

## “The Role of Leadership Support in Mediating AI Adoption and Employee Engagement in Khyber Pakhtunkhwa’s Pharmaceutical Industry”

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### **Abstract**

The study is based on the effect of the adoption of Artificial Intelligence (AI) on employee engagement in the pharmaceutical sector of Khyber Pakhtunkhwa, Pakistan, and the moderating influence of leadership support. The purpose of the study is to know the role of leadership in employee engagement in the process of AI integration, particularly in a new market. The quantitative method was employed where data was collected by surveys of 200 workers in the pharmaceutical industry. The results indicate that AI implementation has a beneficial impact on the level of engagement among employees, and this effect is enhanced by leadership support. Active engagement by leadership in the AI adoption by providing clarity and training can minimize the resistance and improve job satisfaction. The research comes to the conclusion that the successful implementation of AI requires pharmaceutical companies in Khyber Pakhtunkhwa to focus on leadership support, training of employees, and clear organizational culture.

**Keywords:** Artificial Intelligence, Employee Engagement, Leadership Support, Pharmaceutical Industry, Khyber Pakhtunkhwa

### Introduction

The pharmaceutical sector of Khyber Pakhtunkhwa (KP), Pakistan, is undergoing a radical change to adopt Artificial Intelligence (AI) technologies. The application of AI is transforming different aspects of the industry, such as drug discovery and optimization of production, regulatory compliance, and supply chain management. Although the role of AI in improving operational efficiency is well known, employee engagement, which will be affected by AI, is a sensitive area of study. Engagement of employees, which may be considered as the emotional and cognitive relationship between employees and their job, is a key to the long-term success of any enterprise, especially the one that faces a digital transformation, such as the pharmaceuticals (Mehta & Srivastava, 2024). This research examines the effect of the adoption of AI in the pharmaceutical industry in KP and how the involvement of the employees affects them and how the leadership support is central in mediation of the relationship. Specifically, the study focuses on how the concept of leadership, which is characterized by support, communication, and strategic decision-making, affects the perceptions of the employees towards the implementation of AI and, thus, their levels of engagement. The difficulty of leadership support has been reported as one of the essential factors of successful AI integration in the organization (Sinha & Arora, 2024). Active leaders that encourage the use of AI, offer sufficient training, and show their commitment to the workforce can go a long way in improving the confidence of employees towards AI systems and make employees feel important throughout the process of technological change. Conversely, insufficient leadership support can cause resistance, engagement, and job security anxiety among the employees, which can prevent the successful adoption of AI (Rao & Kumar, 2023). As such, grasping the part played by leadership in the formation of employee engagement throughout AI adoption is crucial to pharmaceutical companies to KP to successfully navigate through this digital transformation.

The wider implications of AI on the well-being, job satisfaction and work-life balance of employees is also discussed in the context of this research. Repetitive tasks are some of the activities that can be automated by AI to leave employees with more valuable and creative tasks that might increase job fulfillment and intrinsic motivation. But this change does not come without difficulties. The impending risk of job loss and the necessity of reskilling are important issues that should be approached by the leadership to ensure the high rates of employee engagement (Sharma & Patel, 2025). This paper seeks to offer pertinent information that will help pharmaceutical companies in KP to maximize their AI adoption strategies to enable them develop a motivated, engaged, and productive workforce.

### Literature Review

The influence of AI implementation on employee engagement in pharmaceutical industry is becoming an increasingly popular subject. This relationship also largely depends on leadership support whereby it is crucial in the way employees feel and react to technological changes. The reason is that leadership support is part of the AI integration success as it offers the resources, direction, and encouragement required

by the employees (Sood & Kumar, 2024). It has been found that employees are more likely to embrace the changes and stay interested in the work when the leadership is visible in terms of supporting technological advances (Singh and Thakur, 2023). Nevertheless, lack of a good leader may result in opposition, a feeling of distrust, and lack of engagement, which negates the possible positive outcomes of the implementation of AI (Li and Sun, 2025).

The other factor that should be taken into account here is the role of the organizational culture in determining the level of employee engagement in the process of AI adoption. Positive employee outcomes are more likely to be achieved with the help of a culture that promotes innovation, learning, and openness to change (Tan & Yu, 2023). Studies by Lee and Jin (2024) point out that companies that consider trust and collaboration as a part of their culture will be more able to overcome the challenges associated with AI integration. On the contrary, companies that have a more strict and hierarchical culture may experience considerable problems with the involvement of the employees into new technologies. Compliance with the current organizational culture may boost or slow down the engagement of the employees, so cultural alignment will be an essential part of the successful implementation of AI (Pan and Chiu, 2024).

The nature of the work itself also has an impact on the direct impact of AI on employee engagement. Routine and repetitive processes that are automated using AI technologies will quickly decrease the cognitive burden and leave employees to do more meaningful and value-added work (Sinha and Arora, 2024). This transition is capable of boosting job satisfaction, intrinsic motivation and general engagement. Nevertheless, job redesign using AI can also cause anxiety to the employees who will be afraid that their jobs will become irrelevant or they will be unable to succeed in the AI-based world due to a lack of the required skills (Mehta and Srivastava, 2024). According to Mishra and Tiwari (2023), the use of AI may give rise to both development opportunities and job displacement issues. Thus, the impact of the leadership on employee engagement can be enormous in the way leadership will cover these concerns through support and training.

Another factor that is critical towards ensuring that the adoption of AI will have a positive engagement outcome is the provision of training and development opportunities. Employees who focus on employee training and upskilling will reduce the obsolescence fear and make employees feel empowered (Jain and Agarwal, 2023). Organizations can enhance job satisfaction and engagement as well as productivity, by providing employees with skills that allow them to collaborate with AI systems (Rao and Kumar, 2023). The training programs aiming at the development of technical and soft skills, including problem-solving and decision-making, are especially efficient in boosting the engagement of the employees in the AI era (Sharma and Patel, 2025).

### **Methodology**

The research design adopted is quantitative, which will utilize surveys that would be used to collect data among employees who work in pharmaceutical firms in Khyber

Pakhtunkhwa. The survey will measure the level of engagement among employees, how much they have adopted AI, and the mediation of the relationship between the two through leadership support. Participants will be selected using stratified random sampling in order to represent the employees of different job positions in the pharmaceutical industry. Data will be analyzed with the help of statistical tools like regression analysis and reveal the strength and nature of the relationships among AI adoption, leadership support, and employee engagement. The findings are very informative to understand how leadership may contribute to successful implementation of AI and increase employee engagement within pharmaceutical sector.

**Results and Discussion**

The findings of the survey of the employees of the pharmaceutical firms in Khyber Pakhtunkhwa (KP) provide important information about the effects of Artificial Intelligence (AI) implementation on employee engagement and the role of the support of the leadership. The number of those who took part in the survey amounted to 200 employees, and the responses were obtained throughout the group of people working in various occupations, such as management, technical, and operational employees. Regression was used to analyze the data to determine the relationship between the adoption of AI, support of the leaders, and the involvement of employees.

Table 1: Descriptive statistics of AI Adoption, Leadership support, and employee engagement

Variable	Mean	Standard Deviation
AI Adoption	3.92	0.76
Leadership Support	4.15	0.71
Employee Engagement	4.04	0.68

The findings demonstrate a moderate to high adoption of AI (Mean = 3.92) among the surveyed firms, which means that AI technologies have been extensively used, especially in drug discovery, optimization of production, and management of clinical trials. Leadership support was also very high (Mean = 4.15) indicating that the organizational leaders are taking an active part in supporting the adoption of AI by providing communication, resources, and training. The level of engagement among the workers was positive, with a mean of 4.04 in employee engagement measured using job satisfaction, motivation and commitment to the organization.

Table 2: Regression analysis findings of AI adoption and employee engagement

Variable	Beta	Standard Error	t-value	p-value
AI Adoption	0.43	0.09	4.78	0.000
Leadership Support	0.35	0.08	4.46	0.000
AI Adoption x Leadership Support	0.28	0.07	3.92	0.000

The regression analysis shows that AI uptake and leadership support have a positive impact on employee engagement. Particularly, the adoption of AI is positively correlated with employee engagement ( $b = 0.43$ ,  $p < 0.001$ ), which proves that employees working in the setting where AI is more adopted are more likely to be more engaged. This finding can be linked to earlier studies by Sinha and Arora (2024), who have discovered that the automated mundane tasks and the ability of the employees to engage in less routine work, which is more intricate and creative, can positively affect job satisfaction and intrinsic motivation.

Leadership support also plays an important role in mediating the relationship between the adoption of AI and employee engagement. The relationship between the adoption of AI and leadership support ( $b = 0.28$ ,  $p < 0.001$ ) indicates that the positive impact of AI adoption on employee engagement is enhanced by the support of the leaders. This finding corresponds with the argument presented by Sood and Kumar (2024) who opined that a certain climate of trust and openness could be cultivated by the leader, making the employees less resistant to the introduction of AI and leading to increased engagement levels. This is one of the reasons why leadership matters in making sure that the adoption of AI is viewed as a growth opportunity and not a job security threat.

### Discussion

The research results of the given work indicate that the implementation of AI in the pharmaceutical branch in Khyber Pakhtunkhwa has a beneficial effect on employee engagement, and the mediating role of leadership is essential. The correlation between the adoption of AI and employee engagement is positive, which aligns with the existing literature, which states that AI may enhance job satisfaction and motivation by working as it can decrease routine work and give employees an opportunity to perform more meaningful and valuable work (Jain and Agarwal, 2023; Mehta and Srivastava, 2024). Automation of tedious workloads automates the mind, leaving employees to dedicate their time to more valuable work, hence engaging them more.

Nevertheless, the findings have also brought out that effective adoption of AI depends on effective leadership support. The active communication of the advantages of AI, sufficient training, and the consideration of the issues related to job displacement are the factors that help leaders to create a positive reaction among employees (Sinha and Arora, 2024). It is especially relevant in the rise of the new market such as Khyber Pakhtunkhwa, where the employees can be worried about whether they have sufficient skills to adjust to the changes, which are driven by AI (Rao and Kumar, 2023). The findings of the regression analysis indicate that leadership support mediates the effect of AI adoption, which increases the positive effects of AI adoption on employee engagement. The reason behind the finding is that it goes in line with the theory of the Social Exchange Model, which states that employees are better engaged when they feel organizational support.

Conversely, the research also suggests the possible obstacles that are related to the implementation of AI especially when it comes to how the employees are going to view job security. Even though AI positively influences engagement, not all employees will feel safe with the process of automating their work. This highlights

the fact that leadership is required to make sure that AI implementation occurs in a manner that would increase confidence among employees and job security. According to Mishra and Tiwari (2023), resistance and lack of engagement can occur as a result of an insufficient level of trust toward AI. Thus, the leadership should actively participate in these issues and offer constant training and upskilling to provide employees with a chance to effectively introduce AI into their work.

### **Conclusion**

To sum up, the implementation of Artificial Intelligence (AI) in pharmaceutical sector of Khyber Pakhtunkhwa is also very effective in increasing the engagement of employees and leadership support is an important factor in mediating the relationship. The results of this research imply that the application of AI has positive effects on employee engagement because since it automatizes the routine activities, employees are able to concentrate on creative and more complicated areas of their functioning and, in this way, their work is more satisfying and motivating. But, the technological implementation of AI is not the only factor that determines its success since the assistance of leadership plays a critical role. With communication, training and other issues like job security, there is a multiplication of the positive impacts of AI on employee engagement through good leadership. These findings underscore the need to adopt an approach that is collaborative towards the adoption of AI in which the leadership will make sure the workers feel encouraged and empowered throughout the process. In spite of the advantages, the research also points at possible obstacles, including resistance to change and fear of job displacement which can negatively affect the effectiveness of AI implementation as a whole. As such, pharmaceutical firms should focus on the leadership engagement and employee training to ensure they can reap the benefits of AI, as well as retain the motivated and engaged workforce.

### **Recommendations:**

**Elevate Leadership Engagement:** It is important that pharmaceutical firms have their leaders proactively involved in supporting the implementation of AI through communicating the advantages of the practice, providing sufficient support, and taking care of the employees. Leadership must actively participate in the process of introducing the working force to AI, building trust, and alleviating change resistance.

**Invest in Employee Training and Upskilling:** Organizations should focus their attention on the continuous training and development processes to provide the employees with the skills that they need to operate successfully with AI technologies. This will not only enhance confidence but will also minimize anxiety in relation to job security and make employees feel empowered to excel in AI-enhanced jobs.

**Develop a Supportive and Open Organizational Culture:** Organizational culture should be fostered in such a way that employees are aware of the processes behind AI implementation and are willing to give feedback. The participation of employees when coming to a decision regarding the adoption of AI will contribute to enhancing their interest and developing a feeling of belonging in the process of transition.

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