing efficiency and fairness", *Journal of Business Research*, Vol. 158, 113693, doi: [10.1016/j.jbusres.2023.113693](https://doi.org/10.1016/j.jbusres.2023.113693).
- Lichtenthaler, U. (2019), "A conceptual framework for innovation and new business opportunities in HRM", *Human Resource Management Review*, Vol. 29 No. 4, 100717, doi: [10.1016/j.hrmr.2019.100717](https://doi.org/10.1016/j.hrmr.2019.100717).
- Manyika, J., Bughin, J., Woetzel, J. (2017), "A future that works: Automation, employment, and productivity", *McKinsey Global Institute*, available at: https://cica.org.au/wp-content/uploads/MGI-A-future-that-works_Full-report.pdf.
- Minbaeva, D. (2020), "Building effective HR functions: the evolving role of HR analytics", *Human Resource Management Review*, Vol. 30 No. 2, 100672.
- Moher, D., Liberati, A., Tetzlaff, J. and Altman, D.G. (2009), "Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement", *PLoS Medicine*, Vol. 6 No. 7, e1000097, doi: [10.1371/journal.pmed.1000097](https://doi.org/10.1371/journal.pmed.1000097).
- Naim, M.F. and Lenka, U. (2017), "Mentoring, social media, and Gen Y employees' intention to stay: Towards a conceptual model", *International Journal of Business and Systems Research*, Vol. 11 1/2, pp. 28-41, doi: [10.1504/IJBSRE.2017.087032](https://doi.org/10.1504/IJBSRE.2017.087032).
- Paschen, S.J., Kietzmann, J. and Behrens, S. (2020), "Artificial intelligence and its implications for market knowledge in B2B marketing", *Journal of Business & Industrial Marketing*, Vol. 34 No. 1, pp. 1-13, doi: [10.1108/JBIM-10-2018-0295](https://doi.org/10.1108/JBIM-10-2018-0295).
- Samarasinghe, D. and Medis, S. (2020), "Predictive analytics for employee retention: opportunities and challenges", *International Journal of Human Resource Studies*, Vol. 10 No. 2, pp. 1-15, doi: [10.5296/ijhrs.v10i2.16903](https://doi.org/10.5296/ijhrs.v10i2.16903).
- Stone, D.L., Deadrick, D.L., Lukaszewski, K.M. and Johnson, R. (2015), "The influence of technology on the future of human resource management", *Human Resource Management Review*, Vol. 25 No. 2, pp. 216-231, doi: [10.1016/j.hrmr.2015.01.002](https://doi.org/10.1016/j.hrmr.2015.01.002).
- Van Eck, N.J. and Waltman, L. (2010), "Software survey: VOSviewer, a computer program for bibliometric mapping", *Scientometrics*, Vol. 84 No. 2, pp. 523-538, doi: [10.1007/s11192-009-0146-3](https://doi.org/10.1007/s11192-009-0146-3).
- Wamba-Taguimdje, S.F., Fosso Wamba, S., Kala Kamdjoug, J.R., Tchatchouang, A. and Wanko, C.E. (2020), "Influence of artificial intelligence on firm performance: the business value of AI-based transformation projects", *Business Process Management Journal*, Vol. 26 No. 7, pp. 1893-1924, doi: [10.1108/bpmj-10-2019-0411](https://doi.org/10.1108/bpmj-10-2019-0411).
- Wilson, H.J., Daugherty, P.R. and Morini-Bianzino, N. (2017), "The jobs that artificial intelligence will create", *MIT Sloan Management Review*, Vol. 58 No. 4, pp. 14-16.
- Zhang, X. and Liu, Z. (2020), "Artificial intelligence in workforce planning: a review and future research directions", *International Journal of Human Resource Management*, Vol. 31 No. 14, pp. 1809-1835.

Zhang, P., Dillard, N. and Cavallo, T. (2025), "Navigating the limitations of algorithmic management: an integrative framework of sociotechnical systems theory (STS) and strategic HRD", *Human Resource Development Review*, Vol. 24 No. 3, pp. 279-303, doi: [10.1177/15344843251320252](https://doi.org/10.1177/15344843251320252).

Further reading

- Brock, J.K.-U. and von Wangenheim, F. (2019), "Demystifying AI: what digital transformation leaders can teach you about realistic artificial intelligence", *California Management Review*, Vol. 61 No. 4, pp. 110-134, doi: [10.1177/1536504219865226](https://doi.org/10.1177/1536504219865226).
- Brynjolfsson, E. and McAfee, A. (2016), "The rapid adoption of data-driven decision-making", *American Economic Review*, Vol. 106 No. 5, pp. 133-139, doi: [10.1257/aer.p20161016](https://doi.org/10.1257/aer.p20161016).
- Dwivedi, Y.K., Hughes, L., Coombs, C., Constantiou, I., Duan, Y., Edwards, J.S., Dwivedi, R., Eirug, A., Galanos, V., Ilavarasan, P.V., Janssen, M., Jones, P., Kar, A.K., Kizgin, H., Kronemann, B., Lal, B., Lucini, B., Medaglia, R., Le Meunier-FitzHugh, K., Le Meunier-FitzHugh, L.C., Misra, S., Mogaji, E., Sharma, S.K., Singh, J.B., Raghavan, V., Raman, R., Rana, N.P., Samothrakis, S., Spencer, J., Tamilmani, K., Tubadji, A., Walton, P. and Williams, M.D. (2021), "Artificial intelligence (AI): multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy", *International Journal of Information Management*, Vol. 57, 101994, doi: [10.1016/j.ijinfomgt.2019.08.002](https://doi.org/10.1016/j.ijinfomgt.2019.08.002).
- Fountaine, T., McCarthy, B. and Saleh, T. (2019), "Building the AI-powered organization", *Harvard Business Review*, Vol. 97 No. 4, pp. 62-73.
- Ghose, A. and Rust, R. (2021), "AI for the workforce: balancing productivity and purpose", *California Management Review*, Vol. 63 No. 2, pp. 17-42.
- Jarrahi, M.H. (2018), "Artificial intelligence and the future of work: human-AI symbiosis in organizational decision making", *Business Horizons*, Vol. 61 No. 4, pp. 577-586, doi: [10.1016/j.bushor.2018.03.007](https://doi.org/10.1016/j.bushor.2018.03.007).
- Parry, E. and Battista, V. (2019), "AI technologies and the future of managerial work: a sociotechnical perspective", *Journal of Management Studies*, Vol. 56 No. 5, pp. 905-933.
- Tambe, P., Cappelli, P. and Yakubovich, V. (2019), "Artificial intelligence in human resources management: challenges and a path forward", *California Management Review*, Vol. 61 No. 4, pp. 15-42, doi: [10.1177/0008125619867910](https://doi.org/10.1177/0008125619867910).

Corresponding author

Febri Egasmara can be contacted at: febri@upi.edu