Zakariya Journal of Social Sciences (ZJSS)

ISSN Print: 2957-4897
ISSN Online: 2957-4900
Volume 5, Number 1, 2026, Pages 01 – 09
Journal Home Page
https://journals.airsd.org/index.php/zjss

Impact of Artificial Intelligence on Sustainable Performance of SME in Pakistan: The Mediating Roles of Supportive Leadership

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ARTICLE INFO

Article History:

Received:	*November*	*02, 2025*
Revised:	*December*	*30, 2025*
Accepted:	*January*	*10, 2026*
Available Online:	*January*	*19, 2026*

Keywords:

Adoption of Artificial Intelligence, Sustainable Performance, Supportive Leadership and SME in Pakistan.

ABSTRACT

The primary goal of this study is to assess whether artificial intelligence (AI), along with supportive leadership, impacts an organization's sustainable performance. To better understand the relationships among these concepts, a quantitative study was conducted. Data were collected from 280 employees working in SMEs in Pakistan. Using structural SPSS software for analysis. The study results show that AI significantly increases the sustainable performance. Furthermore, the findings demonstrate that supportive leadership has a positive moderating effect on the AI and sustainable performance. These study results may provide organizational leaders with guidance on implementing productive work environments by leveraging AI as a valuable resource to achieve sustainable performance standards, while also fostering employee participation in the strategic process of transforming systems to meet long-term objectives.

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Introduction

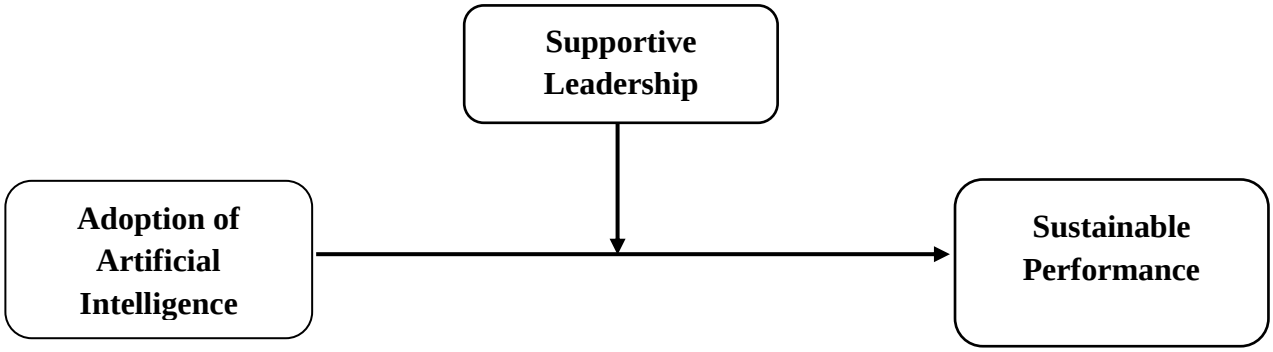
Worldwide organizations have correctly highlighted the value of using Artificial Intelligence (AI) to enhance organizational effectiveness and efficiency. AI will enable companies to implement innovative technologies and methods that ensure timely completion of all work assignments (Oyekunle & Boohene, 2024). AI will provide alternative methods for modifying and reconfiguring strategic management processes. The vast majority of organizations are currently utilizing modern technological advancements, including intelligent automation, robotics, machine learning, and predictive analytics, to enhance their overall operational efficiency and productivity (Tao et al., 2026). Thus, AI-based

technological innovation is an important aspect of achieving long-term sustainability and developing competitive advantage (Jorzik et al., 2024; Latif et al., 2025; Latif, 2025). These same applications can assist companies in enhancing decision-making and departmental performance by facilitating interdepartmental communications and enabling real-time tracking of project activities (Jorzik et al., 2024; Ma et al., 2022; Sibt-e-Ali, 2025). Furthermore, service firms may utilize AI to enhance resource allocations and reduce costs while simultaneously pursuing sustainable performance (Oluwaseun et al., 2024). To remain structurally efficient and manage complex service-related processes, industry organizations must immediately integrate AI into their systems. Sustainable performance can be realized through effective tracking of activities, process improvement, quality assurance, and enhancements to the supply chain (Espina-Romero et al., 2024; Zhu et al., 2024; Hanif et al., 2024). Developing a comprehensive regulatory framework for the implementation of AI in businesses is required to achieve this objective. To do this, organizations must successfully integrate AI capabilities into current systems and provide support to employees in quickly adapting to the new AI technology so they can fully benefit from its applications and complete their job responsibilities in alignment with commonly accepted sustainability objectives (Gurjar et al., 2024; Khan et al., 2025; Ibrahim et al., 2025). Due to the rapid advancement of AI in service businesses, it may become difficult for service companies to establish sustainable performance and invest in smart technology. There has been limited research at the interface of AI and organizational processes, as well as a low rate of AI adoption in organizational environments. While recent AI research primarily focuses on improving performance, little attention has been given to investigating the influence of environmental factors and human capital on actual results (Dwivedi, 2025). The Resource-Based Approach serves as an excellent method for managers to assess the alignment of their organization within the Strategic Management Process. Managers have employed RBT for many years as a resource-based tool for identifying those resources which can produce a "Sustainable Competitive Advantage" for the firm. Additionally, RBT is also an extremely effective framework for organizations to assess and forecast their primary source(s) of competitive advantage (Utami & Alamanos, 2023). AI serves multiple functional purposes in supporting consumers, suppliers and internal organizational activities, thereby improving long-term performance (Rejeb et al., 2019). An additional study found that AI improved Trust and Safety, lowered Costs, improved Efficiency, minimized Waste, and transformed Perceptions of Sustainable Performance. Furthermore, the implementation of AI is essential for attaining Sustainability (Queiroz et al., 2020). AI also facilitates the creation of company reporting, thereby improving long-term performance (Nicoletti & Appolloni, 2025). Leadership can provide considerable assistance in implementing current AI-based systems within the organization. The supportive nature of leadership is demonstrated by leaders' practical activities (i.e., providing encouragement to other members, increasing members' abilities, directing members toward common goals, and acknowledging members' contributions), which contribute to creating a culture of learning (Braathu et al., 2022). Moreover, such supportive behavior positively affects how effectively organizations address challenges in acquiring knowledge about AI-based systems, overcoming resistance to adopting AI, and fostering an active role for employees in learning to use new devices and methods (Sposato, 2024). In general, both the application of AI and the supportive nature of leadership are mutually influential and together provide a means for organizations to achieve their desired outcomes. AI helps leaders obtain timely information regarding ongoing operations and provides real-time operational monitoring. Furthermore, employees' motivation to properly apply AI-based technologies relies heavily on leadership. Therefore, supportive leadership is necessary to address obstacles and help organizations reach their objectives. Also, supporting leadership fosters a culture of continuous learning and motivates

employees to leverage modern technological capabilities to meet their performance objectives (Smith et al., 2018). As discussed above, the following hypotheses are formulated.

Hypothesis H1: There is a positive relationship between the adoption of artificial intelligence and sustainable performance.

Hypothesis H2: There is a positive moderator relationship between supportive leadership and the adoption of artificial intelligence and sustainable performance.



Conceptual Model

Methodology

This study examines the adoption of artificial intelligence for sustainable performance in SMEs in Pakistan. The empirical study-based moderator role of AI adoption and Sustainable performance. This research uses methodologies and analytical tools that have been developed over time, based on previous research using multidisciplinary articles by F. Saddique & N. Mushtaq et al. (2021 to 2026), in which survey instruments were shared with SMEs in Pakistan. A total of 400 surveys were initially sent; however, only 280 were completed and returned. Some methods used in research are adopted from the old studies which were done by the (N, Mushtaq & F, Saddique et al., 2020 to 2026)

Table 1: Detail of Variables, No. of Items, and Reference:

Variable	Items	Reference
Artificial Intelligence Adoption	3	(Paschen et al., 2019)
Supportive Leadership	3	(Braathu et al., 2022)
Sustainable performance	5	(Lin et al., 2013)

Table: 2. Sample Distribution:

	Characters	F
Gender	Male	195
	Female	85
	Total	280
Ages	Less than 30	42
	31-45	105
	46-55	90
	Above 55	43
Qualification	Matric	53
	Inter	80
	Bachelor	120

	Master	27
Experience	Less than 5 Years	70
	From 6 to 10 Years	120
	From 11 to Above	90

Explanation: As shown in Table 2, the demographic details of this study sample are based on 280 respondents.

Table 3: Reliability Analysis:

Variable	Cronbach's Alpha
Artificial Intelligence Adoption	0.88
Supportive Leadership	0.86
Sustainable performance	0.79

Explanation: In Table 3, the Cronbach alpha value is 0.70, which allows for further analysis.

Table 4: Correlation Analysis Table:

Variables	1	2
1. Adoption of Artificial Intelligence	1	
2. Sustainable Performance	0.321**	1
3. Supportive Leadership	0.345**	0.401**

Note: P value < 0.05

Explanation: Table 4 presents a positive relationship between AI adoption and sustainable performance (p = 0.01; r = 0.321). Likewise, there is a positive correlation between AI adoption and supportive leadership (p = .000; r = 0.345). Lastly, the relationship between sustainability Performance and supportive leadership shows a positive correlation (p = .000; r = 0.401).

Regression Analysis

Table 5: Model between Adoption of Artificial Intelligence and Sustainable Performance.

Variable	R^2	B	t	Sig
Adoption of Artificial Intelligence	0.178	0.362	9.21	0.000

Dependent Variable: Sustainable Performance * p < 0.05.

Explanation: The results in Table 5 show the relationship between AI adoption and sustainable performance. In addition, the ANOVA p-value is 0.05 or lower. Based on the R-Square of 0.178, each unit increase in artificial intelligence results in approximately a 17.8% increase in sustainable performance. Additionally, the p-value for the coefficient is 0.00, which is less than 0.05; therefore, the relationship between the two variables is statistically significant. As demonstrated by the estimated coefficient (B = 0.362), H1 is accepted.

Table 6: Moderation-Analysis

Variables	*B*	R^2	*P*
Adoption of Artificial Intelligence	0.292	0.181	***
Supportive Leadership	0.212	0.092	***
AAI x SL	0.060	0.167	***

Note: D. V= Sustainable Performance

Explanation: The results in Table 6 show that AAI affected SP < 0.01, β = .292, so, for R^2 = .181. Additionally, the SL has a positive impact on SP (p < .01, β = .212), and (R^2 = .092). Thus, furthermore, the interaction effect (β = .060, p < .01) for the product of the two variables (AAI x SL) indicates that SL moderates the relationship between AAI and sustainable performance. So, hypothesis H2 is accepted.

Discussion

Although AI improves organizational output through supportive leadership, the studies' data show that its use leads to positive consequences for long-term, ongoing business success. By focusing on change through the latest technology, organizations can achieve long-term success. The results indicate that integrating AI-based technology into businesses increases workflow efficiency. Previous studies show that AI-based technologies help improve efficiency in businesses (Fahad et al., 2026). Additionally, this study extends prior research by examining supportive leadership as a moderator of performance outcomes in the SME sector in Pakistan.

Organizations that prioritize managing change will achieve better long-term performance outcomes than those that are resistant to changes driven by new technology. Businesses that coordinate their AI applications with government policy reforms will experience improvements in workflow and process development, with a focus on sustainability (environmental, operational, and social). The data also shows that AI emphasizes organizational transformation and improves long-term performance outcomes. Supportive leadership is also identified as a moderator of the relationship between AI and sustainable performance. This is because leaders encourage employees to use AI to improve how work is performed. A leader may offer training and mentorship to department managers on the use of AI within their existing systems. A supportive leadership style establishes a learning environment where employees can learn to utilize current tools and methods to meet their objectives. The effect of supportive leadership on AI and sustainable performance also underscores the importance of a leader in implementing technology in the service sector, resulting in positive operational and financial performance (Madancian et al., 2024). So, both hypotheses are accepted.

Conclusion

To achieve sustainable success, AI plays an important role in sustaining leadership support. In terms of organization, AI is one way team leaders can increase productivity through strategic use. Additionally, using AI, companies will have a competitive edge in meeting company-wide sustainability performance metrics. Also, because companies will be using human input to make strategic system changes to meet long-term goals, AI facilitates this human input. This theoretical contribution to organizational theory and technology adoption highlights how AI improves performance, and also demonstrates the value of HR and organizational structure. Overall, this helps us understand the role of AI in improving sustainable outcomes. Leadership support positively affects employees' willingness to utilize AI-based solutions to complete tasks within an enterprise.

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