



Artificial Intelligence Adoption in Malaysian SMEs: When to Optimize and When to Transform Business Models?

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METADATA	ABSTRACT
<p>Paper history Received: 10 February 2025 Revised: 20 March 2025 Accepted: 12 May 2025 Published online: 25 May 2025</p> <p>Corresponding author Email: logaiswari@utm.my ORCID: 0000-0001-5706-4441 (Logaiswari Indiran)</p> <p>Keywords Gut microbiota Probiotics Fecal microbiota Transplant</p> <p>Citation Indiran L, Kohar UHA (2025) Artificial intelligence adoption in Malaysian SMEs: when to optimize and when to transform business models?. <i>Innovations in STEAM: Research & Education</i> 3: 25030104. https://doi.org/10.63793/ISRE/0024</p>	<p>Background: Artificial Intelligence (AI) has become an essential driver of innovation, operational efficiency, and competitive advantage in business settings. Despite national efforts to promote digitalisation, its adoption among small and medium-sized enterprises (SMEs) in Malaysia remains limited and inconsistent. One of the core challenges lies in deciding whether to deploy AI for optimising existing processes or to leverage it for broader transformation in business models and value delivery.</p> <p>Objective: To examine how Malaysian SMEs make strategic choices between process optimisation and business transformation in adopting digital technologies.</p> <p>Methodology: A qualitative methodology involving ten in-depth interviews was conducted with owners and managers from four key sectors: retail, education and skills training, home-based food services, and personal health services.</p> <p>Results: The findings show that AI is primarily used for operational convenience, such as automating scheduling, responding to customer queries, and content generation. These decisions were often shaped by peer influence, affordability, and perceived usefulness, rather than formal planning or strategic foresight. Notably, businesses in the education sector displayed greater willingness to explore AI for service innovation and personalised learning delivery, reflecting a higher degree of digital openness. Sectoral differences, owner mindsets, and contextual readiness significantly shaped AI adoption patterns.</p> <p>Conclusion: The study concludes that while AI optimisation remains the dominant approach among Malaysian SMEs, there is a growing awareness and readiness for transformation, underscoring the need for policy frameworks and digital support systems that are contextually responsive and practically aligned with SME realities.</p>

INTRODUCTION

Artificial Intelligence (AI) is increasingly becoming a central feature in the digital transformation journey of businesses around the world. From large corporations to emerging enterprises, the ability to harness AI has been linked to improved operational efficiency, enhanced customer engagement, and the discovery of new business models (Denic *et al.* 2024). However, the application of AI is not simply about acquiring new technology; it involves making informed strategic decisions that align with an organisation's long-term goals, capabilities, and market context. Globally, SMEs are often seen as crucial drivers of innovation and

employment. Yet, many of them face substantial challenges when it comes to adopting emerging technologies such as AI. These include limited access to capital, insufficient digital talent, and the lack of clear frameworks to guide adoption strategies (OECD 2021). The AI landscape for SMEs, therefore, is markedly different from that of larger corporations, necessitating tailored strategies that are sensitive to their unique constraints and opportunities. In Malaysia, SMEs account for approximately 97.4% of total business establishments and contribute over 38% to the national GDP, making them an essential pillar of the economy (SME Corp Malaysia 2023). Despite their significant role, many SMEs in the country still find



themselves at an early stage of digital adoption. While basic digital tools such as point-of-sale systems and social media marketing are widely used, the uptake of more advanced technologies like AI remains relatively low and inconsistent across sectors (Manap and Abdullah 2020). Two main approaches have emerged: AI optimization and AI transformation. Though both depend on AI technologies, they differ substantially in their objectives, scope, and the depth of impact on business operations and value delivery. While AI optimization is centred around improving existing workflows and enhancing operational efficiency, AI transformation involves more radical changes that could redefine business models and restructure how value is created. Understanding these distinctions is essential for organisations, particularly SMEs, to align AI strategies with their readiness levels, risk appetite, and long-term aspirations. The lack of strategic clarity on how and when to adopt AI further complicates this issue.

One of the most pressing decisions facing Malaysian SMEs is whether to adopt AI incrementally, through AI optimization and enhancing existing processes, or to pursue AI transformation, which involves a more fundamental shift in business operations and value delivery. This decision is far from straightforward. It requires SMEs to consider multiple factors such as their current digital readiness, resource availability, industry trends, and long-term strategic objectives (Jalil *et al.* 2024; Tajudeen *et al.* 2025). Making the wrong choice could result in wasted investments or missed opportunities for innovation and growth. This study is therefore positioned to examine this critical decision-making process. By conducting in-depth interviews with SME owners and managers across four key sectors, retail, education and training, home-based food services, and personal health and wellness, this research explores how these businesses navigate the challenges and opportunities presented by AI. The goal is to develop a contextualized decision-making framework that can guide Malaysian SMEs in choosing the most suitable AI pathway, whether through optimization or transformation. In doing so, this study aims to contribute towards more informed, strategic, and sustainable AI adoption among SMEs in Malaysia. The integration of AI into business practices has become increasingly central in shaping strategic direction across industries.

MATERIALS AND METHODS

This study adopts a qualitative approach to explore how MSEs in Malaysia are engaging with AI, with a particular focus on whether their efforts are aimed at improving existing processes or shifting towards new business models. The main objective was to understand the motivations, practices, and challenges faced by small business owners when navigating AI adoption within their respective industries. A qualitative

methodology involving ten in-depth interviews was conducted with owners and managers from four key sectors: retail, education and skills training, home-based food services, and personal health services. Participants were selected through purposive sampling to ensure relevance to the study. All businesses involved met the criteria of having fewer than thirty employees and generating annual revenues of less than RM3 million, in line with the Malaysian definition of micro and small enterprises. The interviews were semi-structured, allowing for flexibility while still maintaining focus on the key research questions. They were conducted in a mix of Bahasa Malaysia and English, depending on the comfort level of each participant, and lasted between thirty to forty-five minutes. The discussions explored current use of AI tools, perceived benefits, practical challenges, and whether their adoption efforts leaned more towards process optimization or business transformation. All interviews were transcribed and coded manually. A thematic analysis was then carried out to identify emerging patterns, with particular attention given to sectoral differences, owner motivations, and the depth of AI integration within business operations.

RESULTS

Retail sector

In the retail sector, which included three micro and small businesses such as a local mini market, a preloved item shop, and an online reseller, the adoption of AI was primarily geared towards basic optimization rather than full-scale transformation. Most of these businesses incorporated simple AI tools such as WhatsApp chatbots to manage customer inquiries, inventory restocking applications, and lightweight analytics to track popular products. For these small business owners, AI was seen as a practical solution to everyday challenges, especially when they had limited manpower and time to handle repetitive tasks. As one owner explained, “I use a chatbot, so I don’t have to reply to every question myself. It’s a time saver, not a game changer.” This statement reflects the mindset shared by many, where AI was useful for operational convenience but not something they viewed as a driver for major innovation. Interestingly, the decision to adopt AI was often influenced by word of mouth, peer recommendations, or exposure through social media, rather than through formal training or strategic planning. Most preferred ready-made tools were affordable, easy to install, and required little to no technical expertise (Fig. 1). However, there are several limitations; financial constraints remained the most common barrier, followed by uncertainty about the actual return on investment. As a result, AI usage in the retail sector stayed within a narrow scope, mostly focused on saving time and effort rather than exploring its broader potential to shift business models or scale digitally. AI becomes a driver of new revenue streams or entirely new business models. This often includes AI-powered

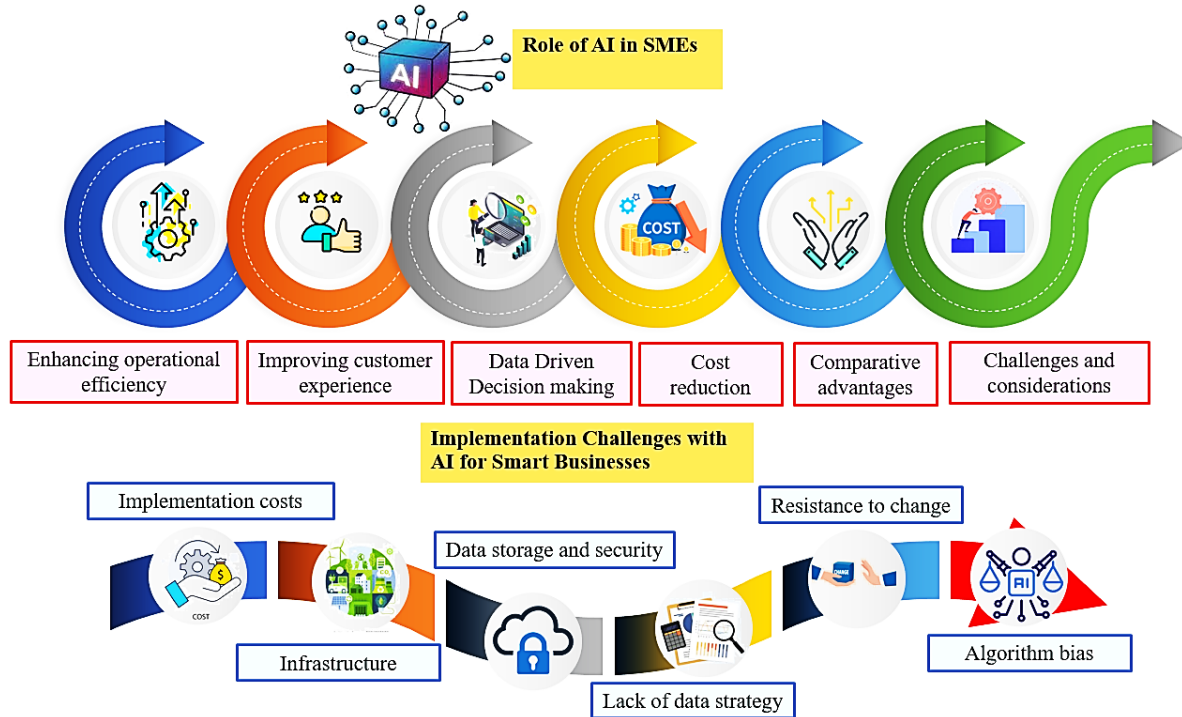


Fig. 1: Role of Ai in SMEs and challenges with its implementation

marketplaces or subscription services that deliver personalized experiences.

Education and skills training sector

In the education and skills training sector, which involved three small businesses such as a private tuition center, an online language coach, and a workshop-based training provider, the use of AI showed a slightly more progressive pattern. Compared to other sectors, these business owners demonstrated a higher level of digital openness and willingness to explore AI tools beyond basic operational tasks. AI was mainly used to support teaching and learning activities, including automating administrative tasks, designing customized learning materials, and tracking student progress. For instance, one educator shared how tools like ChatGPT and Canva helped to prepare content more efficiently, allowing her to handle a larger number of students without needing to hire additional staff. Another respondent mentioned that AI-generated feedback gave students quicker responses and allowed for more personalized guidance. These small but meaningful changes suggest a move towards rethinking service delivery methods, even if the business structure itself remained the same.

Unlike the retail and food sectors, owners in education were more experimental and proactive in searching for tools that could enhance their offerings. Most of them discovered AI applications through online communities, webinars, and peer sharing. They expressed appreciation for tools that were

simple, cost effective, and compatible with their existing teaching styles. Despite their interest, some concerns still existed. These included fear of relying too much on AI to replace human interaction, and uncertainty about how students and parents would respond to AI-assisted learning. However, many saw AI as a support system rather than a threat. As one educator noted, “AI does not replace me as a teacher, but it helps me become a better one. Overall, the adoption of AI in this sector indicated a gradual shift from optimization towards modest transformation, especially in how learning is delivered and how value is created for learners. These early steps, although small in scale, highlight the potential for AI to play a transformative role in micro and small education-based businesses.

Home based food services

In the home-based food services sector, which included two small businesses, a home maker and a frozen food supplier, the use of AI was limited to simple tools that supported daily operations. These entrepreneurs operated with minimal staff and managed most tasks on their own, so any digital tool that could save time or reduce repetitive work was seen as valuable. AI was mainly applied in areas such as social media marketing, basic demand forecasting, and cost calculation. For example, one home baker used AI-generated captions to promote her products more creatively on Instagram, while another business owner relied on template-based apps to predict weekly demand for frozen items and manage stock

accordingly. These tools were not integrated into core processes but served as light support systems that made daily tasks more manageable. The overall approach in this sector was clearly focused on practical optimization, rather than transformation. Most owners had no formal digital background and expressed hesitation in adopting tools that seemed too technical or complex. Their decisions were shaped more by personal comfort and affordability than by long term business strategy. One of the owners explained, “I use AI to help me write better posts and plan ingredients, but I still cook everything myself. It is more of a helper than a big change.” This statement reflects a common sentiment among home based food entrepreneurs, they welcomed tools that enhanced efficiency but were not ready or able to explore deeper digital transformation, such as automated kitchens or smart delivery systems.

Challenges such as limited financial resources, lack of digital skills, and concerns about losing the “personal touch” of their brand were frequently mentioned. As such, while AI was appreciated for its convenience, it was not yet viewed as central to the growth or evolution of the business. AI adoption within the home-based food services sector remained limited in scope, primarily centered on operational efficiency and content creation. There was minimal evidence of broader structural changes or transformative shifts in service delivery.

Personal and health services sector

In the personal and health services sector, which included two small businesses, a freelance physiotherapist and a home-based beauty and wellness service provider, AI was used primarily to support customer engagement and streamline service coordination. While these businesses operated in very personalized settings, they still found value in using simple AI tools to improve efficiency and client experience. The most common applications of AI in this sector were automated appointment scheduling, reminder notifications, and basic client profiling. For example, both business owners used AI powered apps to manage bookings without manual back and forth communication, allowing them to focus more on delivering their services. In one case, a physiotherapist noted that she could reduce missed appointments by using an AI system that automatically reminded clients through WhatsApp. Another practitioner used AI tools to keep track of client preferences, making it easier to personalize treatment sessions. Despite operating on a small scale, these entrepreneurs showed an openness to integrating AI when it was easy to use and directly beneficial to their workflow. One owner explained, “AI helps me keep track of everything without needing an assistant. It’s small things, but it makes a big difference.” This comment highlights how even basic AI tools can support better service delivery in people focused businesses. However, their adoption remained within the boundaries of optimization, rather than full transformation. While there was interest in more

advanced features like AI based skin analysis or customized health monitoring, most felt such tools were out of reach financially or technically. Some also expressed concern about relying too much on technology in services where personal trust and human interaction were central. Overall, AI in this sector played a supportive role, enhancing operational convenience and client satisfaction, but did not fundamentally change how the businesses operated. These early steps, while modest, suggest a readiness to explore more transformative uses of AI in the future if tools become more accessible, affordable, and tailored to the unique nature of personal care services.

DISCUSSION

This study set out to explore how MSEs in Malaysia are approaching AI, and more specifically, how they decide between using AI for process optimization versus business model transformation. The findings suggest that while AI adoption is taking place across different sectors, the depth and purpose of that adoption vary significantly depending on the nature of the business, the digital mindset of the owner, and the practical constraints faced. Across most of the sectors studied, particularly retail, home-based food services, and personal health services, AI was used primarily to simplify daily tasks and save time, rather than to redefine the business model. This form of AI use aligns with what scholars describe as AI optimization, where technology is applied to existing systems without altering the core of how the business operates (Rakova *et al.* 2021). For instance, AI-powered chatbots, appointment reminders, and demand forecasting tools were commonly mentioned, suggesting a focus on task automation rather than innovation. This outcome is not surprising given the operational realities of Malaysian MSEs, as many of these businesses are owner-managed, with limited staff and tight financial margins. In such environments, tools that can reduce workload and streamline operations are naturally more appealing than high-risk, large-scale digital transformations. Similar patterns have been observed in other studies, where SMEs in developing countries tend to favor incremental digital adoption due to cost sensitivity and lack of technical skills.

While most sectors leaned towards optimization, the education and skills training sector demonstrated a slightly more progressive orientation towards AI adoption. The business owners in this group were more open to exploring AI tools that could enhance not only internal efficiency but also the value delivered to clients. Examples included AI-generated learning materials, feedback tools, and adaptive content delivery, all of which reflect early signs of AI transformation, where technology enables new methods of engagement and service delivery (Hewage 2024). What distinguishes this sector is the greater digital exposure and a willingness to experiment, possibly due to the nature of education as a service that increasingly depends on digital platforms. Additionally, the informants in this group were

more likely to have learned about AI through webinars, peer networks, or online communities, reflecting the role of informal learning in shaping digital adoption among small businesses. One common thread across all sectors was the informal way of AI adoption decisions, rather than being part of a structured digital strategy or formal trainings. Most business owners discovered and adopted AI tools through word of mouth, social media exposure, or trial-and-error. This points to a broader issue in the Malaysian SME ecosystem: the lack of accessible, sector-specific guidance or advisory services to support AI adoption (Bader and Kaiser 2019). Despite the absence of formal strategy, many owners displayed pragmatic thinking. They adopted tools based on immediate relevance, affordability, and ease of use. However, this also meant that AI adoption remained surface-level. Without clear understanding of AI's full capabilities, business owners are likely to underutilize the technology, missing out on opportunities for longer-term growth or transformation. Financial constraints were consistently cited as the most significant barrier across all sectors. For small businesses operating on tight budgets, the cost of advanced AI systems, software subscriptions, or even training can be prohibitive. This was followed by concerns over technical complexity and fear of losing the "personal touch", especially in sectors like food services and wellness, where customer trust and human interaction are key differentiators. These concerns reflect the findings of previous studies that emphasize the importance of contextual sensitivity in digital adoption frameworks. For Malaysian MSEs, digital readiness cannot be measured solely by technological infrastructure, it must include cultural readiness, owner confidence, and sector-specific suitability.

While full-scale AI transformation was not evident in most businesses, the findings suggest there is a latent interest among some owners to explore more transformative uses of AI, provided tools become more affordable, intuitive, and relevant to their context. Statements like "AI helps me become a better teacher" or "It's a small thing, but it makes a big difference" show that perceived value is already present, even if adoption is still at a basic stage. This aligns with Brătucu *et al.* (2024) concept of "digital maturity progression," where organizations evolve from using digital tools for convenience, innovation, and differentiation once they have gained enough confidence and support. With appropriate government incentives, training programmers, and ecosystem support, Malaysian MSEs could gradually shift from AI as an enabler to AI as a strategic core of their business.

CONCLUSIONS

This study set out to explore how Malaysian SMEs are adopting AI, with a particular focus on the strategic distinction between AI optimisation and AI transformation. The findings reveal that AI optimisation is the more dominant approach among small businesses.

Entrepreneurs largely adopted AI tools that are affordable, easy to use, and directly relevant to daily operational challenges. This study also identified early signs of transformation in some contexts, particularly in the education sector. Business owners in this domain showed more interest in exploring AI to reshape service delivery, enhance personalisation, and improve learner engagement. It also highlights the importance of digital mindset and informal learning networks in shaping innovation trajectories among small firms. This includes affordable AI tools, accessible training in local languages, and clearer guidance on how AI can align with specific business goals. If such support is extended, it is possible for more Malaysian MSEs to transition from simply "using AI to save time" to leveraging AI as a strategic tool for growth and innovation. This study affirms that the journey towards effective AI adoption among Malaysian MSEs is not binary, but rather situated along a spectrum, from practical optimisation to gradual transformation. While most businesses remain at the optimisation stage, their growing interest and adaptive use of digital tools point to a readiness for deeper change, if given the right environment. As Malaysia moves forward in its national digital agenda, recognising and nurturing this readiness at the MSE level will be essential to ensuring that the benefits of AI are inclusive, sustainable, and locally meaningful.

AUTHOR CONTRIBUTIONS

Both the authors contributed equally to the write up.

CONFLICTS OF INTEREST

The authors affirm that they possess no conflicts of interest.

DATA AVAILABILITY

Not applicable

ETHICS APPROVAL

Not applicable

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