International Journal of Innovative Research and Scientific Studies, 8(2) 2025, pages: 2473-2482

IJIRSS
International Journal of Innovative Research & Scientific Studies

ISSN: 2617-6548

URL: www.ijirss.com

Unveiling the impact of artificial intelligence on economic performance: The mediating roles of leadership and employee engagement

Sultan Alateeg[1*], Ngeyan Nega Almutairi[2], Ahmed Diab[3]

[1]*Department of Management Information System, College of Business Administration, Majmaah University, AL-Majmaah 11952, Saudi Arabia.*
[2]*College of Business Administration, Majmaah University, Al-Majma'ah, 11952, Saudi Arabia.*
[3]*Accounting Department, Prince Sultan University, Riyadh, Saudi Arabia and Faculty of Commerce, Beni-Suef University, Beni-Suef, Egypt.*

Corresponding author: Sultan Alateeg (*Email:* s.alateeg@mu.edu.sa)

Abstract

This study explores the interplay between artificial intelligence (AI), leadership, employee engagement, and economic performance within the manufacturing sector of Saudi Arabia. Adopting a cross-sectional design, data was collected in March 2025 from employees using an online survey questionnaire. Convenience sampling was employed to gather responses from a diverse workforce, ensuring accessibility and feasibility. Data analysis was conducted using Structural Equation Modeling (SEM) with SmartPLS to examine the hypothesized relationships. The findings reveal that AI significantly influences leadership and employee engagement, highlighting its role as a strategic enabler in enhancing decision-making, innovation, and employee motivation. Leadership, in turn, positively impacts economic performance, while employee engagement shows a strong direct effect on economic performance. The study also identifies significant indirect effects, where AI influences economic performance through leadership and employee engagement. These results underscore the importance of integrating AI with effective leadership practices and a culture of engagement to drive organizational success. The study highlights AI's indirect effects on organizational dynamics and offers practical insights for leveraging AI to enhance leadership, employee engagement, and economic outcomes. For organizations in the manufacturing sector and beyond, the findings highlight the need for a holistic approach to AI implementation, combining technological innovation with human-centric strategies to achieve sustainable growth and competitive advantage.

Keywords: Artificial intelligence, Employee engagement, Leadership, Economic performance, Saudi Arabia.

DOI: 10.53894/ijirss.v8i2.5706
Funding: This study received no specific financial support.
History: Received: 14 February 2025 / **Revised:** 17 March 2025 / **Accepted:** 21 March 2025 / **Published:** 26 March 2025

Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Acknowledgment: The authors would like to thank Prince Sultan University for their support.
Publisher: Innovative Research Publishing

1. Introduction

In recent years, artificial intelligence (AI) has emerged as a transformative force across industries, revolutionizing the way organizations operate, make decisions, and engage with their workforce. From automating routine tasks to enabling predictive analytics and enhancing decision-making, AI has become a cornerstone of modern business strategies [1-4]. Its applications span various domains, including customer service, supply chain management, and human resources, making it a critical driver of efficiency, innovation, and competitiveness [5, 6]. The manufacturing sector, in particular, has been at the forefront of AI adoption, leveraging technologies such as robotics, machine learning, and Internet of Things (IoT) to optimize production processes, reduce costs, and improve product quality [7].

Leadership plays a pivotal role in shaping organizational culture, driving innovation, and fostering employee engagement [8]. Effective leadership is critical for navigating the complexities of technological change and ensuring that AI initiatives align with organizational goals. With the advent of AI, leaders are now equipped with advanced tools and data-driven insights that can enhance decision-making, strategic planning, and innovation [9]. However, the extent to which AI influences leadership effectiveness and, in turn, impacts employee engagement and economic performance remains underexplored. Similarly, employee engagement, which is closely linked to productivity, innovation, and organizational success, may be significantly influenced by AI-driven changes in work processes and environments. AI can streamline workflows, reduce repetitive tasks, and provide employees with meaningful insights, potentially increasing their motivation and commitment [10]. Conversely, concerns about job displacement or privacy issues may hinder engagement. Understanding these dynamics is essential for organizations seeking to harness the full potential of AI while maintaining a motivated and committed workforce.

As organizations increasingly integrate AI into their operations, understanding its broader impact on leadership practices, employee engagement, and economic performance have become essential. This study aims to explore these interrelationships within the context of Saudi Arabia's manufacturing sector, a key driver of the nation's Vision 2030 initiative, which emphasizes economic diversification and technological innovation. This study fills a literature gap by examining the relationships between AI, leadership, employee engagement, and economic performance. By doing so, it provides valuable insights into how AI can be leveraged to enhance organizational outcomes. The findings of this study have significant implications for both theory and practice. From a theoretical perspective, it contributes to the growing body of literature on AI's role in organizational dynamics by highlighting its indirect effects through leadership and engagement. Practically, the study offers actionable recommendations for organizations aiming to integrate AI into their operations while fostering effective leadership and employee engagement. By aligning technological advancements with human-centric strategies, organizations can achieve sustainable growth and maintain a competitive edge in an increasingly AI-driven world. Therefore, this study serves as a roadmap for leveraging AI to enhance leadership, engagement, and economic performance in the manufacturing sector and beyond.

2. Literature Review

The rapid advancement of AI has transformed the way organizations operate, making it a critical area of research in the fields of leadership, employee engagement, and organizational performance [10]. This literature review explores the relationships between AI, leadership, employee engagement, and employee performance, focusing on six key hypotheses. By examining existing studies and theoretical frameworks, this section provides a comprehensive understanding of how AI influences leadership and engagement, and how these factors, in turn, impact employee performance.

2.1. Artificial Intelligence and Leadership

AI has become a game-changer for leadership practices, offering tools and insights that enhance decision-making, strategic planning, and innovation [11]. AI enables leaders to analyze vast amounts of data, identify patterns, and make informed decisions, thereby improving their effectiveness [12]. AI-driven analytics can provide leaders with real-time insights into market trends, customer behavior, and operational efficiency, allowing them to respond quickly to changing conditions [13]. This capability is particularly valuable in the manufacturing sector, where leaders must navigate complex supply chains and production processes [14].

Moreover, AI can automate routine tasks, freeing up leaders to focus on higher-order responsibilities such as strategic planning and employee development [15]. By reducing administrative burden, AI allows leaders to dedicate more time to fostering innovation and building relationships with their teams. However, the integration of AI into leadership also presents challenges, such as the need for leaders to develop digital competencies and adapt to new technologies [9]. Leaders who successfully leverage AI can enhance their decision-making capabilities, drive innovation, and improve organizational outcomes. Hence, the following hypothesis is proposed:

$H_{1:}$ AI has a significant influence on leadership.

2.2. Artificial Intelligence and Employee Engagement

Employee engagement is a critical factor in organizational success, as it directly impacts productivity, innovation, and employee retention [16]. AI has the potential to significantly enhance employee engagement by transforming work processes and creating a more efficient and motivating work environment. AI-driven tools can automate repetitive tasks, provide personalized feedback, and offer insights that help employees perform their roles more effectively [17, 18]. By reducing mundane tasks and enabling employees to focus on more meaningful work, AI can increase job satisfaction and engagement [19].

Additionally, AI can foster a culture of transparency and collaboration by providing employees with access to real-time data and insights [20]. This transparency can enhance employees' sense of involvement and commitment to organizational goals. However, the impact of AI on engagement may also depend on how it is implemented. Concerns about job displacement or privacy issues could potentially hinder employee morale, highlighting the need for organizations to address these challenges proactively. When implemented effectively, AI can create a more engaging work environment, leading to higher levels of employee motivation and commitment. Hence, the following hypothesis is proposed:
$H_{2:}$ AI has a significant influence on employee engagement.

2.3. Leadership and Employee Performance

Leadership plays a critical role in shaping employee performance by providing direction, motivation, and support. Effective leaders inspire their teams, set clear goals, and create an environment that encourages innovation and collaboration [21]. Leaders who promote a culture of trust and empowerment can significantly enhance employee productivity and performance. Transformational leadership, which focuses on inspiring and motivating employees, can positively affect performance by fostering intrinsic motivation and encouraging employees to go beyond their formal responsibilities [22]. Leaders also play a key role in aligning individual goals with organizational objectives, ensuring that employees understand how their contributions contribute to the overall success of the organization. By providing regular feedback and recognition, leaders can boost employee morale and performance [23]. Furthermore, leaders who embrace AI-driven insights can make more informed decisions about resource allocation, training, and performance management, further enhancing employee outcomes. This hypothesis posits that leadership has a direct and positive influence on employee performance by providing the necessary guidance, motivation, and support [24].

The relationship between AI and employee performance is not a direct one. It may be mediated by leadership. AI equips leaders with tools and insights that enhance their ability to guide and support their teams, thereby indirectly improving employee performance [25]. AI-driven analytics can help leaders identify performance gaps, provide targeted feedback, and allocate resources more effectively, all of which contribute to improved employee outcomes [26]. Leaders who leverage AI can also create a more data-driven and innovative work environment, which can inspire employees to perform at their best. By using AI to streamline processes and enhance decision-making, leaders can set a positive example for their teams, fostering a culture of continuous improvement and excellence. The following hypotheses suggest that leadership acts as a bridge between AI and employee performance, translating technological advancements into actionable strategies that drive performance:

$H_{3:}$ Leadership has a significant influence on employee performance.

$H_{4:}$ Leadership mediates the relationship between AI and employee performance.

2.4. Employee Engagement and Employee Performance

Employee engagement is a key determinant of employee performance, as engaged employees are more likely to be motivated, committed, and productive [27]. Engaged employees exhibit higher levels of enthusiasm, creativity, and dedication, which directly contribute to better performance outcomes. Employees who are passionate about their work are more likely to go above and beyond their formal responsibilities, leading to higher levels of innovation and productivity [28]. Studies have shown that organizations with high levels of employee engagement tend to achieve superior financial results and operational efficiency [29, 30]. Engaged employees are also more likely to stay with the organization, reducing turnover costs and maintaining institutional knowledge [31]. Furthermore, engaged employees are better equipped to handle challenges and adapt to change, making them valuable assets in dynamic and competitive environments. This hypothesis posits that employee engagement has a direct and positive influence on employee performance by fostering a motivated and committed workforce.

AI can indirectly influence employee performance through its impact on employee engagement. By automating routine tasks, providing meaningful insights, and creating a more efficient work environment, AI can enhance employee engagement, which in turn drives performance [32]. AI-driven tools can help employees manage their workloads more effectively, reducing stress and increasing job satisfaction. Engaged employees are more likely to leverage AI tools effectively, leading to improved productivity and innovation [33]. Moreover, AI can foster a culture of transparency and collaboration, which can enhance employees' sense of involvement and commitment to organizational goals [34]. When employees feel engaged and supported, they are more likely to perform at their best, contributing to the overall success of the organization. The last two hypotheses suggest that employee engagement serves as a mediator between AI and employee performance, highlighting the importance of fostering engagement to maximize the benefits of AI:

$H_{5:}$ Employee engagement significantly influences employee performance.

$H_{6:}$ Employee engagement mediates the relationship between AI and employee performance

Figure 1 presents the research model.”

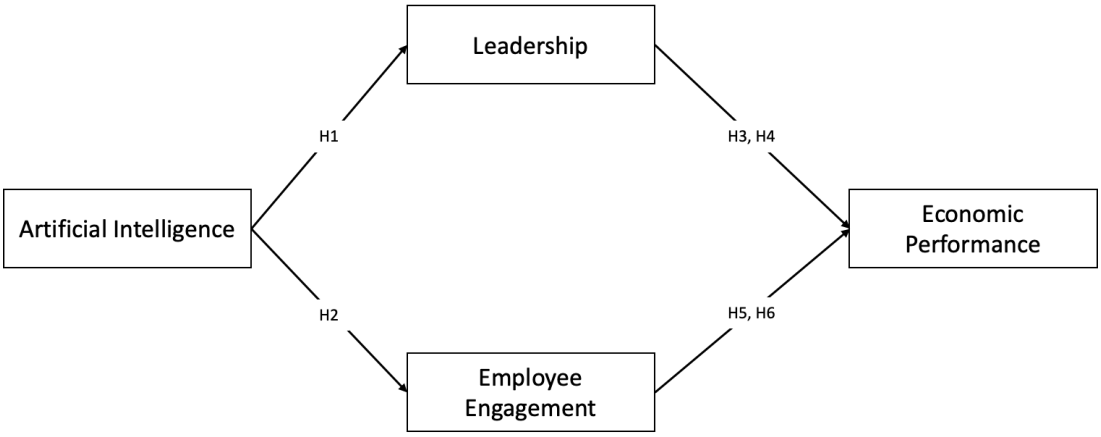

Figure 1.
Research Model.

3. Methodology

This study adopted a cross-sectional study design to examine the relationships between AI, Leadership, Employee Engagement, and Economic Performance. Data were collected from employees working in the manufacturing sector in Saudi Arabia during March 2025. The manufacturing sector was chosen as the focus of this study due to its strategic importance in Saudi Arabia's economy, particularly in the context of the nation's Vision 2030 initiative, which emphasizes economic diversification and technological advancement. This sector is at the forefront of AI adoption, utilizing technologies such as automation, predictive analytics, and machine learning to enhance productivity and innovation. Its reliance on AI provides a rich context for understanding how technological advancements influence organizational dynamics, making it an ideal setting for this research.

The study employed a convenience sampling technique to select participants, ensuring accessibility and feasibility in data collection. Convenience sampling was justified by the practical challenges of accessing a large and geographically dispersed workforce within the manufacturing sector. While this approach may limit generalizability, it is a pragmatic and efficient method for exploratory studies aiming to understand complex relationships within a specific context. The diverse workforce in the manufacturing sector, which includes both local and expatriate employees across various organizational levels, allowed for a comprehensive examination of how AI and leadership practices influence employee engagement and performance across different demographic and professional groups.

Data collection was conducted through an online survey, leveraging digital platforms to reach a wide audience efficiently. The questionnaire utilized a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), to measure participants' perceptions and experiences. The constructs in the study were operationalized using validated items from prior research. Specifically, seven items for AI were adapted from Paschen, et al. [35] and Wijayati, et al. [36] focusing on the role of AI in enhancing decision-making, data accuracy, and privacy protection. Four items for Leadership were adapted from Djordjevic, et al. [37] emphasizing the role of senior management in promoting innovation and strategic planning. Eight items for Employee Engagement were adapted from Wijayati, et al. [36] capturing aspects such as employee passion, enthusiasm, and commitment to organizational success. For Economic Performance, respondents were asked to evaluate their organization's performance over the past 12 months compared to leading competitors using a 5-point Likert-type scale (1 = well below average, 5 = well above average). Three items for this construct were adapted from Henri and Journeault [38] focusing on metrics such as return on investment, operating profits, and cash flow from operations.

Data analysis was performed using “Structural Equation Modeling” (SEM) with “SmartPLS version 4”. SEM was chosen for its ability to analyze complex relationships between multiple constructs simultaneously and to handle both measurement and structural models.

4. Results

The demographic profile (Table 1) of the study participants (n = 240) reveals a higher proportion of male respondents (68%) compared to females (32%), indicating a gender imbalance among the participants. The majority of respondents fall within the 25–34 age group (35%), followed by those aged 35–44 (27%), while younger participants below 25 account for 23%. Older age groups, including 45–54 years (13%) and 55 years and above (2%), are less represented. Regarding educational qualifications, most participants hold a bachelor’s degree (61%), while 24% have a high school diploma or less. A smaller proportion possesses higher education, with 13% holding a master’s degree and only 2% having a doctorate. In terms of job positions, mid-level managers constitute the largest group (40%), followed by entry-level employees (35%). Senior managers and executives/directors are equally represented, each making up 13% of the sample. Participants' work experience varies significantly, with the majority having less than two years (42%) or between two to five years (41%) of experience. Fewer participants have six to ten years (15%), while only 2% possess more than ten years of experience. This distribution suggests that the study predominantly includes early to mid-career professionals.

Table 1.
Demographics of study participants (n=240).

Category	Subcategory	Frequency	Percentage
Gender	"Male"	163	68%
	"Female"	77	32%
Age	"Below 25"	56	23%
	"25–34"	83	35%
	"35–44"	65	27%
	"45–54"	32	13%
	"55 and above"	4	2%
Highest Education Level	"High school diploma or less"	58	24%
	"Bachelor's degree"	147	61%
	"Master's degree"	30	13%
	"Doctorate/PhD"	5	2%
Current Job Position	"Entry level"	84	35%
	"Mid-level manager"	95	40%
	"Senior manager"	30	13%
	"Executive/Director"	31	13%
Years of Experience	"Less than 2 years"	101	42%
	"2–5 years"	99	41%
	"6–10 years"	35	15%
	"More than 10 years"	5	2%

Table 2 presents the measurement model for the constructs of AI, Leadership, Employee Engagement, and Economic Performance, along with their respective items, loadings, and reliability metrics. For the AI construct, all items exhibit high factor loadings, ranging from 0.714 to 0.890, indicating strong correlations with the construct. The "Cronbach's alpha" of 0.809 and composite reliability of 0.729 suggest good internal consistency, while the AVE of 0.657 meets the threshold for convergent validity. Items such as AI3 ("AI can help in making important decisions") and AI5 ("AI can protect privacy") show particularly high loadings, emphasizing the perceived utility and trustworthiness of AI in organizational contexts. The Leadership construct also demonstrates strong reliability, with a "Cronbach's alpha" of 0.784 and composite reliability of 0.721. The AVE of 0.744 exceeds the required threshold, confirming convergent validity. The loadings for leadership items range from 0.731 to 0.829, with LD2 ("Senior management is interested in innovation strategies") and LD1 ("Senior managers promote innovation") showing the highest loadings. This highlights the role of leadership in fostering innovation and strategic planning within the organization. For Employee Engagement, the construct shows a "Cronbach's alpha" of 0.754 and composite reliability of 0.862, indicating excellent internal consistency. The AVE of 0.559 is slightly below the ideal threshold but is still acceptable given the high reliability. The loadings range from 0.710 to 0.884, with EE1 ("Using AI enhances employee effectiveness") and EE8 ("Employees believe in the successful development of the enterprise") having the highest loadings. This suggests that employee engagement is closely tied to the perceived benefits of AI and a shared belief in the organization's success. Finally, the Economic Performance construct exhibits strong reliability, with a "Cronbach's alpha" of 0.853 and composite reliability of 0.811. The AVE of 0.673 confirms convergent validity. The loadings for economic performance items range from 0.788 to 0.832, with EP1 ("Return on investment") and EP2 ("Operating profits") showing the highest loadings. This indicates that economic performance is primarily measured through financial metrics, reflecting the organization's competitive standing over the past 12 months.

Table 2.
Measurement model.

"Items with constructs"	Loadings"	Cronbach's alpha"	Composite reliability"	Average variance extracted (AVE)"
Artificial Intelligence		0.809	0.729	0.657
AI1: "Artificial intelligence can help me find lost data"	0.714			
AI2: "Artificial intelligence provides accurate data and information"	0.753			
AI3: "Artificial intelligence can help me in making important decisions in the company"	0.874			
AI4: "Artificial intelligence can help display hard-to-measure data"	0.828			
AI5: "Artificial intelligence can protect the privacy of yourself and others"	0.89			
AI6: "Artificial intelligence can help me in getting the job done"	0.806			
AI7: "The authorities can easily audit artificial	0.843			

"Items with constructs"	Loadings"	Cronbach's alpha"	Composite reliability"	Average variance extracted (AVE)"
intelligence"				
Leadership		0.784	0.721	0.744
LD1: "Senior managers promote the importance of innovation in the company"	0.803			
LD2: "Senior management is interested in the development of strategies and plans relating to innovation"	0.829			
LD3: "Improvement plans developed by senior managers are based on the management of feedback"	0.773			
LD4: "Values which are based on the innovation in our company are clearly expressed in form of objectives, principles and actions and represent the foundation of strategic planning"	0.731			
Employee Engagement		0.754	0.862	0.559
EE1: "Using AI enhance employee effectiveness"	0.884			
EE2: "Employees are engaged to the quality of their work"	0.752			
EE3: "Employees do their work with passion"	0.815			
EE4: "Employees are engaged to achieve successful business results"	0.853			
EE5: "Employees are aware of the importance of innovation for our enterprise, and they are helping to develop the enterprise"	0.793			
EE6: "Employees are enthusiastic in their work"	0.805			
EE7: "Employees are engaged for business ideas and solutions"	0.71			
EE8: "Employees believe in the successful development and operation of our enterprise"	0.853			
Economic Performance		0.853	0.811	0.673
"Performance of the organization over the past 12 months compared to leading competitors:"				
EP1: "Return on investment"	0.832			
EP2: "Operating profits"	0.815			
EP3: "Cash flow from operations"	0.788			

Table 3 presents the discriminant validity of the constructs—AI, Employee Engagement, Employee Performance, and Leadership—using the "Fornell-Larcker criterion". Discriminant validity is established when the square root of the Average Variance Extracted (AVE) for each construct (shown on the diagonal) is greater than the correlations between that construct and all other constructs (off-diagonal values). The square root of the AVE for each construct is as follows: AI (0.811), Employee Engagement (0.871), Employee Performance (0.879), and Leadership (0.862). These values, which represent the variance shared between the construct and its measures, are higher than the correlations between each construct and the others, confirming discriminant validity. The correlation between AI and Employee Engagement is 0.638, which is lower than the square root of the AVE for both constructs (0.811 and 0.871, respectively). Similarly, the correlation between Leadership and Employee Performance is 0.539, which is less than the square root of the AVE for both constructs (0.862 and 0.879).

Table 3.
Discriminant Validity (Fornell-larcker criterion).

	AI	Employee Engagement	Employee Performance	Leadership
AI	0.811			
Employee Engagement	0.638	0.871		
Employee Performance	0.584	0.514	0.879	
Leadership	0.754	0.654	0.539	0.862

Table 4 presents the path coefficients, which indicate the strength and significance of the relationships between the constructs in the proposed model. All hypotheses (H1 to H6) are supported, as evidenced by the significant p-values ($p < 0.01$) and high t-statistics (all exceeding the threshold of 1.96). The path from AI to Leadership has a strong positive beta value of 0.854, indicating that AI significantly influences leadership practices. This suggests that the adoption and use of AI technologies enhance leadership capabilities, likely by providing data-driven insights and decision-making tools. Similarly, the path from AI to Employee Engagement shows a beta value of 0.838, highlighting that AI positively impacts

employee engagement. This implies that AI tools and systems contribute to greater employee involvement, effectiveness, and enthusiasm in their work. The relationship between Leadership and Employee Performance is also significant, with a beta value of 0.517. This indicates that effective leadership practices directly improve employee performance, likely by fostering innovation, providing clear direction, and supporting employee development. Furthermore, the indirect path from AI to Employee Performance through Leadership (beta = 0.685) demonstrates that AI not only directly influences leadership but also enhances employee performance by strengthening leadership practices. The path from Employee Engagement to Employee Performance has a beta value of 0.728, showing a strong positive relationship. This suggests that higher levels of employee engagement led to better performance, as engaged employees are more passionate, committed, and aligned with organizational goals. Additionally, the indirect path from AI to Employee Performance through Employee Engagement (beta = 0.61) indicates that AI contributes to improved performance by boosting employee engagement.

Table 4.
Path coefficients.

Paths	Beta	Standard deviation	T statistics	P values	Results
AI -> Leadership	0.854	0.034	24.927	0.00	"H1 supported"
AI -> Employee Engagement	0.838	0.05	16.774	0.00	"H2 supported"
Leadership -> Employee Performance	0.517	0.131	4.656	0.00	"H3 supported"
AI -> Leadership -> Employee Performance	0.685	0.114	7.63	0.00	"H4 supported"
Employee Engagement -> Employee Performance	0.728	0.122	5.98	0.00	"H5 supported"
AI -> Employee Engagement -> Employee Performance	0.61	0.11	5.526	0.00	"H6 supported"

The R-square values provide insights into the explanatory power of the model, indicating how well the independent variables account for the variance in the dependent constructs (Figure 2). For Leadership, the R-square value of 0.729 suggests that 72.9% of the variance in leadership practices is explained by AI. This high value highlights the significant influence of AI on leadership, likely by equipping leaders with advanced tools and data-driven insights that enhance decision-making, strategic planning, and innovation within the organization. The strong relationship underscores the transformative role of AI in shaping effective leadership. For Employee Engagement, the R-square value of 0.702 indicates that 70.2% of the variance in employee engagement is explained by AI. This demonstrates that AI plays a crucial role in fostering employee engagement, likely by streamlining work processes, improving efficiency, and creating a more innovative and supportive work environment. The high explanatory power suggests that AI not only enhances operational effectiveness but also contributes to employees' emotional and psychological investment in their work, leading to higher levels of engagement. Finally, for Economic Performance, the R-square value of 0.848 reveals that 84.8% of the variance in economic outcomes is explained by the combined effects of Leadership and Employee Engagement. This very high value emphasizes the critical role of effective leadership and engaged employees in driving the organization's financial success, such as return on investment, operating profits, and cash flow. It suggests that leadership practices and employee engagement are key mediators through which AI indirectly influences economic performance, highlighting their importance in achieving organizational goals.

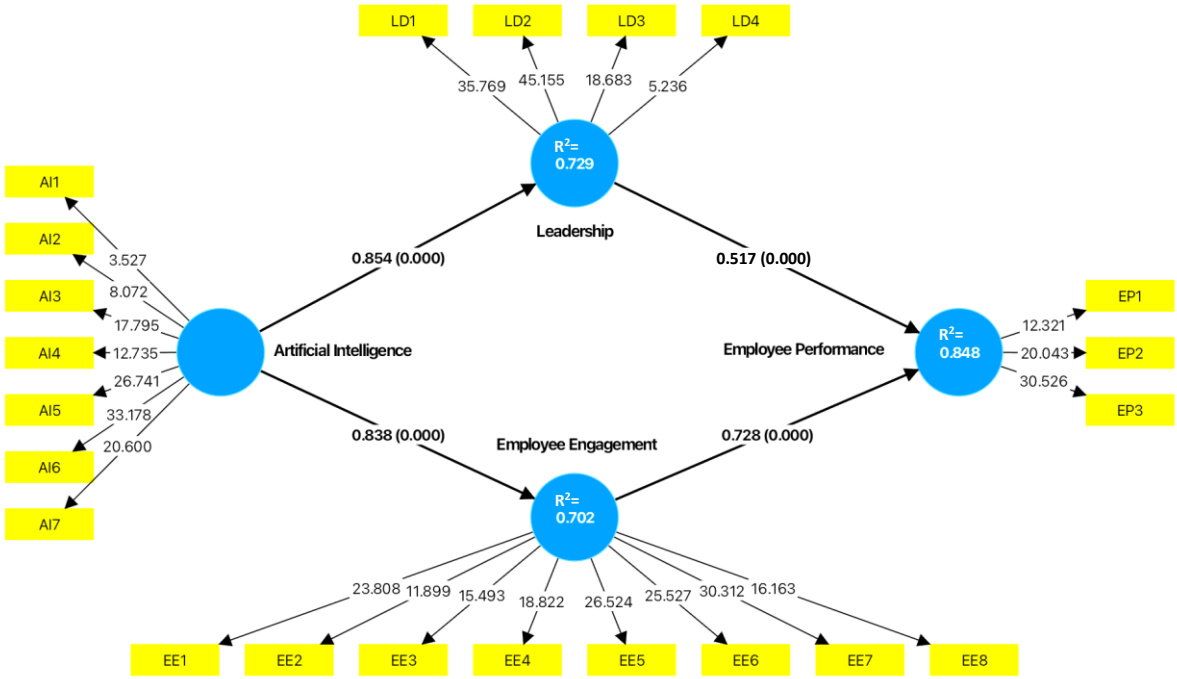

Figure 2.
Structural model.

5. Discussion

The findings of this study provide valuable insights into the interplay between AI, leadership, employee engagement, and economic performance within organizational contexts. The results highlight the transformative role of AI in shaping leadership practices and fostering employee engagement, which collectively drive economic outcomes. The strong path coefficients further reinforce these relationships. The significant impact of AI on leadership (beta = 0.854) and Employee engagement (beta = 0.838) demonstrates that AI is not just a technological tool but a strategic asset that enhances human capital. Leadership, in turn, positively influences employee performance (beta = 0.517), highlighting the importance of effective leadership in translating AI-driven insights into actionable outcomes. Similarly, the direct and indirect effects of employee engagement on economic performance (beta = 0.728 and 0.610, respectively) emphasize the critical role of engaged employees in achieving organizational success. Engaged employees, who are passionate and committed to their work, are more likely to contribute to innovation, productivity, and financial performance. By providing data-driven insights, streamlining processes, and enhancing decision-making, AI empowers leaders to innovate and strategize more effectively, while also creating a work environment that motivates employees to perform at their best.

The high R-square values for leadership (0.729) and employee engagement (0.702) underscore the substantial influence of AI on these constructs, suggesting that AI serves as a critical enabler of effective leadership and a catalyst for employee involvement and enthusiasm. The high R-square value for economic performance (0.848) further validates the model, indicating that leadership and employee engagement collectively explain a significant portion of the variance in economic outcomes [39]. This suggests that while AI provides the technological foundation, it is the human elements—leadership and employee engagement—that ultimately drive economic success [40]. Organizations that effectively integrate AI into their operations while simultaneously investing in leadership development and employee engagement are likely to achieve superior performance.

The findings of this study carry significant implications for organizations in Saudi Arabia, particularly within the context of the nation's Vision 2030 initiative, which emphasizes economic diversification, technological innovation, and human capital development [41]. As Saudi Arabia continues to transition from an oil-dependent economy to a knowledge-based economy, the integration of AI into organizational practices presents a unique opportunity to enhance leadership, employee engagement, and economic performance. These implications can be categorized into theoretical, managerial, strategic, and practical dimensions, each offering actionable insights for organizations operating in the Saudi context.

From a theoretical perspective, this study contributes to the growing body of literature on AI by positioning it as a strategic enabler rather than just a technological tool. For Saudi Arabia, where the adoption of advanced technologies is a key pillar of Vision 2030, this perspective is particularly relevant. The strong relationships between AI, leadership, and employee engagement highlight AI's role in shaping organizational dynamics and human capital development [42]. This expands the understanding of AI's indirect effects on performance through mediating factors like leadership and engagement, providing a foundation for future research in the region. Additionally, the study offers an integrated framework that connects AI, leadership, engagement, and economic performance, which can serve as a model for scholars and practitioners in Saudi Arabia to explore similar interrelationships in different sectors or with additional variables, such as cultural or industry-specific factors.

From a managerial standpoint, the findings emphasize the importance of investing in AI-driven leadership development. In Saudi Arabia, where leadership practices are often influenced by cultural and traditional norms, equipping leaders with AI tools and data-driven insights can enhance decision-making, strategic planning, and innovation. Training leaders to leverage AI effectively will ensure that technological advancements translate into actionable outcomes, aligning with the goals of Vision 2030. Furthermore, managers should recognize the role of AI in fostering employee engagement. By implementing AI systems that streamline workflows, improve efficiency, and provide meaningful insights, organizations can create a more engaging and motivating work environment. This is particularly important in Saudi Arabia, where a young and dynamic workforce is increasingly seeking meaningful and innovative work experiences. Building a culture of innovation is also critical, as the study highlights the importance of leadership in promoting innovation. Managers should cultivate an environment that encourages experimentation, feedback, and continuous improvement, aligning AI initiatives with organizational values and goals to inspire employees to embrace innovation.

Strategically, the study underscores the need for a holistic approach to AI implementation in Saudi Arabia. Organizations should ensure that technological investments are complemented by human capital development, aligning AI strategies with leadership practices and employee engagement initiatives to maximize overall impact. This is especially relevant in the Saudi context, where the government is actively promoting digital transformation and innovation across sectors. Measuring and monitoring the impact of AI on leadership and engagement is equally important, as it allows organizations to make data-driven adjustments to their strategies. The strong relationship between leadership, employee engagement, and economic performance suggests that focusing on these human elements can drive financial success. By leveraging AI to strengthen leadership and engagement, organizations in Saudi Arabia can achieve sustainable growth and maintain a competitive edge in the global market. Additionally, addressing ethical and privacy concerns related to AI implementation is crucial to building trust among employees and stakeholders. Transparent AI practices and robust data governance frameworks will be essential in achieving this, particularly in a region where data privacy and ethical considerations are gaining increasing attention.

Practically, organizations in Saudi Arabia should invest in training programs to upskill employees and leaders in AI technologies, ensuring they can effectively utilize AI tools and contribute to the organization's success. This aligns with Vision 2030's focus on developing local talent and reducing reliance on expatriate labor. Collaborative AI adoption,

involving IT departments, leadership teams, and employees, will ensure that AI systems are aligned with organizational needs and user expectations. Finally, using feedback from employees and leaders to continuously refine AI systems and strategies will help organizations adapt to changing needs and maximize the benefits of AI. Saudi organizations can establish innovation labs or AI centers of excellence to pilot AI initiatives and gather feedback for iterative improvements.

6. Conclusion

This study highlights the transformative role of AI in shaping leadership practices, fostering employee engagement, and driving economic performance within organizations. The findings demonstrate that AI serves as a strategic enabler, significantly influencing leadership capabilities and creating a more engaging work environment for employees. The strong relationships between AI, leadership, and employee engagement underscore the importance of integrating technological advancements with human-centric strategies to achieve organizational success. By equipping leaders with AI-driven insights and tools, organizations can enhance decision-making, innovation, and strategic planning, while also motivating employees to perform at their best. The study also emphasizes the critical role of leadership and employee engagement as mediators between AI and economic performance. The high explanatory power of the model, as evidenced by the R-square values, confirms that effective leadership and engaged employees are essential for translating AI's potential into tangible financial outcomes. This highlights the need for organizations to adopt a holistic approach to AI implementation, ensuring that technological investments are complemented by leadership development and a culture of engagement.

Furthermore, the study provides valuable insights into both theory and practice. It contributes to the theoretical understanding of AI's indirect effects on organizational dynamics and offers a framework for future research. Practically, it offers actionable recommendations for organizations to leverage AI effectively, including investing in leadership training, fostering employee engagement, and addressing ethical and privacy concerns. By aligning AI strategies with human capital development, organizations can maximize the benefits of AI and achieve sustainable growth.

References

[1] S. Rashid, O. Fayez, H. Ismail, and R. F. Khan, "Digital social support for undergraduate students during COVID-19: Pivotal support for the digital transformation," *Journal of Public Health Research*, vol. 10, no. 4, p. jphr. 2021.2148, 2021. https://doi.org/10.4081/jphr.2021.2148

[2] F. Olan, E. O. Arakpogun, J. Suklan, F. Nakpodia, N. Damij, and U. Jayawickrama, "Artificial intelligence and knowledge sharing: Contributing factors to organizational performance," *Journal of Business Research*, vol. 145, pp. 605-615, 2022. https://doi.org/10.1016/j.jbusres.2022.03.008

[3] M. Alenezi and M. Akour, "Digital Transformation blueprint in Higher Education: A case study of PSU," *Sustainability*, vol. 15, no. 10, pp. 1-14, 2023. https://doi.org/10.3390/su15108204

[4] F. Alanazi and M. Alenezi, "Driving the future: Leveraging digital transformation for sustainable transportation," *Journal of Infrastructure, Policy and Development*, vol. 8, no. 3, p. 3085, 2024. https://doi.org/10.24294/jipd.v8i3.3085

[5] A. A. Alzaidi, "Impact of artificial intelligence on performance of banking industry in Middle East," *International Journal of Computer Science and Network Security*, vol. 18, no. 10, pp. 140-148, 2018.

[6] S.-L. Wamba-Taguimdje, S. F. Wamba, J. R. K. Kamdjoug, and C. E. T. Wanko, "Influence of artificial intelligence (AI) on firm performance: The business value of AI-based transformation projects," *Business Process Management Journal*, vol. 26, no. 7, pp. 1893-1924, 2020. https://doi.org/10.1108/BPMJ-10-2019-0411

[7] E. O. Pyzer-Knapp *et al.*, "Accelerating materials discovery using artificial intelligence, high performance computing and robotics," *npj Computational Materials*, vol. 8, no. 1, p. 84, 2022. https://doi.org/10.1038/s41524-022-00765-z

[8] Y. Peifer, T. Jeske, and S. Hille, "Artificial intelligence and its impact on leaders and leadership," *Procedia Computer Science*, vol. 200, pp. 1024-1030, 2022. https://doi.org/10.1016/j.procs.2022.01.301

[9] L. Moldenhauer and C. Londt, "Leadership, artificial intelligence and the need to redefine future skills development," in *Proceedings of the European Conference on Management, Leadership & Governance*, 2018, pp. 155-160.

[10] M. Sposato, "Leadership training and development in the age of artificial intelligence," *Development and Learning in Organizations: An International Journal*, vol. 38, no. 4, pp. 4-7, 2024. https://doi.org/10.1108/DLO-12-2023-0256

[11] M. Fullan, C. Azorín, A. Harris, and M. Jones, "Artificial intelligence and school leadership: Challenges, opportunities and implications," *School Leadership & Management*, vol. 44, no. 4, pp. 339-346, 2024. https://doi.org/10.1080/13632434.2023.2246856

[12] S. Alateeg and S. Al-Ayed, "Exploring the role of artificial intelligence technology in empowering women-led startups," *Knowledge and Performance Management*, vol. 8, no. 2, p. 28, 2024. https://doi.org/10.21511/kpm.08(2).2024.03

[13] R. E. Sari, S. Min, H. Purwoko, A. Furinto, and D. Tamara, "Artificial intelligence for a better employee engagement," *International Research Journal of Business Studies*, vol. 13, no. 2, pp. 173-188, 2020. https://doi.org/10.21632/irjbs.13.2.173-188

[14] D. M. Huber and O. Alexy, *The impact of artificial intelligence on strategic leadership. In Handbook of Research on Strategic Leadership in the Fourth Industrial Revolution*. United Kingdom: Edward Elgar Publishing, 2024, pp. 108-136.

[15] N. V. Quaquebeke and F. H. Gerpott, "The now, new, and next of digital leadership: How Artificial Intelligence (AI) will take over and change leadership as we know it," *Journal of Leadership & Organizational Studies*, vol. 30, no. 3, pp. 265-275, 2023. https://doi.org/10.1177/15480518231181731

[16] G. L. Tortorella, D. Powell, P. Hines, A. Mac Cawley Vergara, D. Tlapa-Mendoza, and R. Vassolo, "How does artificial intelligence impact employees' engagement in lean organisations?," *International Journal of Production Research*, vol. 63, no. 3, pp. 1011-1027, 2025. https://doi.org/10.1080/00207543.2024.1862023

[17] C. Hughes, L. Robert, K. Frady, and A. Arroyos, *Artificial intelligence, employee engagement, fairness, and job outcomes. In Managing technology and middle-and low-skilled employees*. United Kingdom: Emerald Publishing Limited, 2019, pp. 61-68.

[18] P. Mittal, R. B. Jora, K. K. Sodhi, and P. Saxena, "A review of the role of artificial intelligence in employee engagement," presented at the 2023 9th International Conference on Advanced Computing and Communication Systems (ICACCS), IEEE, 2023.
[19] S. Rao, J. Chitranshi, and N. Punjabi, "Role of artificial intelligence in employee engagement and retention," *Journal of Applied Management-Jidnyasa*, vol. 12, no. 2, pp. 42-60, 2020.
[20] M. A. Gusti, A. Satrianto, E. Juniardi, and H. Fitra, "Artificial intelligence for employee engagement and productivity," *Problems and Perspectives in Management*, vol. 22, no. 3, p. 174, 2024. https://doi.org/10.21511/ppm.22(3).2024.14
[21] A. Malik, P. Thevisuthan, and T. De Sliva, *Artificial intelligence, employee engagement, experience, and HRM. In Strategic human resource management and employment relations: An international perspective*. Cham: Springer International Publishing, 2022, pp. 171-184.
[22] D. Iskamto *et al.*, "Analysis of relationship between leadership and employee performance at manufactur company in Indoenesia," in *Proceedings of the 11th Annual International Conference on Industrial Engineering and Operations Management. Singapore: IEOM Society International*, 2021, vol. 8, pp. 3262-3269.
[23] N. Iqbal, S. Anwar, and N. Haider, "Effect of leadership style on employee performance," *Arabian Journal of Business and Management Review*, vol. 5, no. 5, pp. 1-6, 2015. https://doi.org/10.4172/2223-5833.1000146
[24] I. Hajiali, A. M. F. Kessi, B. Budiandriani, E. Prihatin, and M. M. Sufri, "Determination of work motivation, leadership style, employee competence on job satisfaction and employee performance," *Golden Ratio of Human Resource Management*, vol. 2, no. 1, pp. 57-69, 2022. https://doi.org/10.52970/grhrm.v2i1.160
[25] I. Buil, E. Martínez, and J. Matute, "Transformational leadership and employee performance: The role of identification, engagement and proactive personality," *International Journal of Hospitality Management*, vol. 77, pp. 64-75, 2019. https://doi.org/10.1016/j.ijhm.2018.06.014
[26] D. Iskamto, "The role of leadership and influence on employee performance in digital era," *Jurnal Manajemen Bisnis*, vol. 17, no. 4, pp. 470-484, 2020. https://doi.org/10.38043/jmb.v17i4.2730
[27] H. M. Nguyen and L. V. Nguyen, "Employer attractiveness, employee engagement and employee performance," *International Journal of Productivity and Performance Management*, vol. 72, no. 10, pp. 2859-2881, 2023. https://doi.org/10.1108/IJPPM-04-2021-0232
[28] M. Meswantri and A. Ilyas, "Determinant of employee engagement and its implications on employee performance," *International Review of Management and Marketing*, vol. 8, no. 3, pp. 36-44, 2018.
[29] V. Saxena and R. Srivastava, "Impact of employee engagement on employee performance–Case of manufacturing sectors," *International Journal of Management Research and Business Strategy*, vol. 4, no. 2, pp. 139-174, 2015.
[30] D. N. Fidyah and T. Setiawati, "Influence of organizational culture and employee engagement on employee performance: job satisfaction as intervening variable," *Review of Integrative Business and Economics Research*, vol. 9, no. 4, pp. 64-81, 2020.
[31] K. Sendawula, S. Nakyejwe Kimuli, J. Bananuka, and G. Najjemba Muganga, "Training, employee engagement and employee performance: Evidence from Uganda's health sector," *Cogent Business & Management*, vol. 5, no. 1, p. 1470891, 2018. https://doi.org/10.1080/23311975.2018.1470891
[32] O. Nazir and J. U. Islam, "Enhancing organizational commitment and employee performance through employee engagement: An empirical check," *South Asian Journal of Business Studies*, vol. 6, no. 1, pp. 98-114, 2017. https://doi.org/10.1108/SAJBS-04-2016-0036
[33] J. Anitha, "Determinants of employee engagement and their impact on employee performance," *International Journal of Productivity and Performance Management*, vol. 63, no. 3, pp. 308-323, 2014. https://doi.org/10.1108/IJPPM-01-2013-0008
[34] M. Bedarkar and D. Pandita, "A study on the drivers of employee engagement impacting employee performance," *Procedia-Social and Behavioral Sciences*, vol. 133, pp. 106-115, 2014. https://doi.org/10.1016/j.sbspro.2014.04.174
[35] J. Paschen, J. Kietzmann, and T. C. Kietzmann, "Artificial intelligence (AI) and its implications for market knowledge in B2B marketing," *Journal of Business & Industrial Marketing*, vol. 34, no. 7, pp. 1410-1419, 2019. https://doi.org/10.1108/JBIM-10-2018-0295
[36] D. T. Wijayati, Z. Rahman, M. F. W. Rahman, I. D. C. Arifah, and A. Kautsar, "A study of artificial intelligence on employee performance and work engagement: The moderating role of change leadership," *International Journal of Manpower*, vol. 43, no. 2, pp. 486-512, 2022. https://doi.org/10.1108/IJM-07-2021-0423
[37] P. Djordjevic, M. Panic, S. Arsic, and Z. Zivkovic, "Impact of leadership on strategic planning of quality," *Total Quality Management & Business Excellence*, vol. 31, no. 5-6, pp. 681-695, 2020. https://doi.org/10.1080/14783363.2018.1490176
[38] J.-F. Henri and M. Journeault, "Eco-control: The influence of management control systems on environmental and economic performance," *Accounting, Organizations and Society*, vol. 35, no. 1, pp. 63-80, 2010. https://doi.org/10.1016/j.aos.2009.02.001
[39] E. Soane, *Leadership and employee engagement. In Employee engagement in theory and practice*. United Kingdom: Routledge, 2013, pp. 149-162.
[40] M. Rožman, P. Tominc, and B. Milfelner, "Maximizing employee engagement through artificial intelligent organizational culture in the context of leadership and training of employees: Testing linear and non-linear relationships," *Cogent Business & Management*, vol. 10, no. 2, p. 2248732, 2023. https://doi.org/10.1080/23311975.2023.2248732
[41] H. H. Al-Baity, "The artificial intelligence revolution in digital finance in Saudi Arabia: A comprehensive review and proposed framework," *Sustainability*, vol. 15, no. 18, p. 13725, 2023. https://doi.org/10.3390/su151813725
[42] M. Alarefi, "The impact of artificial intelligence on business performance in Saudi Arabia: The role of technological readiness and data quality," *Engineering, Technology & Applied Science Research*, vol. 14, no. 5, pp. 16802-16807, 2024. https://doi.org/10.48084/etasr.7871