



## Original Article

## Digital Transformation in the Software Industry: A Firm's Perspective

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## ABSTRACT

This study explores digital transformation in Pakistan's software industry from a firm-level perspective, with a specific focus on the integration of artificial intelligence in human resource management and recruitment practices. Using a qualitative case study approach, in-depth semi-structured group interviews were conducted with human resource managers of a leading software firm to capture lived managerial experiences of artificial intelligence adoption. The findings reveal that artificial intelligence-driven tools have significantly enhanced recruitment efficiency, reduced administrative workload, and transformed human resource roles from operational gatekeeping to strategic decision-making. However, the study also identifies emerging challenges, including algorithmic bias, false candidate matching due to generative artificial intelligence use by applicants, employee resistance, and ethical concerns related to transparency and fairness. To address these risks, the firm employs a strict human-in-the-loop model, ensuring that artificial intelligence functions as a decision-support system rather than a final authority. The study concludes that successful digital transformation in human resources depends not only on technological capability but also on strong leadership, organizational readiness, continuous upskilling, and ethical governance, offering practical insights for software firms and policymakers in developing-country contexts.

**Keywords:** Artificial intelligence, Digital transformation, Firm-level perspective, Human resource management, Software industry

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## INTRODUCTION

The integration of artificial intelligence (AI) into human resource management (HRM) represents a transformative shift in organizational practices, particularly in developing economies like Pakistan, where traditional HR functions are evolving to incorporate technology-driven solutions. AI in HRM encompasses tools and systems that automate tasks such as recruitment, performance evaluation, employee engagement, and talent acquisition, aiming to enhance efficiency, reduce biases, and support strategic decision-making (Ullah et al., 2025). This topic is of critical importance because it addresses how organizations can leverage AI to optimize human capital amid global competition, while also navigating unique contextual challenges such as infrastructural limitations and cultural resistance. In Pakistan, the adoption of AI in HRM is still nascent, with many firms grappling with barriers that hinder its full potential, underscoring the need for context-specific insights to bridge the gap between technological innovation and practical implementation (Abbasi et al., 2025).

The background of this research draws from the rapid advancement of AI technologies in the 21st century, which have transitioned from theoretical concepts to practical applications in sectors like banking and information technology (IT) in Pakistan. For instance, AI tools such as chatbots for initial screenings and predictive analytics for workforce planning are being explored to streamline HR processes, yet their uptake remains limited due to factors like high implementation costs and data privacy concerns (Mughal et al., 2025). This context is particularly relevant in Pakistan, where organizational cultures often prioritize traditional methods, leading to reluctance in adopting AI despite its potential to improve operational efficiency and employee satisfaction (Patrick & Khattak, 2025). The significance of studying AI in HRM lies in its ability to foster innovation, such as through automated candidate matching that minimizes human bias, while also highlighting risks like job displacement and ethical dilemmas that could exacerbate workforce insecurities.

Despite these advancements, a notable research gap exists in the Pakistani context, where studies have primarily focused on either qualitative exploration of challenges or quantitative assessments of barriers, but few integrate both to provide a holistic understanding. For example, while quantitative data reveal widespread infrastructural deficiencies affecting AI adoption, qualitative insights emphasize cultural and ethical hurdles that are equally impediments (Abbasi et al., 2025; Mughal et al., 2025). This gap is evident in the limited examination of how AI's benefits, such as time savings in recruitment, can be realized amid persistent issues like power outages and skill shortages in regions like Khyber Pakhtunkhwa (Ullah et al., 2025). Addressing this gap is essential for policymakers and HR practitioners in Pakistan to develop tailored strategies that promote AI integration without compromising human elements in HRM. By drawing on both qualitative and quantitative approaches from existing studies, this project aims to contribute to a more comprehensive framework for understanding AI's role in enhancing HRM practices in Pakistan.

The literature on AI in HRM reveals a multifaceted landscape, encompassing applications, benefits, and significant challenges. Key studies employ both qualitative and quantitative methods, providing complementary insights: qualitative approaches offer in-depth explorations of practitioner experiences and cultural nuances, while quantitative methods deliver measurable data on barriers and adoption rates, together enriching the understanding of AI's integration in HRM (Abbasi et al., 2025; Mughal et al., 2025; Patrick & Khattak, 2025; Ullah et al., 2025).

A central theme in the literature is the application of AI tools in core HRM functions, particularly recruitment and talent management. Ullah et al. (2025) argue that AI-driven technologies, such as resume screening algorithms and chatbots, revolutionize recruitment by automating preliminary interviews and improving candidate-job matching, thereby reducing time-intensive manual processes. This aligns with Mughal et al.'s (2025) qualitative findings from interviews with HR professionals in Pakistan's banking sector, where AI is described as enhancing recruitment efficiency through automated filtering and initial screenings, which help mitigate delays and biases in candidate selection. Similarly, Patrick and Khattak (2025) highlight through expert interviews that organizations in Pakistan are increasingly using AI-based assessments to evaluate job candidates' employability, emphasizing its role in strategic workforce planning. However, these applications are critiqued for their dependency on reliable data and infrastructure, which quantitative evidence suggests is

often lacking in Pakistan (Abbasi et al., 2025). Critically, these studies demonstrate AI's potential to shift HRM from administrative to strategic roles; they also underscore a theory-practice divide, where global AI theories on predictive analytics are not fully adaptable to local contexts due to technological limitations.

The benefits of AI in HRM are another prominent argument in the literature, with studies illustrating improvements in efficiency, objectivity, and employee outcomes. Ullah et al. (2025) posit that AI facilitates real-time performance feedback and personalized development plans, enabling employee engagement and retention by identifying turnover risks through pattern analysis. This is supported by Mughal et al.'s (2025) thematic analysis, which reveals AI's capacity to detect early signs of employee dissatisfaction in performance management, allowing HR teams to focus on motivational and career development aspects. Quantitatively, Abbasi et al. (2025) report that AI adoption, though limited to 15% of surveyed organizations at full capacity, offers data-driven solutions that enhance productivity and strategic planning. Patrick and Khattak (2025) extend this by noting that AI integration boosts operational efficiency for HR professionals, freeing them for value-adding activities like talent retention. A critical analysis, however, reveals that these benefits are unevenly distributed; qualitative data indicate that while AI reduces biases in banking settings, quantitative surveys show broader organizational resistance, suggesting that benefits may be overstated without addressing foundational issues like training (Mughal et al., 2025; Abbasi et al., 2025). This highlights a theoretical gap in HRM literature, where models of AI-driven efficiency assume robust infrastructure, which does not align with Pakistan's realities.

### **Challenges and Barriers to AI Adoption in Pakistan**

Challenges and barriers to AI adoption form a core critique across the studies, revealing organizational, technological, ethical, and cultural hurdles. Abbasi et al. (2025) quantitatively identify key barriers through surveys of 460 HR practitioners, including high implementation costs, inadequate infrastructure, data confidentiality concerns, and employee resistance due to job loss fears, emphasizing the gap between AI's potential and actual usage in Pakistan. This is echoed in Patrick and Khattak's (2025) exploration, where experts cite cultural misalignment and technological inadequacies due to slow AI integration, arguing that AI could be ineffective in non-supportive environments. Mughal et al. (2025) add ethical dimensions, such as data privacy risks and job insecurity from automation, recommending updates to HRM practices for employee protection. Ullah et al. (2025) critically analyze algorithmic biases and privacy concerns, warning that without ethical transparency, AI could exacerbate inequalities in sectors like IT in Khyber Pakhtunkhwa. A comparative critique shows that quantitative approaches (e.g., Abbasi et al., 2025) provide statistical rigor to barriers, while qualitative ones (e.g., Mughal et al., 2025; Patrick & Khattak, 2025) offer nuanced narratives on cultural resistance, collectively arguing for a balanced approach to overcome these challenges. However, literature lacks integrated frameworks that combine these insights, pointing to a need for hybrid models in future HRM theories.

Overall, the studies contribute to HRM theory by demonstrating AI's dual role as an enabler and disruptor in Pakistan. Qualitative methods illuminate contextual experiences, such as ethical dilemmas in banking, while quantitative data quantifies adoption gaps, together advocating for context-specific strategies (Abbasi et al., 2025; Mughal et al., 2025). Yet, critical gaps persist, including limited inter-sectoral comparisons and insufficient attention to long-term cultural shifts, which future research should address to fully realize AI's possibilities in Pakistani HRM.

### **METHODOLOGY**

This is qualitative case study research to understand the real, lived experiences of HR managers who are actually using AI every day – not just numbers or surveys. The qualitative method is best when we want deep insights, feelings, daily practices, and managerial decision-making (Yin, 2018). We selected Software House as a single in-depth case because it is a successful Pakistani company that has fully adopted AI in recruitment. In November 2024, we conducted one long, semi-structured group interview with HR managers who represent different levels: (Head of People & Culture) – strategic and leadership view, (Senior Talent Acquisition Specialist) – operational and daily practice view, and (HR Manager) – employee relations. The interview was 90 minutes, fully audio-recorded with consents taken, and later transcribed word-for-word. We asked 18 open

questions and follow-up questions. Having three managers together helped us see the same issue from strategic, operational, and human angles at the same time. This means ensuring triangulation in qualitative research, which makes our findings stronger and more reliable.

After reading the transcription multiple times and coding responses manually, several strong and interconnected themes emerged that tell a clear success story with some very current challenges. The first and most obvious theme is rapid and proactive adoption of AI technologies. Firms did not wait for a crisis; they started experimenting with AI tools in 2021 and went fully live in 2022 simply because they “like to stay ahead of the curve. This early-adopter culture, combined with in-house AI expertise, removed almost all the barriers that stop other Pakistani companies. The second theme is the digital transformation of HR work processes. The manager explained that she no longer spends hours opening CVs one by one. Workable and Tally AI conduct the initial screening and complete technical interviews, detect cheating in real-time, and provide detailed scores. Only shortlisted candidates reach their desk. This has completely changed her role from a “gatekeeper” to a “strategic consultant” who applies human judgment on top of AI recommendations.

A third powerful theme is the strict Human-in-the-Loop discipline. Managers also repeated several times, “AI is a recommendation only, never the final decision-maker. He also gave practical examples of pulling logs and overriding AI when a strong candidate was wrongly rejected. This practice directly protects against bias and maintains trust. The most interesting and modern challenge that appeared is “false candidate matching” caused by candidates using ChatGPT and similar tools. Both managers described how perfect-looking CVs started arriving that passed AI filters but collapsed in live interviews. The company is countering this by publishing mandatory pre-application coding tests and relying more on Tally AI’s live assessment features. Employee fear and resistance existed in the beginning, but the company handled it gracefully. She shared that staff worried about job loss when automation started. Leadership promised that there would be no layoffs, and they focused on upskilling. Today, team members say they are happier because boring, repetitive work has disappeared, and they now do more meaningful tasks.

Candidate experience is actively protected. While most rejections are automated, it acts as a “human buffer” she personally calls or writes warm emails to good candidates who were rejected, explaining the reason. This small but important step prevents the process from feeling cold and mechanical. Finally, the company has already moved to predictive and strategic HR. Their in-house tool “Octopus” analyses global tech trends and tells them which skills they will need six to twelve months from now. HR is no longer reactive; it has become truly strategic.

## DISCUSSION

When we compare HR practices with what the global and Pakistani literature says, we see a perfect example of how good management can make theoretical work in real life. Literature promised huge efficiency gains and cost savings; the firm delivered exactly that. Their time-to-hire has fallen dramatically, just like Black & van Esch (2020) predicted. Managers everywhere want this, and firm shows Pakistani companies can achieve it too. Literature warned about bias and legal risk firm solved it by never giving final power to AI. This is textbook Human-in-the-Loop practice (Tambe et al., 2019). Most Pakistani studies only talk about fear of bias; the firm prevents it through policy and daily checking.

Literature highlighted resistance and low acceptance because of training gaps (Abbasi et al., 2023) the firm overcame this through early adoption culture, paid tools, and continuous coaching. Their leadership changed from supervising tasks to coaching critical thinking, exactly what strategic HR leaders are supposed to do (Tavis & Cappelli, 2021). The newest problem candidates using ChatGPT are now in every manager’s meeting worldwide (Garg et al., 2024). The firm is already fighting it with live tests, proving they are at the same level as international companies. Finally, the biggest managerial success is role transformation. Literature says HR must move from an administrative to a strategic partner (Stone et al., 2015). At the firm, the manager does workforce forecasting, audits algorithms, and protects candidate feelings – three perfect examples of modern HR leadership in action. In simple words: the firm did not just use AI tools; they managed the entire change process exactly the way top researchers and managers recommend. They are living proof that Pakistani managers can handle world-class technology when leadership is strong and policies are clear.

In Pakistan, if we really want AI to work in recruitment without creating fear, unemployment, or unfairness, we must focus on only one thing: never completely rely on AI for final decisions. Companies should make it a national best practice that AI can screen, score, and suggest, but a trained human must always check, explain, and sign the final yes or no. Along with this, every organization should give simple monthly training on reading AI reports, make live skill tests compulsory (so no one can cheat with ChatGPT), create a “Candidate Happiness Officer” who personally talks to good rejected candidates, and regularly show employees how AI is making their jobs easier, not ending them. If Pakistani companies, universities, and the government together push this “Human-in-the-Loop” model, then within 3–5 years, our country will not just follow the world in AI recruitment, but we will become an example for other developing countries.

## CONCLUSION

This study clearly proves that AI in recruitment is not a distant dream for Pakistan; it is already a powerful reality in companies. What we learned is simple and strong: AI can make hiring many times faster, smarter, and cheaper, but only when humans stay firmly in control. The firm achieved world-class results without a single job cut, without bias issues, and without losing human touch, simply because their leadership made the smart rules: AI only recommends, every decision is checked by a trained person, and people always come first. The software industry has set a new standard for Pakistan. Their success shows that our companies don't need to fear AI; we just need clear policies, regular training, and trust in our own people. This is the model Pakistan must follow to stay competitive in the global market.

## DECLARATIONS

**Consent to participate:** Written consent had been obtained from participants. All methods were performed following the relevant guidelines and regulations.

**Availability of Data and Materials:** Data will be made available upon request. The corresponding author will submit all dataset files.

**Competing interests:** None

**Funding:** No funding source involved

## AUTHORS' CONTRIBUTIONS

**JZ:** Concept and design of study, critical intellectual input.

**JZ:** Acquisition and analysis of data, drafting of the manuscript, and critical intellectual input.

**IB:** Acquisition of data, drafting of the manuscript.

The author had read and approved the final manuscript.

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