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IMPACT OF ARTIFICIAL INTELLIGENCE ADOPTION ON SME PERFORMANCE: THE MEDIATING ROLE OF INNOVATION CAPABILITY AND THE MODERATING ROLE OF LEADERSHIP STYLE

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Abstract

The artificial intelligence (AI) is starting to be viewed as a strategic asset that can be used to increase competitiveness, flexibility, and efficiency of small and medium-sized enterprises (SMEs). However, regardless of the increasing interest in AI, the adoption results in terms of performance are still uneven amongst SMEs. Such companies claim higher productivity, a better customer focus, and returns on innovations, and some of them struggle to find the connection between AI investments and organizational value. This difference implies that the use of AI does not have a direct effect on SME performance. Rather, the outcomes of AI can be clarified by the internal ability of the company to internalize and rearrange and deploy technological resources, as well as the leaderly situations in which the adoption is going to occur. The following paper discusses how the adoption of AI affects SME performance taking into account the mediating role of innovation capability and the moderating role of the leadership style. The paper also advances a conceptual argument on the qualitative research perspective that argues that the multiple-case qualitative study design is appropriate to study the mediating effect of organizational results of SME participants experience the adoption of AI and the effect of such experiences on their behavior have. The article claims that innovation capacity mediates AI-performance relationship since companies have to convert AI inputs into process betterment, learning practices, service restructuring and new value co-creation. The leadership style can moderate this process as leaders can influence the confidence of employees, their strategic orientation, risk-taking and adaptability. The positive contribution of AI implementation to the innovation capability should be supported by the transformational and participative forms of leadership, and restricted by the rigid and authoritative ones. The paper helps fill the gap in SME and digital transformation literature by introducing the concept of AI adoption as both a socio-technical and capability-based process instead of a technological intervention. It equally gives valuable implications to whoever owns SMEs, managers and policy makers with the focus on the fact that successful AI implementation goes beyond the capacity to spend money on digital tools. It requires a management that encourages learning and an organizational culture which encourages capacity of innovation.

Keywords: artificial intelligence, SMEs, performance, innovation capability, leadership style, qualitative research

1. Introduction

The artificial intelligence is one of the most significant technologies which contribute to the new business plan. The predictions, customer analytics, process automations, system suggestions and risks management and decision supports are now implemented using the AI-enabled tools. As far as large companies are concerned, AI is already turning into the centre of revitalization of the approach and the digital skills. Certainly on the instance of the SMEs, but, the definition of AI adoption, is a somewhat more complex definition. On the one hand, AI provides SMEs with an opportunity to overcome resource limitations since it allows

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Volume No: 03 Issue No: 01 (2026)

automatizing routine activities, enhancing the quality of decision-making, and faster response of firms to the fluctuations in the market. Conversely, even in a normal condition, the SMEs have no monetary reserves, technical capacities, data systems, and structure spare to apply AI. Recent studies on the problem of SME digital transformation and AI diffusion constantly give evidence that internal differences, organizational learning, as well as the encouragement of the leadership, will condition that implementation of AI will have a more positive outcome.

Topicality in research in AI in SMEs increases when manipulating economical viability of SMEs. SMEs is the most common form of business in the world which contributes immensely in terms of job creation, inventions and innovations and development of an area. It is also not only due to the failure of SMEs to exploit the digital transformation that leads to single firm failures, but instead propagation of the problem at the wider levels in terms of low productivity and competitiveness. Yet, once SMEs know how to take advantage of AI and seek it in their processes and strategy, resources like improved resilience, improved customer relations, quicker decision-making, and new product or service, can be created. (

Despite the above positive attributes, on the positive side, the way forward of AI is good as the literature has discussed, however, the relationship between the adoption and performance of firms through AI is not a direct relationship. Technology is not as valed as an automatic. Applications of AI might provide a little more information, automatize the processes selected, or generate information examination capabilities, but until the organization has skills to comprehend and apply them safely, they will not inherently stimulate the enhanced operation of the organization. This aspect has been considered very particularly especially in the case of SMEs where implementation processes are largely subject to the discretion of the manager, flexibility and informal routine of the employees. An SME can acquire AI-enabled systems and forecast sales, manage customer relations, or organize the business, but even so, it can never be more successful when the employees are not ready to use the systems, the leaders are not champions of the changes, and when the business can no longer be experimental and creative in terms of the technology.

By this, innovation capability increases to be by far as the greatest to AI discoveries exposition. The ability of the organization to create, assimilate, modify, and apply new ideas, processes and solutions is called innovation capability. It is an art of teaching, practicing and working together, solving of problems and ability to transform knowledge positively to useful human beings. What will change AI is seen as a mediocre addition to the current processes or something that is inseparable to the process redesign, improvements to services and renewal of strategies, is the ability of the innovation that the SMEs will acquire as soon as they resort to AI. Recent discoveries have established that digital, and innovation capabilities complement each other, in terms of AI adoption, and that knowledge management, dynamic capabilities and an organizational change capacity is interwoven with the success of a digital transformation in SMEs.

These dynamics are also influenced by the leadership style. Decision making in most of the SMEs has been established in such a small pool of senior managers or the owner-manager. As a result, the attitude of the leaders to the organisational orientation, acceptance and overall perception of the employees to technological innovation is highly affected by their behaviour. The executives would decide on how AI will be fawned upon such as as an opportunity to develop, a productivity tool, a job cutter or a test plan. The participative leaders, as well as transformation leaders, will be more effective in enabling learning, intent communications,

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Volume No: 03 Issue No: 01 (2026)

adaptation of the employees, and building of trust following the change. Average dictatorial or strict leaders can stress compliance, but not safety of the psyche and drive to be creative. The latest literature on SME digital transformation proves that digital leadership, transformational leadership and other related leadership competencies have a strong connection with the success of transformation, innovation, agility, and resilience.

This paper position can thus be argued as being indirect albeit conditional on the performance of SMEs caused by the receptiveness to AI. The middle between AI adoption and innovation capability is innovation capability, middle between AI adoption and innovation style of leadership is AI adoption, between AI adoption and innovation leadership is innovation leadership, and middle between AI performance and innovation leadership is AI adoption is innovation leadership. The most valid way to carry out such relationships would involve the qualitative approach, which would help determine how the organizational actors view AI, how they redefine the routine, how leaders mediate with the adoption process, and why other technologies, which are analogous, might have different impacts on firms.

The following research questions are discussed in the paper:

1. How does AI adoption affect SME performance?
2. How does innovation capability mediate the relationship between AI adoption and SME performance?
3. How does leadership style moderate the relationship between AI adoption and innovation capability in SMEs?

By answering these questions, the paper contributes to a richer understanding of AI in SMEs as an organizational and socio-technical transformation process rather than a simple technical investment decision.

2. Literature Review

2.1 AI Adoption in SMEs

The pace of uptake of AI in SMEs has been growing at rapid pace in last few years, yet it is not a homogenous and case-specific phenomenon. The literature illustrates that SMEs are not merely smaller scaled reimbursements of larger businesses, but that they possess several weaknesses and advantages, inherent and particular to their design. The benefits that SMEs may usually experience are a flexible character, an entrepreneurial responsiveness and quicker communications within, though it is restricted in its capital, knowledge of the specialists, quality of data and digital possibilities. This is the case describing the pace of taking in AI and its quality.

Ayinaddis (2025) found in a systematic review and bibliometric examination that technological preparedness, skills, administration supports, financial ability, rivalry, pattern of collaboration, and regulation influence the adoption of AI in SMEs. Similarly, research related to AIs in manufacturing SMEs highlights that AI resources need to be coordinated by learning and governance capacities in case firms can get competitive advantage (Anagnoste et al., 2024). European SMEs studies also indicate that AI adoption is more affected by inner capabilities, rather than external support per se, which hints at the capability building within the company to drive adoption success (Díaz-Chao et al., 2024).

These outcomes refute deterministic assumptions on how digital tools are going to automatically generate performance gains after its application. In situations where companies are adopting AI, decisions about data governance, process redesign, task allocation and learning within the company are to be made. These are often made in the case of SMEs where

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uncertainty exists and no big pool of experts is considered. As a result, the use of AI can be regarded as an organizational learning process, as the realization of this technology choice should be a part of the technology decision-making process as well.

2.2 SME Performance in the Context of AI

The performance of the firms is a multi-dimensional problem especially in case of SMEs. Other indicators of financial performance such as profitability, growth, market share, and cost reduction matter, but a qualitative study shows that agility, quality of services, resilience, customer responsiveness, employee productivity, and output of innovations will remain less important performance indicators in digitally transforming SMEs. The returns encircling AI that may be achieved in the performance context can take non-financial types and then be transformed into money.

An example is that SME will have a more efficient planning of their inventory, reduced time with customers, reduced administrative overhead, more predictability in demand forecast or more customized services. These need not be reflected in annual profit ratios but can drastically increase competitiveness of the firm in long term as well. Based on the research work on AI and SME resilience, AI might become more flexible and efficient in their functioning in those cases when firms have a chance to use AI in decision-making and strategic planning (Kraus et al., 2025). Speaking of which, the research on the sustainable business ecosystem reveals that the adoption of AI in SMEs could be associated with productivity, resiliency, and low-carbon management in the event of organizational capabilities (Roux et al., 2025).

That way performance concept needs to be generalized in the present study. The advantage of a qualitative style is that it not only documents the numerical outcomes, but also the connotations of the owners, managers and employees to what improvement means. The performance that has been performed successfully can be characterized in different ways by the respondents; this might be less errors, decisions can be made quickly, more innovation in offering or more employee confidence or better interaction with the customer.

2.3 Innovation Capability as the mediator.

Innovation capability is one of the largest constructs that can be used to explain why the acceptance of AI has positive effects to some SMEs and not others. The ability to innovate can be explained as the performance of the organizations to find the opportunity, brainstorming, and combining internal and external knowledge, experimenting new practices as well as successful implementation of change. It integrates both formal and informal process of learning, suitating and being creative.

The mediating role of innovation capability can be explained with the use of the logic of transformation. AI systems output can be in any of the following forms: insights, transactions, or pattern of customer behavior, but technical solutions do not necessarily have a positive impact on the performance of firms. It takes the organization some personality to read such outputs, decide what to do with them, redesign processes of work and incorporate the new tools into the business. This conversion is only possible due to innovation capability.

Tsalakiou et al. (2025) state that the deciphering determinants of the SME innovation proficiency encompass knowledge and learning capacity, organization structure and organizational culture, innovation strategy, and digitalization-related factors. That is, both mindset and routines are created to build the ability to be innovative and organizational structures. In the same manner, digital transformation literature reveals that knowledge management and collaboration processes are the key to SMEs access to digital tools to

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Volume No: 03 Issue No: 01 (2026)

strategically transform (Matarazzo et al., 2025). Effective utilization of AI is achieved when enabled via experimentation, absorptive learning, and capability to transform data-informed understanding into high-quality products, services or business processes.

The existence of such a correlation between AI and production of innovations is also validated by new studies. Studies have identified that AI implementation intersects with product and process innovation, the development of digital values, and innovation culture, but all of them are conditional and complementary organization factors (Haque and Suki, 2024). This reinforces the line of thought that innovation capability is the means by which AI gets to be economically meaningful.

2.4 Leadership Style as a Moderator

Leadership style also plays a role in creating a shift in perception, sharing as well as implementation of technological change within organizations. This is very significant particularly in the context of SMEs where the leadership is normally centralized, visible and connected with the day to day activity. At the strategic level, staff in most SMEs is likely to apply a rating about the seriousness, meaning and validity of such efforts; mostly on the basis of the behavior of the owner-manager or senior management team.

Transformational leadership has been largely linked with preparedness to change, motivation, overall growth of leadership and general growth of the workers. Transformational leaders in the digital transformation will make employees consider technology as a part of a larger organization in future, and not as a technical requirement. The participative leadership technique can also be applied because participation, feedback and creation are all applicable in the context of the event where the technologies modify the daily routine, and the local knowledge is required to make the event successful.

The evidence on SMEs field confirms that they have positive associations with the ones associated with digital capabilities, digital strategy, agility and organizational resilience (Gyamerah et al., 2025; Yao et al., 2024). The digitalization of leadership studies also presupposes that the list of competencies and skills in leadership can be ordered according to the purpose of leadership change demanded, but the parallelogram is that leaders have to be able to provide a direction in the process of the technology change in learning, interpretation and alignment (Benitez et al., 2024; Cortellazzo et al., 2024).

The relationship between AI adoption and innovation capability is probable to be mediated by the leadership style in terms of AI. Improvements to this relationship would include an investment in the legitimization of experimental work, the absence of fears, teamwork, and an AI being committed to a shared strategic purpose that with the support of transformational, supportive, and participative leadership could be reinforced. Rigid/authoritarian leadership on the other hand may spoil this relationship by instilling resistance, the non-sharing of knowledge and assure the workers to explore new ways of working. Therefore, leadership does not occur by chance with the advent of AI but rather it is a condition of whether the organization will develop the capability to induce innovations, which will transform AI usage into performance gain.

2.5 Theoretical Framing

The present research is based on a socio-technical and capability-based perspective of digital transformation. In capability terms, technologies generate possibilities as opposed to assured value. Firms achieve value when they are able to restructure resources, internalize knowledge and when organizational processes are aligned with strategic opportunities. The theory of

dynamic capabilities is particularly applicable in this case since it focuses on sensing the opportunities, taking them, and changing the organization respectively. This is a way to think about AI adoption in SMEs as an effort to enhance sensing and decision-making ability, whereas whether the firm could utilize the opportunity in the form of innovation and change determines whether the adoption is successful or not.

A socio-technical approach is also pertinent. The use of AI also transforms systems, roles, decision rights, as well perceptions about work. It implies that the study of AI within the SMEs should take into account the relations of technology, individuals, and organizational environment. Here, the qualitative methods are especially appropriate since they articulate the meaning, experience and process.

2.6 Conceptual Framework

The paper suggests a conceptual framework where based on the literature:

- **AI adoption** is the independent variable.
- **SME performance** is the dependent variable.
- **Innovation capability** is the mediating variable.
- **Leadership style** is the moderating variable.

The model assumes that AI introduction has the highest positive effects on performance, when it evokes the potential of innovations. This process is largely dependent on leadership style that defines trust, learning, communication and participation of employees. The result will be a hypothetical and indirect description of AI-driven performance in SMEs.

3. Research Methodology

3.1 Research Philosophy and Approach

The research paper is based on an interpretivist method of qualitative research. The approach to interpretivism is appropriate as the purpose of the paper is to understand how the SME actors perceive such implementation of AI and how they make sense of it rather than simply measure predefined variables of a statistical model. It focuses on meanings, experiences, routines and processes in an organization. Implementation of AI is not expected to affect different companies in the same way; to one SME, the same technology will be viewed as empowering, to the other, it will be disruptive. A qualitative design enables the possibility to investigate these differences in a more in-depth manner.

The research is exploratory and explanatory too. It is exploratory since the relationship between AI adoption, innovation capability, leadership style and SME performance are still fledgling in the literature, particularly qualitatively. Explanatory means it attempts to describe the question of why and how the adoption of AI impacts the performance given the circumstances of the particular organization.

3.2 Research Design

The suggested type of study is a multiple-case study design. Case study research is rather suitable to contemporary studies of organizations when it is impossible to isolate the context and process (Yin, 2024). Since the implementation of AI among SMEs is determined by the leadership behaviours, employee perceptions, organization routines and environmental forces, a case-based design would be a suitable methodological fit.

Multiple-case design will be better than single case design since it will be possible to compare cases across. By studying certain SMEs, which have already tried to implement AI in different spheres, the researcher will be capable of identifying certain patterns common to them, as well as will be able to preserve a depth of context. As an example, an SME that operates a chat

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES

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Volume No: 03 Issue No: 01 (2026)

system based on AI might face various issues of adaptation compared to a manufacturing SME using predictive maintenance software, but some unifying aspects could include the topic of learning, leadership and innovativeness.

3.3 Sampling Strategy

The samples and participants are to be selected on basis of purposive sampling. The criteria chosen to select the firm could be part of:

1. the organization fits the requirement of being called an SME within its domain of operation;
2. the company has at least implemented an AI-driven solution or application in the past two to three years;
3. the adoption material has been in the sense that it has shaped work practices, decision making or service provision;
4. the corporation will be satisfied to give access to the executives and employees.

In all cases, respondents should include a mix of owners, top management, operational supervisors, and front-line workers who have attended to have implemented or used AI. The involvement of multi-level participants enhances the credibility and enables the researcher to juxtapose the strategic and operational points of view.

An in-depth qualitative research would require a sample of 4-5 SMEs with 3-5 representatives of the companies. This would most likely lead to 15 to 25 interviews that would be rich thematically but not too in-depth.

3.4 Data Collection Methods

Semi-structured interviews should be the main method of data collection. By allowing the researcher enough flexibility to explore personal experience, semi-structured interviews are flexible enough to assure similar themes are obtained throughout respondents. The 45-60-minute interviews may produce detailed descriptions of the introduction of AI, employee reactions, leader communication of change, and organizational outcomes that ensued.

Some examples of interview questions that can be used are:

- motives of introducing AI;
- expectations before implementation;
- apparently the obstacles and helps in adoption;
- change of working hours and judgement;
- examples of process innovation or service redesign;
- leadership communication and support;
- online perceived change of organizational performance.

Possible interview questions include:

- What motivated your organization to adopt AI tools?
- How did AI affect the way people in your firm perform their work?
- Can you describe any process or service improvements that emerged after adoption?
- How did leaders guide or communicate the adoption process?
- What kinds of performance changes have you noticed since adopting AI?

To improve triangulation using interviews, document analysis might be involved. The material materials that may be used are presentation of the applicants, implementation roadmap, training documents, workflow charts, standard operating procedure, vendor proposal or internal performance summary. These reports will have the capacity to bring additional background details of the framing, implementation and evaluation of AI.

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES

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Volume No: 03 Issue No: 01 (2026)

Value addition can also be carried out through the non-participant observation which is optional. The scholar can visit displays of AI applications, team discussions, or daily practice in the workplace to gain a concept of the variations in the official accounts and on-the-job practice.

3.5 Data Analysis

To organize, systematize, and find meaning patterns in qualitative data, thematic analysis is recommended to be conducted based on the practice of Braun and Clarke (Braun and Clarke, 2006, 2022). The thematic analysis is suited since it is versatile, it can theoretically fit the interpretivism approach and is well suited in investigating organizational experiences, which have many processes.

The analysis may go in the following phases:

1. Reading of transcripts and notes several times to get acquainted with the data.
2. Coding of meaningful categories of variables in regard to adoption of AI, innovation, leadership, and performance at preliminary.
3. Finding themes through combination of relevant codes in greater categories.
4. Carrying out cross-case comparison of themes so to know its consistency and uniqueness.
5. Setting and labelling themes in terms of conceptual framework.
6. Writing the report based on a mix of themes and quotes of the participants and literature.

Potential themes may include:

- AI as the helper and not the game changer;
- innovation ability as experimentation and focus on problem-solving;
- leadership as sensemaking and trust-building;
- employee participation as a pre-cursor to successful adoption;
- performance becomes so gradual and patchy;
- data quality, skill related, and cultural resistance barriers.

It will be significant to have cross-case analysis. The researcher will need to contrast the improved and worse performance results in companies in their effort to determine how leadership and innovation ability can be utilized in containment of difference.

3.6 Trustworthiness

Credibility, transferability, dependability and confirmability should constitute qualitative rigor.

- Triangulation can also be a tool to supplement based on the credibility (interviews, documents, and observations) and member checking.
- To improve transferability, comprehensive descriptions of the environment of firms, business industry, implementation of AI and its implementation history could be presented.
- Reliability may also be guaranteed by the existence of a clear audit trail of the sampling process, the interview process, code decisions and theme constructions.
- It is possible to enhance the aspect of confirmability through reflexive memoing and good judgement wise whether researcher assumption may be effective on the interpretation.

3.7 Ethical Considerations

The ethical practices should entail informed consent, free participation and privacy too secure data storage. As the processes or performance information related to the use of AI could be commercially sensitive, the participants should be guaranteed that the name of firms and

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Volume No: 03 Issue No: 01 (2026)

individuals will remain anonymous. Handling of interview files and transcripts must be in a secure manner and should not be involved whenever carrying out research.

4. Discussion

The presented model in the article will highlight the fact that organisational mediation and leadership contingency is the best model to explain how performance in AI adoptions in SMEs can be defined as compared to technological determinism. Entertainment of AI can establish the probability of enhanced performance but it would just be situational leadership that enshrines the establishment of innovation capacity as well as mobilizes this capability to enhance performance.

Seeing the qualitative approach, the successful cases will be more inclined to indicate that AI has become a part of the larger organization learning. The individuals working within these types of companies can inform us of how AI solutions have assisted them in restructuring customer-service, enhancing the accuracy of planning, redesign business process or development of new products. These reports would show the AI implementation was over and above automation towards innovation potential.

Conversely, failed cases (or cases that did not generate a serious impact) can also indicate that AI was still on a specialized use. The respondents can mention that there were untrusted tools in place, staffs were not receiving the proper training or that leaders were unable to communicate the implementation. Here, the technology can be possessed by the companies but they lack the routines and trust to make use of it. This contrast gives credence to the understanding that the potential of innovation is the procedure which turns AI into performance.

Likely, the situational factor that is likely to determine the style of leadership is the situation. Transformational leaders can offer a strong vision of why AI is important, to enable employees to relate technology to the business intention. Experimentation and implementation decisions can be introduced by participative leaders and enhance fit and minimize resistance. These leadership practices facilitate the psychological safety, trust and initiative which are prerequisites towards building the capability of innovation.

Instead authoritarian or overbearing leaders may put the same to cripples. Another reaction to it could be sufficiently low response rate when employees are made to feel that they are coerced into using AI without a discussion and are therefore not creative besides not having feedbacks to use in new system adaptations. The leadership style therefore, does not purely influence morale with hope of enhanced the chance of transformed adoption to innovation ability, and enhanced performance of AI.

It is also hinted in the discussion that performance itself could be conceived of like cumulative and layered. Short term benefits may take the form of faster speeds, enhanced precision, stability of the services or less workload. Such improvements in the long-term would result in larger outcomes, such as competitiveness, expansion, resilience, and strategic agility. What is significant about this aspect of time is that SMEs might not be able to measure the value of AI they seek short-term monetary gains.

5. Implications

5.1 Theoretical Implications

In three ways, this paper is pertinent to the literature. To begin with, it shifts to more process oriented approach of explaining the uptake of AI by small and medium enterprises on the ground that technology influences performance indirectly through technology through capacity

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Volume No: 03 Issue No: 01 (2026)

to innovate. Second, it broadens the field of the past leadership studies in the area of digital transformation because it presents leadership style as a moderating, rather than antecedent factor. Third, it helps to develop socio-technical knowledge about SME transformation, in addition, it demonstrates that the results of AI development are the product of the interaction of technological tools, humanization, and organizational conditions.

5.2 Practical Implications

The lesson that AI will have the greatest impact on the SME owners and managers is that it cannot be considered a plug-and-play tool. Technology acquisition should be invested in learning (employees), processes through experimentation, and sharing of knowledge in the company. The management needs to do more than just pick tools, but create the capability to be innovative to utilize them.

The behavior of leadership is essential, as well. Any leader should explain the reasons why AI is being adopted and how it will help in achieving objectives of the business and how employees will be helped by the change. The participative implementation practices can be used to introduce a knowledge of activities and ownership.

The implication as a policymaker/SME support institution is to not just increase the programs of AI adoption but do not simply finance tools or infrastructure. Managerial capability, digital leadership, training, and innovation systems Support might be regarded as equally important assuming that SMEs are able to gain ongoing value out of AI.

6. Conclusion

The authors in this paper discussed the impact of adoption of AI on the performance of the SMEs, and the moderating variable is the leadership style and innovation capability is the mediating variable. The point made is that the implementation of AI does not necessarily result in improved performance of SMEs. Rather, AI creates a potential value which must be unlocked by the capabilities to innovate within the firm and trained by environment within which the firm implements the practices adopted.

The idea of the ability to innovate can be used to determine how the AI may become useful: they will provide the opportunity to learn and experiment with the new technology, to adapt to it and apply, in a more useful process and product, the data-based knowledge. The reasons, based on which, this ability is strengthened or weakened, are presented through leadership style. In its turned form and applied to participative leadership styles, AI will grow more positive regarding its capacity to form trust, learn and collaborate; a severe form of leaders will likely eradicate the latter behavior that can foster AI-facilitated innovation.

A very powerful design would be multiple-case study design (qualitative based approach) to investigate these processes since it would be employed to discover the lived experiences, organizational meanings and organizational context of diverse situations that would not be discovered through quantitative models. The presented framework, whose empirical studies may be provided in the future, may even further illuminate why and how SMEs may then proceed to the next stage of leaving the technology adoption phase and becoming the real organizational change.

And finally, but not least, one of the simplest yet significant conclusions of the research is made: performance effect of AI in SMEs is not comprised solely of remuneration at the emergence of intelligent tools. It is also interested in creation of smart organizations.

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Volume No: 03 Issue No: 01 (2026)

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