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Does Technical Support Matter? The Impact of Blended Learning on Accounting Students' Academic Achievement

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Abstract: The empirical and conceptual research on artificial intelligence (AI) adoption in small and medium-sized enterprises (SMEs) that was published between 2019 and 2025 is compiled in this systematic literature review. This evaluation incorporates information from three main research domains: AI applications in business operations, adoption enablers and barriers, and organizational performance results. It is based on fifty peer-reviewed articles that were found through searches of Scopus, Web of Science, and IEEE Xplore. Results show that in order to improve customer service, marketing automation, and operational efficiency, SMEs primarily use machine learning, natural language processing, and chatbot technologies. While financial limitations, a lack of skills, and insufficient digital infrastructure continue to be obstacles, top management support, technical preparedness, and staff capability emerge as crucial organizational facilitators. Although adoption rates are still concentrated among larger organizations, AI adoption is correlated with quantifiable increases in operational efficiency, cost reduction, customer retention, and innovation performance. There are clear regional differences, with rising nations in Latin America and Asia spearheading adoption despite more limited resources. Significant research gaps about long-term sustainability, contextual differences among developing economies, ethical governance frameworks, and the efficacy of support interventions are identified by the review. To promote inclusive, responsible AI integration in SMEs, our findings highlight the necessity of customized implementation strategies, focused capacity-building initiatives, encouraging legislative frameworks, and multi-stakeholder cooperation. For practitioners, governments, and researchers looking to close the gap in AI adoption and uncover revolutionary potential for small businesses worldwide, this paper offers practical ideas.

Keywords: Artificial intelligence, Developing economies, Digital transformation, Small and medium enterprises, Technology adoption.

INTRODUCTION

One of the most revolutionary technological advancements of the twenty-first century is artificial intelligence (Rashid & Kausik, 2024). With a compound annual growth rate of 32.2%, the worldwide AI market is expected to rise from USD 233.46 billion in 2024 to USD 1.77 trillion by 2032 (Agbaakin, 2025). At the same time, small and medium-sized firms (SMEs) make up more than 90% of all businesses globally and contribute between 60 and 70 percent of GDP and employment in both established and emerging markets (Le Dinh et al., 2025). Despite their economic importance, small and medium-sized enterprises (SMEs) encounter different obstacles to technology adoption than dolarge corporations (Faiz et al., 2024). These obstacles include inadequate capital allocation, a lack of specialized talent, a

dispersed technological infrastructure, and organizational limitations that hinder quick digital transformation.

The incorporation of AI into SME operations is a complicated adaptive challenge as well as an unparalleled potential. SMEs have historically trailed behind large multinational firms in their investments in AI research, development, and application (Yesuf & Fields, 2025). However, new data from 2019 to 2025 shows an accelerating change: in emerging markets, SME adoption of AI technologies rose from roughly 10% in 2018 to 45% by 2025. This increase was fueled by falling technology costs, improved accessibility through cloud-based AI-as-a-Service (AIaaS) models, and growing competitive pressures (Gupta, 2025).

In order to fill in these gaps, this systematic literature review synthesizes current evidence on a number of important research dimensions: (1) Current AI applications and use cases in SMEs across business functions, including sectoral variations and practical implementation pathways; (2) Adoption drivers and barriers, which include organizational, technological, environmental, and human capital factors that facilitate or impede AI implementation; and (3) Performance outcomes and competitive impact, which includes quantified returns on investment, operational enhancements, and long-term sustainability implications.

LITERATURE REVIEW

Artificial Intelligence (AI)

The goal of artificial intelligence (AI), a relatively new technology, is to improve human intelligence or work capacity. It has a wide range of applications (Kolotylo-Kulkarni et al., 2021). AI is a technical term that uses intellectual stimulation and development to assess and actualize a human's normal brain processes (Zohuri & Behgounia, 2023). Algorithms that replicate human mental processes form the basis of AI technology (Kankam, 2025). AI combines engineering and social science in a variety of ways that benefit society (R. Xu et al., 2024). It can recognize human commands and use algorithms to evaluate data in a manner akin to that of human minds (R. Xu et al., 2024). Developments in the economy and society are intimately related to advances in computer technology and artificial intelligence (Kankam, 2025).

AI has seen a rise in commercial applications due to the development of modern science and technology, which has altered the way people live and work. It has a number of advantages, especially in e-commerce, and is becoming more and more of its motivator (Helmy Mohamad et al., 2022). AI is gaining traction in both academia and business, attracting scholars to improve its technological developments and broaden its applications in a variety of fields (Renkema & Tursunbayeva, 2024). These days, it helps people perform a variety of tasks, etc, consequently, it is one of the primary sources of the current era of development (Renkema & Tursunbayeva, 2024).

Artificial Intelligence in Business Settings

Machine learning, generative AI systems, and data analytics are examples of artificial intelligence technologies that are radically changing how entrepreneurs find opportunities, make choices, and carry out company plans (Rashid & Kausik, 2024). AI's quick development

and broad use have given businesses previously unheard-of chances to improve human decision-making, automate repetitive tasks, and produce data-driven insights that improve their competitive posture (Rashid & Kausik, 2024).

Adoption of AI is a crucial component of digital transformation, allowing business owners to take advantage of cutting-edge computational capabilities for consumer engagement, market analysis, and operational optimization (Tursunbayeva & Chalutz-Ben Gal, 2024). Entrepreneurs now have new opportunities to acquire strategic insights, boost creativity, and speed up innovation cycles thanks to the incorporation of generative AI tools like ChatGPT and other large language models (Fui-Hoon Nah et al., 2023).

The SMEs Digital Transformation

AI and digital transformation are increasingly seen by SMEs functioning in today's competitive landscape as strategic imperatives rather than discretionary technological enhancements (Islam et al., 2025). Many SMEs were forced to quickly embrace technologies including e-commerce platforms, remote work infrastructure, and AI-powered customer service solutions due to the COVID-19 pandemic's acceleration of digital adoption across industries. Reimagining business models, generating new revenue sources, and gaining a durable competitive edge are all included in digital transformation, which goes beyond operational efficiency (Muhammad et al., 2025). However, many SMEs struggle to turn technological investments into real commercial value, and the path to effective AI adoption for resource-constrained enterprises is still little known.

SMEs need to be digitally changed and reorganized to support economic growth and the rapidly expanding globalization of society (Wang & Zhang, 2025). This will guarantee SMEs' long-term commercial viability and promote innovation. Furthermore, digitization presents several opportunities for SMEs to grow sustainably and integrate more fully into global markets (Piccialli et al., 2021). Digitalization has the ability to lower costs, save time and resources, and be particularly advantageous for smaller businesses that have fewer internal resources and less market and bargaining strength to manage complicated business environments (Piccialli et al., 2021).

The expertise required to properly leverage the promise of digital transformation technology is lacking in SMEs (Yao et al., 2026). Usually, these businesses are unaware of the benefits of the solutions provided (Gams & Kolenik, 2021). Additionally, SMEs have limited access to outside consultants due to budgetary constraints (De Blick et al., 2024), which exacerbates the lack of more seasoned IT specialists who can benefit more from more advanced digital transformation tools like big data and machine learning (Mhaske et al., 2025). Even in the early and more fundamental phases of digitization, SMEs have fallen behind in the process of digital transformation and, consequently, in developing subject-matter competence (Seppänen et al., 2025).

SMEs can market and promote their products and services with the use of digital marketing (Long, 2025). A supply-demand imbalance prevents SMEs from using digital marketing platforms or participating in e-commerce (Bao et al., 2025).

Therefore, it is crucial to communicate the value of using technology for marketing and to recognize the opportunities it presents (Hoffman et al., 2022). SMEs have a tougher time hiring and retaining skilled employees than do large firms due to their smaller

networks, reduced capacity to locate and access talent, and generally inferior working conditions (Krishnan & Scullion, 2017). Additionally, SMEs pay more for specialized training (OECD, 2021).

The Use of AI Display in The Digital Landscape

As computers become more complex and clever in terms of their wide range of applications, a growing body of research shows that AI has the capacity to establish emotional relationships (Huang& Rust, 2021). The notion that psychological qualities and interactions with anthropomorphic objects may result in the formation of emotional attachments is consistent with the computers are social actors (CASA) paradigm (Rincon et al., 2018). If face-to-face communication can be extended to computer-mediated communication (McShane et al., 2021), relevant examples can be found in live streaming platforms, where emotional expression is a powerful catalyst for interaction (Lin et al., 2021) with virtual or non-human entities (Chuah & Yu, 2021).

More precisely, it has been demonstrated that consumer behavior in retail environments (Pantano & Scarpi de Claricini, 2022), social media user engagement, and social interactions are significantly influenced by the six core emotions (disgust, anger, surprise, fear, and sadness) (Ekman, 1992; Landwehr et al., 2011). A joyful display, for instance, increases client satisfaction (Chuah & Yu, 2021). Fear is a sign of a need or urgency that drives people to take action (Roberts & David, 2019). Sadness may elicit empathy and emotional resonance to encourage emotional engagement (Taruffi et al., 2021). However, if anger is expressed carelessly, it may be misinterpreted and cause inadvertent offense or disagreement (Campos et al., 2013).

Similarly, shock (Chuah & Yu, 2021) and disgust (Fischer et al., 2012) can be purposefully used to attract consumers to digital media. By incorporating unexpected experiences into user interfaces, marketers can capture consumers' attention through the display of surprise (Chuah & Yu, 2021).

Additionally, utilizing repulsive language to highlight negative elements is likely to draw attention to and encourage interaction with the brand message (Fischer et al., 2012).

Research Gap and Justification

The majority of the literature that has been written about the adoption of AI has been on big businesses or certain technical applications in specialized industries. Despite the recent emergence of bibliometric and systematic reviews, they frequently lack practical depth with regard to implementation hurdles, developing-economy-specific success variables, and longitudinal performance tracking.

Furthermore, there are still gaps in our knowledge of how institutional support mechanisms, labor market features, regulatory settings, and financing availability influence the adoption trajectories of AI in SMEs across diverse regional contexts. There is still a dearth of research explicitly addressing the relationship between workforce capability development, organizational readiness, and long-term AI adoption.

METHODOLOGY

Target Databases and Search Strategy

To guarantee transparency, repeatability, and methodological rigor, this systematic literature review complies with PRISMA 2021 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) criteria (Chedrawi et al., 2026; Zournatzidou, 2025). Both landscape visualization and in-depth interpretive analysis of intricate adoption processes are made possible by the review's integration of quantitative bibliometric mapping with qualitative thematic synthesis.

Systematic searches were conducted across three primary academic databases: (1) Scopus (multidisciplinary, comprehensive coverage of peer-reviewed literature); (2) Web of Science (citations database with strong coverage of high-impact journals); (3) IEEE Xplore (specialized collection for technology and engineering research).

Searches were restricted to publications between 2019 and 2025 to capture contemporary evidence reflecting recent technological advances, market dynamics, and post-pandemic organizational adaptations. Exemplary search string as follows: ("artificial intelligence" OR "machine learning" OR "generative AI") AND ("small and medium enterprise*" OR "SME*" OR "small business") AND ("adoption" OR "implementation" OR "digital transformation").

Inclusion criterias as follow: (1) Peer-reviewed empirical studies, systematic reviews, or conceptual frameworks published 2019–2025; (2) Focus on SMEs (organizations with <500 employees, per World Bank definition) or comparison studies including SME cohorts; (3) Primary focus on AI or machine learning adoption, implementation, or performance outcomes; (4) English-language publications; (4) Studies providing empirical data, case evidence, or theoretical models. Exclusion criterias as follow: (1) Literature reviews without empirical grounding (opinion pieces, editorials, unsubstantiated commentary); (2) Studies exclusively addressing large enterprises or multinational corporations without SME comparison; (3) Technical papers focused solely on algorithm development without organizational or adoption context; (4) Non-peer-reviewed sources (blogs, white papers, conference proceedings without journal publication); (5) Studies with primary focus on unrelated topics where SME adoption was peripheral.

Data Extraction and Quality Assessment

Publication metadata (author, year, journal/conference), study design (qualitative, quantitative, mixed-methods), geographic context, sector focus, sample size, AI technologies examined, adoption enablers and barriers identified, and quantified performance metrics where available were all included in the extracted data.

The GRADE (Grading of Recommendations Assessment, Development, and Evaluation) criteria (Prasad, 2024) were modified to evaluate the risk of bias, consistency, directness of evidence, and accuracy of effect estimates. Research was categorized as high-quality (big sample, strong technique, published in high-impact journals), moderate-quality (limited scope, clear design), or low-quality (severe methodological constraints).

Synthesis Approach

Instead of using meta-analysis, a theme synthesis technique was used due to the variation in study designs, outcome measures, and contextual factors. Themes were arranged using the Technology-Organization-Environment (TOE) framework, a popular model in technology adoption research, and data were methodically coded against emerging themes using qualitative thematic analysis (Keong et al., 2025). Narrative integration within theme categories was used to synthesize qualitative information about barriers, facilitators, and contextual factors, while tabular summaries and descriptive statistics were used to synthesize quantitative data (adoption rates, performance indicators).

FINDINGS

The PRISMA search protocol's initial results revealed a vast corpus of 487 possibly pertinent records from the chosen databases, demonstrating the significant interest among academics worldwide in AI adoption by SMEs. A sizable pool of 487 possibly pertinent records was found in the first database search, indicating the significant and growing scholarly attention focused on this interdisciplinary confluence. 312 distinct records were left for abstract and title screening, 85 for full text review and finally 50 studies included in systematic review.

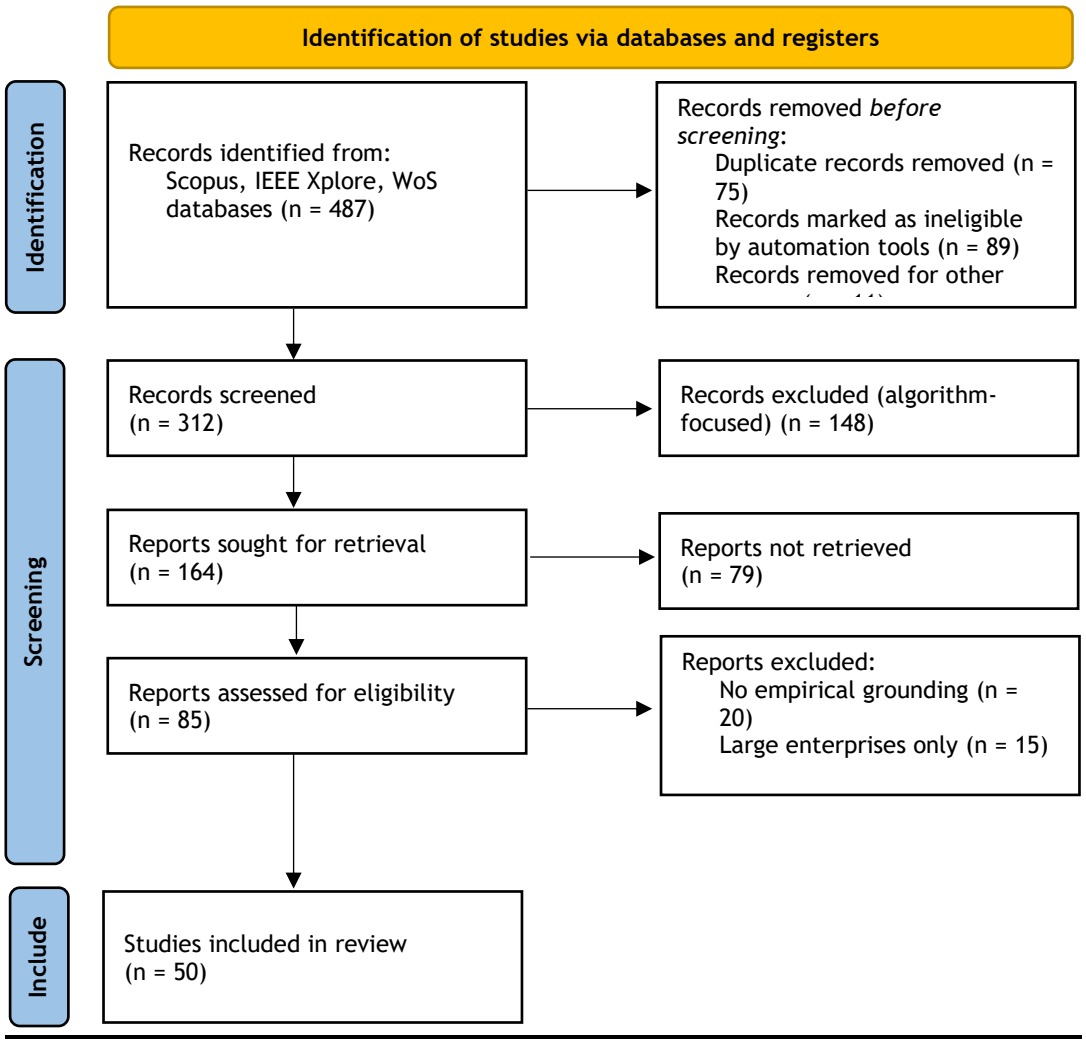

Figure 1: PRISMA Flowchart

Common AI Applications and Use Cases in SMEs

Customer-facing solutions intended to improve engagement and automate routine interactions are the most common AI applications in SME industries (Le Dinh et al., 2025). AI-powered chatbots are the most popular adoption category; studies have shown its use in the telecoms, e-commerce, and customer support industries. Natural language processing (NLP) and machine learning power these conversational AI systems, which automate answers to commonly asked questions, offer tailored product recommendations, and manage transactional inquiries with proven increases in response times and customer satisfaction ratings (Olujimi & Ade-Ibijola, 2023). Beyond chatbots, SMEs use AI for predictive analytics and consumer segmentation, allowing for tailored marketing efforts that have been shown to increase campaign conversion rates (Kumar et al., 2024).

Digitally advanced SMEs have been shown to use email marketing automation, which is driven by machine learning algorithms that improve send times and personalize content based on user behavioral patterns (Castelli et al., 2025a). With applications in brand reputation management and early customer dissatisfaction detection, AI-driven sentiment analysis solutions that allow SMEs to track customer feedback across social media, review platforms, and customer service channels represent an emerging application category (Castelli et al., 2025b; Le et al., 2026).

Machine learning algorithms enhance resource allocation, forecast maintenance needs, and simplify workflow management in internal operations and corporate processes, where significant AI deployment takes place (Scaife, 2024). SMEs in manufacturing and logistics can reduce unexpected downtime and maintenance costs by anticipating equipment problems before they happen thanks to predictive maintenance powered by AI algorithms evaluating equipment sensor data (Benhanifia et al., 2025). A second significant operational use, which is especially common among retail and e-commerce SMEs, is inventory optimization employing machine learning algorithms that predict demand, control stock levels, and lessen overstocking (Liu et al., 2025).

Demand forecasting, logistics route optimization, supplier risk assessment, and other AI-powered supply chain optimization technologies are widely used by manufacturing and distribution SMEs, with verified cost savings in logistics and transportation operations (Khedr & S, 2024). In manufacturing settings, machine learning models for quality control and defect detection show quantifiable drops in defect rates and product returns (Kausik et al., 2025).

Machine learning systems for cash flow forecasting, budgeting automation, fraud detection, and risk assessment are examples of AI usage in financial management and administrative tasks (Wasserbacher & Spindler, 2022). SMEs may minimize fraud risk, increase the accuracy of financial decision-making, and enhance working capital management with the help of these tools. Optical character recognition (OCR) and machine learning-powered automated invoice processing and expense classification minimize the administrative burden of manual data entry (Dragomirescu et al., 2025). When compared to conventional scoring techniques, machine learning-based credit risk assessment models greatly increase lending accuracy (Machado et al., 2025).

Adoption of AI-driven marketing analytics and decision support solutions is expanding quickly. Machine learning-based predictive lead scoring models find high-probability sales opportunities, allowing for more effective sales force distribution and higher conversion

rates (González-Flores et al., 2025). Recommendation algorithms and behavioral analytics-driven content customization systems provide tailored product and content recommendations, increasing average order value and engagement metrics (Valencia-Arias et al., 2024).

There are noticeable differences in AI applications between industries and regions. SMEs in the retail and e-commerce sectors exhibit the highest adoption rates when it comes to inventory control and customer experience (Indiani et al., 2025). Predictive maintenance and quality control systems are widely used by manufacturing SMEs, whereas business services SMEs prioritize chatbots for customer support and marketing automation (Benhanifia et al., 2025). SMEs in the healthcare and professional services sectors have lower rates of AI use, with a focus on appointment scheduling and administrative automation (Ayinaddis, 2025).

Geographical differences are noticeable: AI adoption among SMEs is concentrated among larger SMEs and companies in high-tech industries, with rising Asia (especially China, India, and Southeast Asia) leading the way, followed by Latin America (Gupta, 2025). With a focus on compliance and data protection issues, European SMEs have intermediate adoption rates (Monson & Sackey, 2025).

Enablers and Drivers of AI Adoption

The best indicator of effective AI deployment, according to research, is top management commitment (Keong et al., 2025). Organizational cultures that support technology adoption are created by leaders that provide clear strategic justifications for integrating AI, assign specializedresources, and openly support digital change (Oyetade et al., 2024). On the other hand, attempts to deploy AI that are primarily motivated by competitive emulation or leadership skepticism often leads to unsuccessful implementations (Westenberger et al., 2021).

AI adoption success rates are considerably greater in companies with innovative cultures, psychological safety for experimenting, and failure tolerance (Ayinaddis, 2025). AI adoption is more successfully navigated by businesses with proven change management capabilities and prior technology deployment expertise (Tursunbayeva, 2024). AI-powered analytics naturally connect with digital-first organizational cultures that prioritize data-driven decision-making (Szukits & Móricz, 2024).

In contrast to highly hierarchical organizational structures, decentralized decision-making, cross-functional collaboration, and committed innovation teams enable more successful adoption of AI (Baumann & Wu, 2023). Better implementation results are attained by companies that create leadership positions specifically focused on AI or digital transformation (Weber et al., 2022).

AI implementation requires a foundational IT infrastructure, such as dependable internet connectivity, cloud computing capabilities, data management systems, and cybersecurity infrastructure (van der Vlist et al., 2024). Implementation costs are disproportionately high for organizations with inadequate infrastructure (Sohn et al., 2020a). Adoption of cloud computing is a key facilitator, giving SMEs access to advanced AI capabilities via subscription structures (Sohn et al., 2020b).

The availability, quality, and integration of data across organizational systems are critical components of AI application (Bernardo et al., 2024). Faster AI implementation and better model performance are attained by organizations with well-established data management procedures and data governance frameworks (M. C. M. Lee et al., 2023). For SMEs using older systems, data integration complexity becomes a very serious problem (Putrama & Martinek, 2024). AI adoption success rates are greater in companies with well-established IT departments and systems integration know-how (Ayinaddis, 2025). Adoption is greatly aided by the availability of technical competence for data preparation, model training, and system integration (Le Dinh et al., 2025).

Although the availability of such talents is still severely limited, especially in developing economies, workforce expertise in data analytics, machine learning, and AI technologies emerges as a crucial enabler (Mhaske et al., 2025). Businesses that prioritize staff upskilling can obtain the human capital needed for successful AI implementation through strategic partnerships, specialized training, or external hires (Asiedu & Tenakwah, 2025). Organizational preparedness is facilitated by digital literacy, which is the fundamental understanding of data ideas and algorithm functionality (Michelotto & Joia, 2024).

The success of AI implementation is strongly influenced by employee engagement and acceptability (Savolainen et al., 2026). Compared to workforces who view AI as a danger to employment, employees who recognize AI's potential to enhance their capabilities exhibit higher adoption excitement and faster technological assimilation (Savolainen et al., 2026). Adoption resistance is decreased by open communication about role consequences, retraining options, and promises about job stability (Colaner, 2022). Superior AI implementation results are attained by organizations that form cross-functional teams of domain experts, technical specialists, and process owners (Sharma, 2024). Adoption of AI is often hampered by IT and business unit silos, which restrict the transfer of domain expertise (Hána & Lameijer, 2025).

Organizations that perceive competitive threats from AI-enabled competitors exhibit greater adoption urgency (Hagiu & Wright, 2025). Competitive dynamics are a major driver of AI adoption (Ayinaddis, 2025). Sectoral dynamics are important; the retail, financial services, and technology industries see the most intense competitive pressure (Ietto-Gillies & Trentini, 2023). Adoption of AI by SMEs is significantly aided by institutional support systems, financial incentives, and government legislation (Sánchez et al., 2025). Significantly higher SME adoption rates are shown by data from countries that provide AI subsidies, tax breaks, and training grants (Ayinaddis, 2025). Innovation sandboxes created by digital policy frameworks lower regulatory obstacles to technology testing (Aydın & Yardımcı, 2024).

For SMEs with limited resources, access to technology partners, consulting companies, cloud service providers, and AI-as-a-Service platforms lowers implementation obstacles (Le Dinh et al., 2025). Through strategic alliances with academic institutions, research centers, and technology suppliers, SMEs can have access to knowledge and technological resources that are beyond their own capabilities. Implementation success is highly influenced by the quality of vendor support (Le Dinh et al., 2025). Adoption timescales are influenced by sectoral factors such as competitive intensity, profit margins

that allow technological investment, and data accessibility. AI adoption is faster in high-margin, data-rich, fiercely competitive industries (Yesuf & Fields, 2025).

Key Barriers and Implementation Challenges

Large upfront expenses for implementing AI, such as technology licensing, infrastructure development, and employing specialists, are the most commonly mentioned adoption hurdle among SMEs (Haber & Carmeli, 2023). For SMEs with limited resources, the implementation costs of enterprise-grade AI systems are still unaffordable (Peretz-Andersson et al., 2024). For the smallest SMEs with little money to spare, even cloud-based AI-as-a-Service models continue to be financially difficult (Oldemeyer et al., 2025).

SME decision-makers often find it difficult to estimate projected returns from AI investments, especially for strategic applications where financial gains take time to materialize (Molina-Abril et al., 2025). Management is less inclined to commit limited funds as a result of this financial reward uncertainty (Chiu et al., 2022). The limited availability of venture capital and development financing for SMEs limits the amount of money that can be used to adopt AI (Sánchez et al., 2025). Banking systems in developing nations sometimes show a lack of comprehension of AI business cases, which lowers their readiness to fund technological projects (Marak & Ayyagari, 2025).

The severity of the talent gap is especially severe in developing nations (Adeleye et al., 2024). The capabilities are shifting the bounds of traditional human occupations in addition to changing how work is done (Henkenjohann & Trenz, 2026). Organizational preparedness for AI deployment is hampered by general digital literacy deficiencies across SME workforces (Ali & Khan, 2025). Making informed decisions is hampered by the fact that many SME managers and staff lack a basic comprehension of data principles and algorithmic thinking (Seppänen et al., 2025). Vendor overselling and improper technology selection are made more likely by this literacy mismatch (Meridha, 2024).

The majority of SMEs don't have organized methods for upskilling their workers. Many emerging economies' formal education systems fail to produce enough AI experts (Gruenewald & Mueller, 2025). Large corporations are often the focus of external training alternatives, or they require strong technological foundations (Ciarli et al., 2021). Experienced data scientists and AI experts need to be paid far more than the standard SME compensation ranges (Senol & Dagdeviren, 2019). As larger technology businesses provide recruitment advances to specialist AI professionals, retention issues become more pressing (Fernandez-Mateo, 2026).

Many SMEs run outdated information systems that are incompatible with contemporary data platforms and AI infrastructure, especially in conventional industries (Kallmuenzer et al., 2025). Implementation expenses for independent AI are sometimes higher than those for system integration (Eidi et al., 2026). AI model development is severely hampered by fragmented data sources, low-quality data, and a lack of data governance frameworks (Gong et al., 2023). Data silos between functional domains restrict the availability of training data for AI systems and hinder integrated analytics (Bhardwaj et al., 2026).

In many developing-economy environments, unreliable electrical supply, poor internet connectivity, and restricted access to cloud computing infrastructure are major

obstacles (Oyenuga et al., 2025). The implementation of cloud-based AI solutions by SMEs is restricted by these infrastructural limitations (Sánchez et al., 2025). Implementing AI creates additional data protection needs and cybersecurity threats (Jada & Mayayise, 2024). For SMEs using AI systems processing personal data, regulatory compliance requirements incur significant compliance expenses (Andrews et al., 2026).

Adoption is often hampered by workforce resistance to AI implementation, which is motivated by worries about job security or a general aversion to change (Golgeci et al., 2025). Resistance is made worse by inadequate change management skills and poor communication about role consequences (Warrick, 2023). Many SMEs see technology as an opportunistic buy rather than a strategically aligned investment, without a clear strategic goal for the deployment of AI (Sánchez et al., 2025). Implementations are often unsuccessful due to poor business case formulation or a misalignment of technology selection with real business demands (Oludapo et al., 2024).

SMEs usually lack the implementation discipline and formal project management skills needed for effective AI deployments (Peretz-Andersson et al., 2024). Deployment failures are caused by poor scope management and inadequate post-implementation assistance (Schmidt, 2023). The knowledge integration required for a successful AI implementation is hampered by functional silos between IT and business departments (M. C. M. Lee et al., 2023). AI systems with little uptake are often created by isolated IT departments using disjointed solutions (Uren & Edwards, 2023).

Uncertainty about acceptable AI applications and compliance difficulty are caused by evolving AI rules and data protection needs (Cajueiro & Celestino, 2026). Regarding AI governance, regulatory organizations in many developing economies are unclear. Organizations are forced to use enterprise solutions that require expensive customisation due to the lack of AI solutions tailored to SME scale and requirements (Ayinaddis, 2025). SME-scaled solutions are not the primary focus of many vendors (Zare et al., 2025).

SME access to implementation knowledge is hampered by underdeveloped AI vendor ecosystems and a lack of consulting services scaled to SME budgets (Sánchez et al., 2025). AI service provider ecosystems are still in their infancy in emerging nations (Kergroach & Héritier, 2025). Compliance is complicated by regulations pertaining to the gathering and use of data (Bottoms, 2019). Implementation complexity is increased by worries about algorithmic bias and accountability requirements (Barbudo Carrasco, 2025).

Business Outcomes, Performance Impact, and Competitive Implications

Adoption of AI has significantly improved operations across a number of performance parameters, according to quantified data. The most frequently reported result is cost reduction, with SMEs reporting operational cost reductions that vary from 5 to 30% based on application area and implementation quality (Gupta, 2025). These reductions are the result of ordinary process automation, resource allocation optimization, and defect reduction.

Process execution efficiency gains are documented in a number of areas: chatbot automation improves customer service response times (Marcineková et al., 2025); AI-optimized inventory management improves inventory turnover (Archie, 2025); route optimization reduces logistics costs (Chaubey & Panchal, 2025); and predictive maintenance

reduces production downtime (Chaubey & Panchal, 2025). Automation of ordinary analytical processes leads to increases in labor productivity (Isaza & Cepa, 2024).

Adoption of AI has been shown to increase sales and revenue through a number of mechanisms, including better lead scoring that increases sales conversion rates (Mohd Amin et al., 2025), personalized recommendations that increase average order value and customer lifetime value (Mohd Amin et al., 2025), and optimized pricing strategies that increase revenue realization (X. Li & Liu, 2026). AI-optimized marketing efforts that achieve higher conversion rates lead to increases in customer acquisition (Mohd Amin et al., 2025). As AI-powered customer experience enhancements boost market competitiveness, market expansion benefits become apparent (Sahut & Laroche, 2025). AI chatbots that improve customer service lower service cost barriers to market expansion (Gupta, 2025).

Improvements in customer satisfaction are well-documented results of implementing AI. Customer satisfaction ratings rise when chatbots are available and respond more quickly (Rita et al., 2026). Personalized service, proactive problem solving, and tailored product suggestions all contribute to improvements in customer retention (proven increases in retention rates) (Gupta, 2025). Competitive advantage in customer experience becomes increasingly crucial as differentiating basis. Businesses that use AI to improve customer satisfaction get a competitive edge (Y. Chen & Prentice, 2025).

Adoption of AI promotes innovation in several ways. AI-powered design optimization and customer insight generation enable innovation in products and services (Le Dinh et al., 2025). New service delivery methods and prospects for data monetization are made possible by AI, which leads to business model innovation (Sjödin et al., 2021). AI-powered competitive intelligence and emerging opportunity identification enhance strategic innovation and market sensing capabilities (Gao et al., 2025).

Sustained, long-term performance increases necessitate ongoing investment and capability development, according to longitudinal data (Gupta, 2025). Performance plateaus are common in organizations that achieve initial efficiency benefits but fail to maintain competence development (T. Lee et al., 2025). AI-driven scenario planning and flexible resource allocation increase an organization's resistance to market change (Bessa & Barbosa, 2025). Successful AI implementation gives SMEs a sustained competitive advantage through a combination of operational excellence, superior customer experience, and innovative potential, according to cumulative business effect statistics (Islam et al., 2025).

DISCUSSIONS

Technology Adoption Framework Evolution

The technology adoption frameworks, especially the Technology-Organization-Environment (TOE) model (Keong et al., 2025) and the Technology Acceptance Model (TAM) (Natsir et al., 2023), are expanded and improved by the review's findings, which show that adoption dynamics in resource-constrained SME contexts differ greatly from patterns in large enterprises. Conventional adoption models place more emphasis on individual views and technology features, while research shows that organizational and environmental factors, especially budgetary limitations and the availability of human capital, have a greater impact on SME adoption decisions (Faiz et al., 2024). This implies that adoption models for SME contexts in underdeveloped economies should place more attention on ecosystem

considerations and resource limitations (Mishra et al., 2025). Additionally, the review shows that static adoption models fail to appropriately capture temporal changes in adoption processes. Research indicates that rather than a quick, all-encompassing shift, SME adoption follows gradual, incremental approaches (Siregar et al., 2024). Before moving on to strategically complicated applications, organizations should start with low-risk, high-visibility apps. The organizational learning processes and risk management priorities that binary adoption models fail to effectively envision are reflected in this phased adoption approach (Basten & Haamann, 2018).

Dynamic Capabilities and Organizational Transformation

The review's conclusions about the significance of adaptive transformation and ongoing capability building are consistent with dynamic capabilities theory (S. T. Cavusgil & Deligonul, 2025). Dynamic capabilities, such as sensing capabilities that enable the identification of new AI opportunities, seizing capabilities that enable strategic resource commitment, and reconfiguring capabilities that enable organizational transformation, are demonstrated by organizations that achieve sustained competitive advantage from AI adoption (S. Cavusgil & Knight, 2015). The analysis also shows that AI's performance impact is essentially mediated by organizational learning capacity and knowledge integration skills. Better AI implementation results are attained by companies with established knowledge management procedures and cultures of continual learning (Nakash & Bolisani, 2025).

Human Capital and Organizational Effectiveness

In the literature on technology adoption, the crucial significance of human capital, which includes digital literacy, technical know-how, the capacity to manage change, and cross-functional cooperation, emerges as an underappreciated theoretical feature. The availability and caliber of human capital constitute binding barriers to the adoption of AI, which are especially severe in poor nations (Brey & van der Marel, 2024). This implies that adoption theory needs to take into account human capital as an endogenous organizational trait that plays a major role in mediating the effectiveness of technology implementation (J. Xu & Lu, 2022). Additionally, research on identity work and employee engagement during digital transitions shows that organizational psychology and change management aspects are crucial to the success of AI adoption (Skare & Blažević Burić, 2022). Organizational behavior viewpoints should be more fully incorporated into adoption studies in the future (Quttainah, 2025).

Practical Implications for SME Practitioners

The results indicate that a targeted, phased deployment approach is preferable to opportunistic technology acquisition for SME executives thinking about using AI. The suggested course of action is as follows: (1) AI literacy and awareness building among leadership establishing shared understanding; (2) business case and opportunity identification, rigorously evaluating where AI can address significant business problems; (3) pilot project implementation, starting with lower-risk applications; (4) capability building and infrastructure development, investing in talent and technology infrastructure; (5)

integration into strategic objectives, gradually expanding AI applications; and (6) continuous learning and adaptation.

Adopting AI successfully necessitates intentional preparedness building across several business dimensions: (1) Leadership commitment and vision; provide a clear strategic justification for the deployment of AI, communicate openly, assign specific resources, and openly support digital transformation (Holmström & Magnusson, 2025); (2) Workforce involvement and change management; establish clear communication about the effects of roles, provide opportunity for retraining, and reassure employees about their job security (Shinde, 2025); (3) Cross-functional cooperation; create cross-functional teams including technology specialists and business process experts (Le Dinh et al., 2025); (4) Digital literacy; invest in the development of fundamental digital skills at all organizational levels to promote digital literacy (Bouwmans et al., 2024).

Practically speaking, SMEs should use proactive tactics to overcome identified adoption barriers: (1) Financial constraints; prioritize high-ROI applications, look for public funding and subsidies, and use cloud-based AI-as-a-Service solutions (S.-S. Chen et al., 2026); (2) Deficits in skills; create hybrid talent strategies that combine internal training and external hiring; collaborate with technology vendors; and involve consulting partners (Le Dinh et al., 2025); (3) Infrastructure constraints; prioritize modernizing legacy systems, start with cloud-based solutions, and invest in fundamental digital infrastructure (H. Li, 2026); (4) Change resistance; implement systematic change management with an emphasis on open communication and staff involvement to address change resistance (Sahay & Goldthwaite, 2024).

Policy Implications for Policymakers

Research shows that structural impediments that can be addressed by policy action continue to limit SME AI adoption rates. Policymakers should think about: (1) Financial support mechanisms; tax incentives for AI investment, concessional financing, and direct subsidies for AI deployment lower financial adoption barriers. Significantly higher acceptance rates are shown by data from government-sponsored AI adoption initiatives (X. Li et al., 2026); (2) Talent development infrastructure; important human capital shortages are addressed by funding technical education programs that produce professionals prepared for AI. Curriculum congruence with labor market demands is made possible by public-private collaborations (Aljohani et al., 2022); (3) Technology infrastructure development; public funding for dependable internet access and cloud computing infrastructure eliminates fundamental obstacles, especially in poor nations (Ozili, 2025); (4) Regulatory support and clarity; reduce regulatory ambiguity by establishing transparent AI governance frameworks. Establish innovation sandboxes with regulatory protections to allow AI experimentation (Ruschemeier, 2025).

Policy frameworks that facilitate the adoption of AI work best when multiple stakeholders work together: the government provides financial support and regulatory frameworks; industry provides technology solutions and implementation expertise; educational institutions develop talent; and civil society ensures public interest protection. Policymakers should make sure that underprivileged SME segments, such as rural firms, minority-owned enterprises, and female-led businesses, receive assistance in adopting AI.

Inclusive participation is promoted by culturally sensitive training methods and targeted support programs (Le Dinh et al., 2025).

Emerging Research Gaps and Future Directions

Significant knowledge gaps persist despite increased study attention: (1) Longitudinal performance tracking; the majority of research shows either short-term gains or cross-sectional data. There is still a dearth of long-term studies monitoring long-term effects on performance (Gupta, 2025); (2) Contextual variance in developing economies; there is significant variance among areas, despite the fact that research on developing-economy contexts is becoming more prevalent (Gashi et al., 2026); There are few broadly applicable conclusions from studies that focus on particular national contexts and sectoral differences; (3) Ethical AI governance and responsible implementation; there is still a lack of research on the ethical aspects of SME AI adoption, such as algorithmic bias, accountability, and transparency (Maiti et al., 2025); (4) AI implementation in conventional non-tech sectors; research on AI adoption focuses on industries with high levels of technology. Dedicated research is needed to understand implementation pathways in traditionally low-tech businesses (Le Dinh et al., 2025).

CONCLUSION

Theoretical insights and empirical data about AI acceptance, implementation difficulties, and business effects across SMEs are synthesized in this systematic literature review. The synthesized literature leads to several important conclusions: (1) AI adoption among SMEs has increased significantly since 2019 due to technological democratization, cloud-based solutions, and competitive pressures; and (2) implementation barriers continue to be complex and interconnected, encompassing organizational readiness, talent scarcity, and regulatory uncertainty in addition to technical and financial constraints.

Future research should track AI implementation trends, performance sustainability, and long-term competitive outcomes through multi-year longitudinal studies. Mixed-methods designs that combine qualitative implementation experiences with quantitative performance indicators would offer more complex insights into the variables influencing long-term adoption success. Future research can also conduct quasi-experimental research and randomized controlled trials to assess the efficacy of particular policy solutions. It should determine which strategies successfully speed up adoption and guarantee high-quality implementation.

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