

MODERN DAY IMPACT OF ARTIFICIAL INTELLIGENCE AND AUTOMATION TOOLS IN SMALL BUSINESSES

Understanding adoption trends, challenges in implementation and the impact of AI automation on the success of small businesses across the globe.

Ritobrata Chakraborty¹, Dinesh Bansal¹, Udayan Saha¹, Trisha Sinha²

Department of Management, St Joseph's University, Bengaluru, Karnataka State, India ¹

Department of Professional Studies, CHRIST (Deemed To Be University), Bengaluru, Karnataka State, India ²

ABSTRACT: This study examines the influence of artificial intelligence (AI) and automation technologies on the operational efficiency of small businesses. The data and reports published between 2023 and 2026 by organisations including the U.S. Small Business Administration (SBA), McKinsey & Company, Salesforce, the Organisation for Economic Co-operation and Development (OECD), the Massachusetts Institute of Technology (MIT), JPMorgan Chase Institute, Boston Consulting Group (BCG), and Gartner, show challenges associated with the implementation of AI in small Businesses. The findings reveal that AI adoption among small businesses increased substantially between 2023 and 2024, narrowing the historical technology adoption gap between small firms and large enterprises.

Businesses that have effectively integrated AI into their operations report improvements in revenue growth, productivity, and operational capacity. Survey evidence shows that firms experiencing business growth are significantly more likely to adopt AI compared to those facing declining performance. Many commercial vendors promote exceptionally high returns on investment from AI implementation; however, most organisations that successfully implement AI report moderate but meaningful gains in efficiency, productivity, and revenue rather than extraordinary financial returns. Evidence from MIT and McKinsey indicates that a large proportion of AI initiatives fail to generate measurable financial value, highlighting a persistent gap between AI adoption and successful implementation.

Index Terms: Artificial Intelligence, AI in small businesses, Return on Investment(ROI), Adoption trends, High Returns, AI Implementation, Revenue growth, Generative AI

I. INTRODUCTION

The release of ChatGPT in late 2022 marked a significant turning point in the accessibility of artificial intelligence technologies. In a relatively short period, AI has moved beyond large corporations and technology-focused organisations, becoming increasingly available to small businesses across various industries. According to data from the JPMorgan Chase Institute, small businesses have adopted AI at a much faster rate than previous generations of digital technologies, indicating growing accessibility and declining implementation costs.

Additionally, advances in computing power, cloud-based platforms, and large language models have greatly reduced the costs associated with deploying AI-enabled solutions. Tasks that once required specialised software, technical expertise, or substantial financial investment can now be automated with affordable, subscription-based tools. Consequently, many small businesses have begun to experiment with AI-driven applications for customer service, marketing, accounting, inventory management, and workflow automation.

However, despite these advancements, widespread adoption has not always resulted in measurable business value. While organisations continue to invest in AI technologies, many struggle to achieve significant improvements in productivity, profitability, or operational performance. This gap between adoption and successful implementation has emerged as one of the most pressing questions in contemporary business research and forms the foundation of this study.

Research Gap

1. Under what conditions can small businesses successfully convert AI adoption into measurable operational and financial improvements?
2. What evidence exists regarding the impact of AI and automation technologies on productivity, costs, revenue generation, and organisational capacity?
3. What barriers most commonly prevent successful adoption and implementation among small businesses?
4. Why do many AI initiatives fail to produce measurable business outcomes, and what distinguishes successful implementations from unsuccessful ones?

Scope and Definition

This study focuses on small businesses as defined by the global standards, generally referring to firms employing fewer than 500 workers. The analysis considers a broad range of AI and automation technologies, including workflow automation platforms, generative AI systems, AI-enabled customer service applications, intelligent accounting software, predictive analytics tools, and AI-assisted marketing solutions.

This study examines evidence published between 2023 and 2026, a period characterised by rapid advances in generative AI and significant growth in small business adoption. Emphasis is placed on identifying verified outcomes from academic research, government publications, and industry reports rather than relying solely on vendor-generated claims.

II. REVIEW OF LITERATURE

The Technology–Organisation–Environment (TOE) framework developed by DePietro, Wiarda, and Fleischer (1990) remains one of the most widely used models for examining organisational technology adoption. This framework proposes that the decision to adopt and implement a new technology is influenced by three interrelated dimensions: technological factors, organisational characteristics, and environmental conditions. Technological factors include existing systems, their complexity, and the extent to which they can be tested before full implementation. They influence how organisations evaluate the potential benefits and risks associated with adoption.

Organisational factors are internal characteristics, including firm size, financial resources, managerial capabilities, employee skills, leadership support, and organisational culture. They determine whether a business possesses the capacity to implement and sustain technological change effectively.

Environmental factors encompass external influences such as competitive pressures, industry trends, government regulations, access to technical support, and broader economic conditions. These factors often shape the urgency and feasibility of technology adoption. The relevance of the TOE framework to AI implementation lies in its acceptance that technological capability alone rarely determines success. Research consistently demonstrates that organisational preparedness and environmental conditions often exert a stronger influence on implementation results than the technical features of the technology itself. As a result, businesses with strong leadership, adaptable processes, and supportive organisational cultures can achieve greater benefits from AI than organisations that simply invest in advanced software solutions.

Diffusion of Innovation (DOI) theory, proposed by Rogers (2003), provides another important insight for understanding the rapid adoption of artificial intelligence among small businesses. According to the theory, innovations spread through populations over time as individuals and organisations move through different stages of adoption. These groups include innovators, early adopters, the early majority, the late majority, and laggards. A central contribution of DOI theory is the recognition that adoption decisions are influenced not only by objective evidence of effectiveness but also by social influence and perceived legitimacy. Organisations often adopt technologies because they observe competitors, industry leaders, or peer firms doing so, and in many cases, the visibility of adoption can be more influential than proven evidence of financial returns.

The rapid growth in AI adoption among small businesses has occurred alongside extensive media coverage, public discussion, and widespread claims regarding the transformative potential of artificial intelligence. As a result, some organisations may adopt AI technologies primarily to remain competitive or avoid perceived technological disadvantage rather than as part of a carefully planned business strategy.

The relationship between technological innovation and organisational change has been extensively examined within management literature. Scholars such as Kotter (1996) and Prosci (2010) argue that technology initiatives frequently fail not because of technical limitations but because organisations struggle to manage the human dimensions of change. Kotter's model of organisational transformation emphasises the importance of leadership commitment, communication, employee engagement, and the development of a shared vision throughout the implementation process.

Subsequent studies have further emphasised the importance of organisational cross-functionality in determining implementation outcomes. Research published in *Small Business Economics* found that the benefits of AI adoption are strongly influenced by factors such as digital infrastructure, investment in innovation, and access to external knowledge networks. The study concluded that technological investments alone are insufficient and that meaningful gains often require organisational revamp and governance mechanisms capable of supporting long-term implementation.

III. ADOPTION TRENDS ACROSS INDUSTRIES, BUSINESSES AND SECTORS

Adoption Differences by Business Size

Adoption rates vary according to firm size, even within the small business category. Micro-businesses employing fewer than five individuals generally report lower levels of AI adoption than businesses with larger workforces and greater organisational capacity.

The SBA further reports that many non-adopting micro-businesses perceive AI as irrelevant to their operations. This finding suggests that informational and educational barriers may be as significant as technological or financial constraints, and in many scenarios, business owners simply do not fully understand how AI tools can address operational challenges within their specific industries.

On the contrary, newer businesses appear increasingly likely to incorporate AI from their inception. Data from the JPMorgan Chase Institute indicates that firms established in 2025 adopted AI at substantially higher rates than businesses founded only a few years earlier; thus suggesting that AI is becoming a standard component of the modern entrepreneurial environment rather than an optional technological enhancement.

Industry-level differences are particularly pronounced as information technology, professional services, and scientific research sectors report some of the highest levels of AI adoption owing to stronger digital capabilities, greater access to technical expertise, and business models that readily accommodate data-driven technologies. On the other hand, industries such as construction, transportation, hospitality, and food services generally report lower adoption rates because many small businesses operate within these sectors, resulting in slower adoption contributing to differences in productivity, growth and operational efficiency.

As adoption rates continue to increase in the modern world, a newer problem of successful implementation begins to resurface. Many organisations report experimenting with AI technologies, yet relatively few achieve large-scale integration across business functions. A considerable number of businesses remain in the initial stage rather than progressing toward wide deployment.

IV. IMPACT OF AI ADOPTION ON SMALL BUSINESSES

A. Revenue Impact

Among the available sources examining the relationship between AI adoption and business performance, Salesforce's global survey of 3,350 small and medium-sized business (SMB) leaders provides some of the most comprehensive evidence. The findings indicate that 91 per cent of AI-using businesses reported positive effects on revenue generation. Although the degree of impact varied across regions and industries, the overall trend suggests a strong association between AI adoption and business growth. Approximately 83 per cent of expanding firms reported using AI technologies, compared with 55 per cent of businesses experiencing revenue declines.

B. Return on Investment

The financial returns associated with AI implementation vary considerably across studies. Vendor-sponsored reports frequently highlight exceptionally high returns on investment, whereas independent research generally presents more moderate findings.

Evidence from large-scale industry studies suggests that approximately three-quarters of organisations achieve positive returns from AI investments within the first year of implementation; reported benefits typically include improvements in productivity, operational efficiency, customer service quality, and revenue generation. Revenue increases commonly fall within the range of 6 to 10 per cent, depending on industry conditions and implementation quality.

C. Productivity and Operational Capacity

Research conducted by Stanford University and the Massachusetts Institute of Technology provides some of the most rigorous evidence regarding the productivity effects of generative AI. Studies examining workplace performance have found that employees using AI-assisted tools can complete certain tasks more efficiently, particularly those involving information retrieval, content generation, communication, and administrative work.

At the organisational level, customer service operations represent one of the clearest examples of measurable efficiency gains. Advances in conversational AI have enabled businesses to automate a growing proportion of customer interactions, reducing response times and allowing employees to focus on more complex tasks requiring human judgment.

D. Broader Economic Productivity Implications

Beyond firm-level outcomes, researchers have examined the potential impact of artificial intelligence on national and international productivity growth. According to OECD estimates, AI technologies could contribute between 0.8 and 1.4 percentage points to annual labour productivity growth across G7 economies during the coming decade.

However, the organisation also emphasises that productivity gains are not distributed evenly across firms. Evidence from several European countries demonstrates that businesses with strong digital capabilities are substantially more likely to realise significant benefits from AI implementation than firms with weaker technological foundations. Businesses frequently observed productivity advantages diminish when researchers include sections such as digital infrastructure, workforce skills, cloud computing adoption, and data management practices.

V. BARRIERS TO ADOPTION AND IMPLEMENTATION CHALLENGES

Despite the growing accessibility of artificial intelligence methods, many small businesses still face challenges during both adoption and implementation.

A. Cost and Financial Constraints

Historically, implementation costs represented one of the most significant barriers to technology adoption among small businesses. Many small business owners remain hesitant to invest in AI due to uncertainty regarding expected returns, implementation risks, and limited access to financial aid. Although cloud-based platforms and subscription-based AI models have cut entry costs, successful implementation often requires additional expenditures related to employee training, process redesign, software integration, and ongoing system maintenance.

B. Vendor Selection and Product Suitability

Another challenge involves identifying solutions that align with the specific needs of small businesses because many AI models are developed primarily for large enterprises and may not cater to the operational needs of smaller organisations. Therefore, small businesses frequently encounter difficulties when attempting to adapt enterprise-focused technologies to their own workflows and resource limitations.

C. Data Quality and System Integration

The effectiveness of AI systems depends heavily on the quality and accessibility of organisational data; often, poor data quality, fragmented information systems, and inadequate integration between software platforms restrict small businesses. Organisations that rely on multiple disconnected systems for accounting, customer relationship management, inventory control, and operational reporting face problems during AI integration. AI applications may fail to deliver accurate results due to data being inconsistent

and inaccurate. Thus, data management and system integration have emerged as critical prerequisites for successful AI implementation.

D. Skills and Knowledge Gaps

Knowledge about AI methods requires intense training, and smaller companies may struggle to evaluate vendors, establish realistic performance expectations, or develop effective training programmes to educate employees. Hence, workforce skills are a major determinant of effective implementation and Businesses that invest in employee development and digital literacy programs are at a better position to integrate AI into daily operations and achieve measurable outcomes.

E. Implementation Failure and Organisational Readiness

Established organisations typically lay down clear objectives, allocate sufficient resources, redesign workflows, and develop governance structures capable of supporting long-term adoption. On the contrary, certain failed implementations often lack direction and proper employee training.

F. Facing Management Challenges

Resistance to change can become a significant obstacle to implementation. Change requires leadership commitment, communication, and employee participation throughout the process. Existing employees may express concerns about job security, increased monitoring, or unfamiliar work practices, particularly when organisational policies post AI adoption are not clearly communicated.

Small businesses often face additional challenges because they typically lack dedicated change management teams or formal implementation structures. As a result, technology initiatives may be introduced without sufficient planning, training, or organisational support, increasing the likelihood of implementation difficulties.

G. Regulatory and Data Privacy Concerns

The evolving regulatory landscape surrounding artificial intelligence presents another challenge for small businesses. Business owners must increasingly navigate data protection, privacy, cybersecurity, and algorithmic accountability issues. Compliance requirements can be particularly demanding for smaller firms that lack dedicated legal or compliance departments. The uncertainty associated with future regulatory developments may discourage some businesses from pursuing more advanced AI initiatives, particularly in highly regulated sectors such as healthcare, finance, and legal services.

H. Competitive Pressure and Market Dynamics

Competitive pressures play a complex role because increasing adoption across industries encourages businesses to explore AI technologies in order to maintain competitiveness. On the other hand, pressure to adopt quickly may lead organisations to implement technologies without adequate preparation or strategic planning. As adoption continues to expand, businesses that fail to develop digital capabilities often fail to achieve success.

VI. RESULTS, INTEGRATED FINDINGS AND INFERENCE

The preceding analysis demonstrates that the impact of artificial intelligence on small business performance cannot be explained solely through technological capabilities. Although Artificial Intelligence methods have become increasingly affordable, accessible, and powerful, evidence consistently shows that implementation outcomes vary significantly across organisations. The Technology–Organisation–Environment (TOE) framework provides a useful structure for understanding these differences by examining how technological, organisational, and environmental factors interact to influence adoption and implementation outcomes.

A. Technological Factors: Necessary but Not Sufficient

The findings indicate that technological barriers have declined and technology serves as an enabler of organisational change rather than a determinant of success. The availability of advanced tools creates opportunities for improvement, but the realisation of those

opportunities depends largely on organisational and environmental conditions. Advances in cloud computing, no-code platforms, subscription-based software models, and generative AI applications have reduced many of the traditional obstacles associated with technology adoption. Small businesses can now access capabilities that were previously available only to large organisations with significant technical resources.

B. Organisational Factors

Among the three dimensions of the TOE framework, organisational factors emerge as the most significant determinant of implementation success. Successful organisations invest in employee development and capability building.

Workforce training enables employees to understand, utilise, and adapt to new technologies, thereby increasing adoption rates and reducing resistance to change. Successful implementation often involves redesigning existing workflows rather than simply introducing new software.

The data quality and digital infrastructure play a crucial role in implementation effectiveness, especially in organisations with integrated systems. Reliable data and established digital practices are generally better positioned to realise value from AI than firms operating with fragmented systems and inconsistent information management practices.

C.Environmental Factors such as External Pressures and Opportunities

Environmental factors also influence adoption decisions and implementation outcomes. Competitive pressures, industry conditions, regulatory requirements, and technological ecosystems all contribute to the context within which small businesses operate. When competitors adopt automation technologies and improve operational efficiency, organisations face growing pressure to pursue similar initiatives in order to maintain market relevance.

Environmental conditions can either facilitate or constrain implementation efforts. Industries with strong digital infrastructures, established technology networks, and access to skilled talent often experience higher adoption rates and more successful outcomes than smaller businesses.

VII. DISCUSSION: STRATEGIC IMPLICATIONS

The findings of this study extend beyond understanding adoption patterns and implementation outcomes. They offer important insights for business leaders, policymakers, and researchers seeking to maximise the benefits of artificial intelligence within the small business sector.

A. Implications for Small Business Owners

The findings provide several practical lessons for small business owners. Successful implementation requires more than purchasing software; it depends on the availability of reliable data, integrated systems, managerial commitment, and employee support. Businesses should begin with clearly defined use cases that address specific operational challenges. Research indicates that organisations achieve stronger results when AI is applied to high-volume, repetitive tasks with measurable outcomes. The evidence reviewed throughout this study highlights workforce capability as one of the strongest predictors of implementation success; employees who understand the purpose and functionality of AI systems are more likely to adopt new technologies effectively and contribute to continuous improvement efforts.

B. Implications for Policymakers

The findings also have important implications for public policy. Although the cost has declined significantly, many small businesses continue to face barriers related to skills, knowledge, infrastructure, and implementation support. Policymakers therefore have an important role in creating conditions that enable broader and more effective adoption.

One priority should be the expansion of digital literacy and workforce development programs, thereby reducing the identified knowledge gaps. Partnerships involving governments, educational institutions, industry associations, and business support organisations could help address this challenge through targeted training initiatives. Policymakers should also consider incentives that encourage investment in employee training, digital infrastructure, and organisational remodelling. Financial support

mechanisms, including grants, tax incentives, and innovation programs, may help smaller firms overcome resource constraints and accelerate implementation efforts with a binding regulatory framework.

C. Broader Strategic Significance

Taken together, the findings suggest that artificial intelligence should be viewed as an organisational capability rather than merely a technological tool. Businesses that approach AI as part of a broader transformation strategy are more likely to achieve measurable benefits than those that focus exclusively on software acquisition. The most successful firms will be those capable of combining technological innovation with leadership, workforce development, process redesign, and continuous learning.

VIII. CONCLUSION

This paper focuses on how AI methods and automation tools impacted the operational efficiency of small businesses between 2023 and 2026. Data drawn from government, academic, and industry sources show a major spike in adoption. Modern innovations, making these tools increasingly affordable and cloud-based, enable smaller companies to apply them effectively to customer service, marketing, inventory management, and daily administrative tasks.

However, the examined data also reveals a stark contrast between buying AI software and actually seeing a return on investment due to the inefficiency of a large number of small businesses that purchase these technologies to successfully implement them. Thus, at times, they fail to achieve any measurable financial or operational improvements. As time progresses, the primary hurdle has shifted from accessing technology to building the organisational capability to use it. Altogether, the conclusion drawn indicates that despite AI creating the opportunity for improvement, a company's internal readiness dictates whether that opportunity turns into real value. The companies that see the highest returns treat AI integration as a broader operational shift. Their success is driven by active leadership, well-trained employees, high-quality data, and revamped workflows, rather than treating the AI as a standalone purchase.

To bridge this gap between adoption and actual implementation, business leaders need to change their approach. Rather than rushing to adopt AI without a clear plan, executives should prioritise internal readiness. This means evaluating current processes, setting specific business goals, and heavily investing in staff training and change management. On a broader scale, policymakers can support this transition by funding digital literacy programs and providing small businesses with the guidance they need to navigate these operational changes.

Ultimately, while AI is often described as a transformative technology, that description only holds under the right conditions. Real value is created when advanced tools are paired with skilled teams, adaptable company cultures, and clear strategic goals. Moving forward, the most successful small businesses will not necessarily be the ones with the most sophisticated AI, but it will be the organisations that best align technological innovation with their long-term operational plans.

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