UNDERSTANDING THE ROLE OF ARTIFICIAL INTELLIGENCE IN THE CONTEXT OF SMEs

KOBİ'LER BAĞLAMINDA YAPAY ZEKANIN ROLÜNÜN ANLAŞILMASI

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ABSTRACT

This study provides a systematic review of the literature on the operationalization of artificial intelligence (AI) within small and medium-sized enterprises (SMEs), aiming to develop an integrated conceptual framework for understanding AI adoption. The findings indicate that Technological readiness plays a pivotal role, with SMEs requiring knowledge of AI applications, methods, and capabilities to adopt AI effectively. AI adoption yields diverse outcomes, including enhanced operational efficiency, improved customer engagement, and greater innovation, but these vary based on industry, firm size, and resource capacity. The study emphasizes that AI is not a unitary concept but a multi-dimensional construct, with operationalization requiring alignment with organizational dynamic capabilities. This review offers a framework for understanding AI adoption, helping to bridge fragmented findings in the literature.

Keywords: Artificial Intelligence (AI), Small and Medium-sized Enterprises (SMEs), AI Adoption, Content Analysis.

ÖZET

Bu çalışma, yapay zeka adaptasyonunu anlamak için entegre bir kavramsal çerçeve geliştirmeyi amaçlayarak, küçük ve orta ölçekli işletmelerde (KOBİ'ler) yapay zeka adaptasyonu kavramının operasyonel hale getirilmesine ilişkin literatürün sistematik bir incelemesini sunmaktadır. Bulgular, teknolojik hazırlığın çok önemli bir rol oynadığını ve KOBİ'lerin yapay zekayı etkin bir şekilde benimsemek için yapay zeka uygulamaları, yöntemleri ve yetenekleri hakkında bilgi sahibi olmaları gerektiğini göstermektedir. Yapay zekanın benimsenmesi, gelişmiş operasyonel verimlilik, daha fazla müşteri katılımı ve inovasyon kapsamında ilerleme dahil olmak üzere çeşitli sonuçlar doğurmaktadır. Ancak söz konusu sonuçlar, sektöre, firma büyüklüğüne ve kaynak kapasitesine göre değişmektedir. Çalışma, yapay zekanın üniter bir kavram değil, çok boyutlu bir yapı olduğunu ve operasyonelleştirmenin organizasyonel dinamik yetkinliklerle uyum gerektirdiğini vurgulamaktadır. Bu çalışma, yapay zekanın KOBİ'lerde adaptasyonunu anlamak için bir çerçeve sunmakta, literatürdeki parçalı bulgular arasında köprü kurmaya yardımcı olmaktadır ve KOBİ bağlamında gelecekteki araştırma ve uygulamalara rehberlik etmektedir.

Anahtar Kelimeler: Yapay Zeka, Küçük ve Orta Ölçekli İşletmeler (KOBİ'ler), Yapay Zeka Adaptasyonu, İçerik Analizi.

1. INTRODUCTION

AI is "a system's ability to interpret external data correctly, to learn from such data and to use those learnings to achieve specific goals and tasks through flexible adaptations." (Haenlein & Kaplan, 2019). Its ability to learn from data and provide meaningful outputs based on this learning is what differentiates this technology from others. Although AI has been around since the beginning of the 20th century, its popularity has been increasing thanks to the developments in AI technologies such as machine learning, deep learning and artificial neural networks (Ransbotham et al., 2018).

Today's global conjunction together with the rapid improvements in the technological sphere urge businesses around the world to adapt to the new environment almost simultaneously with the constant changes. Amongst these advancements AI has been drawing huge attention in business literature since AI technologies propose numerous benefits to businesses such as reducing the costs, lessening the errors and improving efficiency (Alsheibani et al., 2020; Murgai, 2018). For example, according to a recent McKinsey survey (2024), 59% of participating organizations report higher revenue and 42% report lower costs as a result of using AI, including generative AI. In the same report, it is mentioned that 72% of organizations—up from 55% in 2023—now use AI in at least one business unit or function. AI systems have been implemented in many business sectors of all kinds and have been transforming them to new levels (Selenko et al., 2022; Cheng et al., 2023). However, AI deployment is a difficult process that entails changes in production techniques and management styles, posing substantial obstacles to enterprises (Wang et al., 2023). This challenge is particularly pertinent to SMEs (Peretz-Andersson et al., 2024) and the study of AI adaptation in SMEs is a rapidly developing area of research that explores the relationship between AI technology and the problems faced by SMEs (Schönberger, 2023).

According to the World Bank (2020), SMEs constitute over 90% of the businesses and provide almost more than 50% of employment around the world playing a huge role for the economy. Therefore, it is of great importance to consider SMEs' AI adoption enablers and consequences. However, these enterprises face difficulties lacking especially financial resources to transform their businesses digitally and adopt AI (OECD, 2019). Integrating AI into organizations results in competitive advantage by enhancing performance and therefore enhancing value of the business (Wamba-Taguimdje et al., 2020). However, implementing AI into business operations is costly and a process that is not easy to follow, thus, it may be rather more challenging for SMEs who have fewer resources than big companies to make the decision to invest in AI implementation (Wei & Pardo, 2022).

In this context, the primary objective of this study is to develop an integrated conceptual framework that provides a systematic understanding of AI adoption within SMEs. To achieve this, this study addresses several key research questions (RQ) to understand AI adoption in SMEs. RQ1 explores how AI adoption can be operationalized for SMEs, focusing on the practical approaches and frameworks that facilitate its integration. RQ2 examines the main theories in the literature that address the AI adoption process in SMEs, providing a theoretical foundation for understanding its dynamics. The RQ3 examines the key factors that influence AI adoption, while the fourth question (RQ4) considers the outcomes and impacts of adopting AI. Finally, RQ5 proposes future research directions, emphasizing propositions that can advance the understanding of AI adoption in SMEs.

These research questions guide the study in synthesizing existing literature and developing a coherent framework to advance understanding of AI adoption in SMEs. In this context, the literature on the intersection of AI and SMEs was subjected to a systematic review and the findings were evaluated through content analysis and presented in a thematic classification.

2. CURRENT STATE OF THE AI LITERATURE IN THE CONTEXT OF SMEs

Before investigating thoroughly, the systematic review of AI, it is of importance to delve into background in order to comprehensively clarify the epicenter of this study. The industrial revolution undoubtedly resulted in far reaching shifts not only for societies but also for firms. It is indisputable that today's globalized markets present a hypercompetitive and dynamic nature, which is the ultimate indication of the extent that firms are exposed to adapt to the constant technological advancements (Paul and Mas, 2019). Relatedly, in order to meet the consumers' ever-changing demands, to survive, and outperform in highly volatile markets, firms have to be alert in catching up with the developments in cutting-edge technologies (Liñán et al. 2019). The recent booming of digital technologies including AI, has given rise to the emergence of pivotal developments and opportunities.

As the essence of AI in augmenting business functions has witnessed burgeoning attraction by the interest of practitioners and scholars, research has predominantly put emphasis on the technological, practical, and theoretical aspects of AI regardless in the domestic or international context (Davenport and Ronanki, 2018). Particularly, due to the abundance of data, businesses are exposed to deal with never-ending but ever-growing challenges in terms of deployment of AI to create unique business values in the era of business digitalization. In this vein, an increasing population of firms started to devote resources to integrate AI and AI-enabled practices into their business operations in order to achieve and sustain superior business performance (Duan et al., 2019). In other words, AI has become the ultimate and utmost source to gain and sustain competitive advantage in the industrial global arena (Dwivedi et al., 2021), which led a radical revolution in doing business (Ågerfalk, 2020). In the context of SMEs, these impacts can be more profound, as AI can significantly help SMEs overcome obstacles, collaborate effectively, and enhance communication with their suppliers and consumers (Peretz-Andersson et al., 2024).

Despite the accelerating interest, empirical research addressing AI and AI-enabled business practices is still at a rudimentary and fragmented state regarding operationalization of AI into firms' business functions in various industries. Besides, there is a limited clarified understanding of the integrative processes of AI into SMEs' business practices through their AI related initiatives. Drawing upon the previous studies, the core aim of this current study is threefold addressing to comprehensively synthesize how SMEs integrate AI and AI-enabled technologies into their business operations, the enablers of AI adoption, and the impact of this integration on business outcomes, which reflects the extent of the importance of AI for global economy, particularly for SMEs.

As well known, countries' advanced economic development level heavily depends on the industrial development, which is achieved by the business success of SMEs particularly for developing countries (Matt et al., 2015; Hess et al., 2016; Habilet al., 2017; Ibrra-Morales et al., 2019). Coupled with the everlasting growth of digital technologies, firms are exposed to change how they operate in intensified global competition. Relatedly, digitalization led to the decrease in the number of large size enterprises. SMEs are the critical epicenters of countries' economic growth regardless of domestic or international markets (Chakraborty and Biswas, 2019). In this framework, SMEs are considered as the principal drivers of economic growth for developing

economies. However, SMEs can suffer from inadequate resources to cope with the fast-changing challenges in hypercompetitive markets (Banerjee et al., 2017). Accordingly, SMEs that engage in digital technologies have the capacity to keep up with ongoing challenges. AI is one of the recent modern digital technologies in terms of adapting such as AI-integrated customer relationship management (AI-CRM) (Srinivasan et al., 2015; Srinivasan and Venkatraman, 2018; Ali et al., 2019; Ng et al., 2019). Shortly, firms utilizing the advantages of availing AI can enjoy vast opportunities through immense productive processes by launching new products and services.

As aforementioned, although AI and AI-enabled business functions have gained tremendous attention, there is a lack of consensus on the drivers and outcomes of AI integrative business activities in different industries in the context of SMEs. Although several attempts have been devoted to providing a review study in order to accumulate existing knowledge in the pertinent literature, the current study based on the useful grounds specifies comprehensive and updated improvements in conceptualization of AI integration engaged by SMEs. Moreover, the pertinent literature focusing on AI is comprised of mostly qualitative approaches including Peretz-Andersen et al. (2024) and Zhang et al. (2021) addressing the role of research orchestration in AI adoption by SMEs, Nagy et al. (2023) scrutinizing the interaction between adoption of Intelligence and Autonomous Technologies and SMEs, Nadi et al. (2024) focusing on integration of AI into business practices of SMEs, Wei and Pardo (2023) underlining the B2B SMEs engagement of AI platforms under the lens of capability perspective, Wang et al. (2021) highlighting how SMEs in central China deal with intelligent transformation by virtue of AI adoption, Lemos et al. (2022) devoting effort to investigate the interrelation between change management and AI adoption, and Wang (2024) analyzing the relationship between E-commerce and AI adoption. In terms of utilizing quantitative approach, Basri (2020), Baabdullah (2021), Damaili et al. (2021), Fonseka et al. 2022, Kumar et al. (2022), Lada et al. (2023), Roux et al. (2023), and Dey et. Al. (2024) have given substantial attention to uncover the mutual effects of AI adaptational and implementing strategies, and business practices of SMEs. Their main contribution to the literature is comprehensively understanding the required capabilities, resources, strategies, and contextual factors that are deemed to be related with SMEs business operations and performance. Moreover, despite the crucial contribution of these existing review studies in the extant literature, the reviewal approaches usually uncover the challenges, opportunities, barriers, and contextual factors affecting AI adoption of SMEs (e.g., Bhaleraeet et al., (2023), Hansen and Bøgh (2021) Oldemeyar et al., (2024), Sotamaa et al., (2024); Hibban and Abhishek (2024), studies unveiling the factors as enablers and outcomes of SMEs through investigating direct and indirect relationships with AI adoption in order to avoid any confrontational research results are scarce. Accordingly, the main focus of this paper is to systematically review the relevant empirical literature on AI integration in SMEs, uncovering unique and conflicting issues. Based on the aforementioned statements, this study is carried out to assess the theoretical and methodological issues through synthesizing the theoretical backgrounds, conceptual frameworks, and the interrelationships of the constructs related to AI integration of SMEs into business functions. Consequently, grounded in 19 existing peer-reviewed articles, this paper concludes that SMEs that accrue utilizing the benefits of AI technologies can gain substantial competitive advantages to reach superior firm performance. As a result, fruitful theoretical and practical insights with recommendations for future empirical studies are provided.

The rest of the paper is organized as follows: the first section shortly summarizes the theoretical background which is followed by the research methodology, after which highlighting the findings by covering the drivers and consequences of SMEs' AI adoption is presented. The last section addresses conclusion and implementations. Consequently, this study is an overview of state-of-the-art research on SMEs' AI integration in the business context that provide theoretical and practical implications.

3. RESEARCH DESIGN

The initial point for the review and evaluation of the existing literature starts with a comprehensive content analysis of journal articles covering AI integration of SMEs. The PRISMA 2020 expanded checklist was utilized to ensure the methodological rigor of this systematic literature review. This checklist facilitated a thorough evaluation of the review's methodological components and supported transparent adherence to established principles. The search process covers finding peer-reviewed scholarly articles published in the databases including Web of Science, Scopus, ProQuest, Emerald, Sage, JStor, Springer, Taylor & Francis, EBSCOhost, Wiley, and Elsevier which are considered as the most trusted citation indices specifically for quality scientific research (Mongeon and Paul-Hus, 2016). Based on the scope of this review, the inclusion criteria cover studies that investigate AI engaged by SMEs empirically in business-related and peer-reviewed academic journals by utilizing primary and/or secondary data. In addition, the inclusion criteria embrace only the empirical articles accessible and published in English. The keyword-based search is utilized to focus on articles addressing the field of AI in SMEs. As an emerging field, available AI literacy is scarce, particularly for SMEs. So, a total of 43 articles were reached. Accordingly, the articles that contained the phrase "Artificial Intelligence" "AI" and "SME" in either the title, the abstract, main text or keywords were reviewed in detail by the researchers. After excluding the irrelevant articles, the search resulted in 19 articles. Through the assessment of the main content in the included articles, related concepts are revealed for further thematic analysis.

After open and axial coding processes are undertaken (e.g., Strauss and Corbin, 1998; Whetten, 1989), the categories emerged as the theories and theoretical approaches utilized, concepts regarding antecedents, moderators, mediators, and consequences, and the contextual factors including, and countries and industries. During the coding process, the authors' original conceptualization with definitions and operationalizations of the related concepts were considered. Lastly, two researchers completed identification of coding schemes blind-coded, independently, compared, and discussed the categorized results of coding, through which emerged contradictions were resolved. By doing so, the internal reliability was checked in order to avoid emergence of potential biases during the review process (Miles and Huberman, 1994). The coding process resulted in inter-coder reliability with a high degree of consensus between two researchers, findings are presented with a thematic analysis. In Table 1, the conceptualization of the factors related to operationalization of AI emerged as a result of the coding process is presented.

4. FINDINGS

4.1. Conceptualization of the Factors Affecting AI Operationalization in SMEs

According to a comprehensive framework for understanding the factors influencing the operationalization of AI in SMEs (As can be seen in Table 1), these factors were categorized into three dimensions based on "Technology-Organization-Environment Theory": technological, organizational, and environmental dimensions. The technological dimension focuses on the extent of AI implementations, patent applications, and engaged practices, emphasizing both AI based innovation and integration across business processes. The organizational dimension highlights the importance of AI-based capabilities such as marketing, AI adoption capabilities,

along with critical factors like top management support, employee skills, and a positive organizational culture. The firm capabilities underlined in the literature, particularly, put emphasis heavily on knowledge-based or technological capabilities (Basri, 2020; Dey et al., 2024; Grashof and Kopka, 2023; Kopka and Fornahl, 2023), which was expected. However, the individual or employee capabilities and managerial factors have been given limited attention. Financial and managerial resources also play a crucial role in fostering AI adoption. Meanwhile, the environmental dimension reflects the impact of external pressures, such as competitive forces, customer expectations, and vendor support, which drive AI implementation. This framework suggests that successful AI adoption requires a balance among capabilities, resources and external pressures. To effectively profit from AI, SMEs must comprehend and align with all of these variables while cultivating an innovative organizational climate.

Table 1. Conceptualization of the Factors Affecting AI Operationalization in SMEs' Business Functions

Aggregated Concept	Third Order	Second Order	First Order
Technological Dimensions			• The extent of AI related Implementations • AI Patent Applications • Engaged AI Practices
Organizational Dimensions	AI-Based Capabilities	AI in Marketing Capabilities	• Digital Marketing Capabilities • Adoption of AI-CRM Capability • Utilizing collaborative decision-making system • Usage of virtual and augmented reality • Usage of Personalization
		AI Adoption Capabilities	• AI Readiness • Willingness to Change • Technology Acceptance Level Towards AI • AI Enablers • Technology openness • Technology affordance • Technology generativity
	Other Capabilities	Business Intelligence Capabilities	• Intelligent information sharing • Intelligent risk management • Intelligent business and marketing • AI Powered Decision Support System
		Organizational Capabilities	• Top Management Support • AI powered workforce management • Knowledge of AI on AI Techniques and Applications among Employees • Employee Capabilities • Relatedness of Firms to AI Techniques and Applications • AI Integration Capability
	Resources	Financial Resources	• Financial resources • Budget spending on AI • Costs
		Organizational Resources	• Positive and supporting climate, and conducive organization culture • Managerial Skills
Environmental Dimensions	Stakeholders	Competitors	• Competitive Pressure
		Customers	• Customer Pressure
		Vendors	• Vendor Support

4.2. Theoretical Foundations and Integrations

From its inception, the perspective of AI has taken a highly and flexibly integrative view with adjacent theories. The analysis of the articles indicate that researchers have devoted substantial interest to addressing AI in the context of SMEs in multiple fronts, however, while the majority of studies are in the context of domestic business operations, only a few studies examine AI in the context of international business. Similar to any other theoretical view, AI is grounded clearly in previous theoretical understandings. These theories are the backbone of assumptions in forming AI as a perspective which can be in explicit or implicit form. While the explicit assumptions provide direct meaning, the implicit forms utilize indirect implications or examination in order to discuss and justify the approach at stake. Building on the previous statements, the majority of the studies included into analysis cover several theories to base their hypotheses and theoretical background, among them both the most implicitly and explicitly mentioned theories are dynamic capabilities (8 studies), competitive advantage (7 studies), and resource-based view (12 studies) (see Table 2). Resource Orchestration, Technology-Organization-Environment Theory, Internationalization Theory, Theory of Innovation, Knowledge-based View, Theory of the Firm Growth, Theory of Internationalization, and Entrepreneurship are amidst the theories that are less mentioned by the researchers. Additionally, researchers built theoretical backbone for AI practices and also employed Collaborative Decision-Making Theory, Technology Acceptance Model, Planned Behavior, and The Status Quo Bias theory at once.

These theoretical interrelations are the explicit and implicit sign of the integration of AI adoption into firms' both internal and external environments. In this study, some of the articles at stake underline the interwoven relationships with AI in exploration and exploitation of unique resources and developing dynamic capabilities (Chatterjee et al., 2022; Dey et al., 2024; Fonseka et al., 2022; Grashof and Kopka, 2023; Jallil et al., 2024; Lada et al., 2023; Palas et al., 2022; Raux et al., 2023). As aforementioned, Resource Based View addresses the valuable and unique allocation of resources and capabilities in order to outperform (Barney, 2001). Resource Based View highlights analyzing both weaknesses and strengths of a firm with its resources and capabilities based on which the business processes are conducted. Relatedly, firms can achieve external and internal fitness through their unique resources and capabilities that guide firms' strategic path in the volatile industrial markets where dynamic capability perspective emerges from resource-based view (Helfat and Peteraf, 2003, 2009). Importantly, for SMEs to achieve a more robust competitive advantage, it is the top priority to improve and implement strategies that cannot be imitated by the rest of the rivals (Rashidirad and Salimian, 2020). Accordingly, the alignment between external and internal business environments are of supreme importance for the principles of resource-based view and dynamic capabilities (Barney, 2001; Helfat and Winter, 2011; Teece, 2007). In this respect, innovation is considered as the paramount generator of upcoming technologies including AI and AI related technologies that can lead to remarkable success for enterprises (GetITAdmin, 2022). In addition to this, employment of AI can enable deep learning which is the critical ingredient of exploration of knowledge and engaging innovation especially in complex high-tech industries, which in turn, can reduce the cost of adaptation (Agrawal et al., 2019; Taddy, 2019; Yamakawa et al., 2016). In other words, AI integration can boost knowledge generation that is of utmost importance for implementing innovative business practices can act as a catalyst for new, rather radical, knowledge (Agrawal et al., 2019; Cockburn et al., 2019). Correspondingly, knowledge-based view is among the theories utilized to base the theoretical assumptions regarding the role of knowledge in building

innovative and knowledge-based capabilities through AI integration by explicitly and implicitly addressing AI-Based decision support systems, business intelligence capabilities, the extension of knowledge acquired by AI related patent applications (Grashof and Kopka, 2023; Jalil et al., 2024; Kopka and Fornahl, 2023; Kumar et al., 2022; Polas et al, 2022; Roux et. Al., 2022). In essence, AI based decision support systems indicate knowledge-based capabilities with ability to analyze, predict, and process big data from multiple data sources, by which firms can utilize data-driven decision-making mechanisms for more objective predictions. Therefore, in the literature there is a two-sided interrelation between AI and firm capabilities, particularly knowledge-based capabilities (Fonseka et al., 2022; Graskof and Kopka, 2023; Lada et al., 2023; Ulrich et al., 2023). From the perspective of internal or organizational issues, firms can benefit from AI in their decision-making processes. In the similar vein, AI powered support systems facilitate analytical, predictive, and computational capabilities to process big data generated from a number of sources which can be fostered for more objective decision making and enable firms to achieve sustainable firm growth. Taken the studies acknowledged the resource-based view into account, digital technologies as a vital strategic source can provide firms achieve and maintain competitive advantage (Agrawal et al., 2019; Cockburn et al., 2019; Lee and Falahat, 2019) that is in line with Barney's (1991) perspective. In the extant literature, studies underlying the role of AI and AI-related business activities assert that firms undergone digital transformation are more competitive and flexible to adapt in highly volatile environments (Rojo Abollado et al., 2017; Bedell-Pearce, 2018; Subramaniam et al., 2019).

In terms of resource allocation and orchestration, the effect of firm size is indisputable as firms differ in building capabilities and utilizing resources. Specifically, SMEs encounter a number of challenges among which inadequate financial resources is the primary issue. Due to the insufficient resources SMEs cannot bear the financial burden of required capital investment of AI adoption compared to large firms (Accenture, 2019; Bianchini and Michalkova, 2019; Daor et al., 2020), which leads to emergence of heterogeneity or divergence between firms (Aghion et al., 2019). Grounding on the aforementioned statements, inadequate resources can jeopardize the emergence of valuable knowledge and relatedly innovative practices which in turn can cause failure in achievement of competitive advantage, low levels of innovation, and firm performance (Ahuja and Lampert, 2001; Castaldi et al., 2015).

In a nutshell, the swift ascent of digitalization through AI technology is viewed as the catalyzer of every cutting-edge developments in each business value chain activities that has the potential to affect all of the players in the global landscape (Iansiti and Lakhani, 2020). Beyond the breakthrough technological shifts in business processes, concern related to preservation of natural resources has become the core issue. In this related vein, AI is viewed as not only the trigger of innovation, but also for sustainable business practices (Krkac, 2019; Mamedov et al., 2018; Sanders et al., 2019), which are interwoven with each other. Therefore, what sets thriving enterprises apart from their rivals heavily depends on adopting a different and unique organizational mindset, which is the only key to achievement of superior and sustainable firm performance, particularly in international business. As can be understood, firms are exposed to embrace a dynamic and adaptive organizational mindset to navigate the ever-emerging digital transformation worldwide.

Lastly, SMEs can improve their firm performance and a number capabilities through adoption of AI and AI-related capabilities including business management capabilities which can be asserted as strategic performance (Basri, 2020), sustainable business practices, organizational agility and

resilience, and risk management capabilities (Dey et al., 2023), overall firm performance (financial performance, customer performance, internal business process performance, learning, and growth performance) (Abrokwah-Larbi and Awuku-Larbi, 2022), operational capabilities (Damioli et al., 2021), operational performance (Damioli et al., 2021), innovation performance (Kopka and Fornahl, 2023), marketing and networking capabilities (Baabdullah et al., 2021), market performance (Baabdullah et al.,2021), and export performance (Denicolai et al., 2021). Moreover, by virtue of AI practices, firms can explore and exploit new frontiers with opportunities (Lu et al., 2022), improve digital marketing capabilities for value creation (Jalil et al., 2024), gain insights regarding consumer behavior, make clear forecasting (Davenport et al., 2020; Huang and Rust, 2022; Verma et al., 2021), and build innovative business models (Sjödin et al., 2020).

Table 2. Theoretical Basis of AI into Firm Business Practices

Author(s)	Article Title	Operationalization of AI	Nature of Utilized AI Scale	Context	Related Theoretical Basis
Basri (2020)	Examining the Impact of Artificial Intelligence (AI)-Assisted Social Media Marketing on the Performance of Small and Medium Enterprises: Toward Effective Business Management in the Saudi Arabian Context	AI-Assisted Social Media Marketing (AISMM) Capability	The extent that companies embraced AISMM practices	Domestic	Implicit: • Resource-Based View
Baabdullah et al. (2021)	SMEs and artificial intelligence (AI): Antecedents and consequences of AI-based B2B practices	• SME's AI Readiness • SME's AI Enablers • SME's AI Practices	• SME's AI Readiness □ Infrastructure □ Technicality □ Awareness • SME's AI Enablers □ Technology Road mapping □ Professional Expertise □ Attitude • SME's AI Practices	Domestic	Explicit: • Technology-0rganization-Environment Theory • Resource-Based view
Damoili et al. (2021)	The impact of artificial intelligence on labor productivity	AI Patent Applications	•Number of AI patent applications	Domestic	Implicit: • Resource-Based View
Denicolai (2021)	Internationalization, digitalization, and sustainability: Are	AI Readiness	AI Readiness in the domain of AI technology and its business	Exporting	Explicit: •Internationalization Theory

	SMEs ready? A survey on synergies and substituting effects among growth paths		applications		Implicit: • Resource-Based View
Ingalagi et al. (2021)	Artificial Intelligence (AI) adaptation: Analysis of determinants among Small to Medium-sized Enterprises (SME's)	AI Adaptation	The extent of AI related implementations	Domestic	Implicit: • Resource-Based View
Chatterjee et al. (2022)	Digital transformation and entrepreneurship process in SMEs of India: a moderating role of adoption of AI-CRM capability and strategic planning	• Technology Acceptance Model Towards AI • AI Adoption Capabilities Regarding CRM	• Technology Acceptance Model Towards AI □ Perceived Ease of Use □ Perceived Usefulness • Willingness to Change • Adoption of AI-CRM Capability	Domestic	Explicit: • The Status Quo bias theory • Technology Acceptance Model Implicit: • Dynamic Capabilities • Resource-Based View
Fonseka et al. (2022)	Impact of E-commerce adoption on business performance of SMEs in Sri Lanka; moderating role of artificial intelligence	AI Adoption in E-Commerce Business Practices	The extent of benefits that AI adoption in e-commerce business practices provide	Domestic	Explicit: • Resource-Based View Implicit: • Dynamic Capabilities • Theory of Competitive Advantage
Kumar et al. (2022)	The adoption of artificial intelligence powered workforce management for effective revenue growth of micro, small, and medium scale enterprises (MSMEs)	• Business Intelligence Capabilities Regarding AI • AI Powered Workforce	• Intelligent information sharing • Intelligent risk management • Intelligent business and marketing • AI powered workforce management	Domestic	Implicit: • Theory of the Firm Growth • Knowledge-Based View • Resource-Based View • Dynamic Capabilities
Polas et al. (2022)	Artificial Intelligence, Blockchain Technology, and Risk-Taking Behavior in the 4.0IR Metaverse Era: Evidence from Bangladesh-Based SMEs	The Role of Knowledge of AI In The Adoption of Blockchain Technology	The extent that employees contribute to knowledge sharing regarding usage of blockchain technology	Domestic	Implicit: • Resource-Based View • Dynamic Capabilities • Knowledge-Based Capabilities

Sharma et al. (2022)	Why Do SMEs Adopt Artificial Intelligence-Based Chatbots?	• The Perceptual Factors Regarding AI Adoption in Business Processes • The AI Chatbot Implementation Intention	• Technology ☐ The perceived relative advantage of AI-based chatbots ☐ The perceived complexity of AI-based chatbots ☐ Cost • Organization ☐ Top Management Support ☐ Financial Resource ☐ Employee Capability • Environment ☐ Competitive Pressure ☐ Customer Pressure ☐ Vendor Support ☐ AI Chatbot Implementation Intention	Domestic	Explicit: • The technology-organization–environment Theory
Grashof & Kopka (2023)	Artificial intelligence and radical innovation: an opportunity for all companies?	• The Amount of AI Knowledge about AI Techniques • The Amount of AI Knowledge about AI Applications • Relatedness of Firms to AI Techniques • Relatedness of Firms to AI Applications	• Patents that are related to technical methods and techniques of AI. • AI applications, in turn, entail the application fields of AI (e.g. robotics) • Related density techniques • Related density applications	Domestic	Explicit: • Resource-Based View Implicit: • Knowledge-Based View • Theory of Innovation • Theory of Competitive Advantage
Lada et al. (2023)	Determining factors related to artificial intelligence (AI) adoption among Malaysia's small and medium-sized businesses	AI Adaptation	The extent of adaptation to AI related implementation	Domestic	Explicit: • Theory of Organizational Readiness Implicit: • Resource-Based View • Dynamic

					Capabilities • Theory of Competitive Advantage
Roux et al. (2023)	Small and medium-sized enterprises as technology innovation intermediaries in sustainable business ecosystem: interplay between AI adoption, low carbon management and resilience	AI Powered Decision Support System	From an organizational and employee perspective, using AI decision-support systems and tools to complete tasks, engage in activities, and make decisions during regular workdays in a digital workplace	Domestic	Explicit: • Theory of Sustainability • Perceived Organizational Support Theory • Dynamic capabilities • Network theory • Resource Dependency Theory Implicit: • Knowledge-Based View • Theory of Competitive Advantage
Ulrich et al. (2023)	Artificial Intelligence in Small and Medium-Sized Family Firms: An Empirical Study on The Impact of Family Influence	• Adoption of AI Technologies	• Relevance • Usage of AI technologies • AI integration • Budget spending on AI	Domestic	Explicit: •Socio-emotional Wealth Theory • Technology Acceptance Model Implicit • Theory of Competitive Advantage
Abrokwah-Larbi & Awuku-Larbi (2024)	The impact of artificial intelligence in marketing on the performance of business organizations: evidence from SMEs in an emerging economy	AI in Marketing	• AI in Marketing □ Internet-of-things □ Collaborative decision-making system □ Virtual and augmented reality □Personalization (modified by authors)	Domestic	Explicit: • Resource Based View •Collabo-rative Decision-Making Theory
Badgihsh & Soomro (2024)	Artificial Intelligence Adoption by SMEs to Achieve Sustainable Business Performance: Application of Technology–Organization–Environment	AI Adoption	The extent of AI willingness and ability to implement AI related business activities.	Domestic	Explicit •Technology–Organization–Environment Theory • The technology acceptance model • The Theory of Planned

	Framework				Behavior
Dey et al. (2024)	Artificial intelligence-driven supply chain resilience in Vietnamese manufacturing small- and medium-sized enterprises	AI Adoption Capabilities	AI adoption practices	Domestic	Explicit: • Resource Based View • Dynamic Capabilities • Resource-Orchestration Theory • Knowledge-Based View
Jalil et al. (2024)	The influential role of artificial intelligence (AI) adoption in digital value creation for small and medium enterprises (SMEs): does technological orientation mediate this relationship?	AI Adoption	• Technology openness • Technology affordance • Technology generativity	Domestic	Explicit • Resource-Based View • Dynamic Capabilities Implicit • Theory of Innovation • Theory of Entrepreneur ship • Theory of Competitive Advantage
Kopka & Fornahl (2023)	Artificial intelligence and firm growth - catch-up processes of SMEs through integrating AI into their knowledge bases	• Knowledge of AI Applications • Knowledge of AI Methods	Patents that are related to technical methods and techniques of AI database	Domestic	Implicit: • Theory of Innovation • Theory of Competitive Advantage • Resource-Based View • Knowledge-Based View

4.3. Antecedents and Outcomes of AI Adoption

Drawing on the previous literature, it is clarified that AI has captured noteworthy interest as it portrays a route to gain and remain competitive advantage particularly under the conditions of breakthrough shifts. Therefore, the domain of attention spans multiple applications including marketing capabilities, innovation, strategic orientations, business intelligence capabilities, digital facilitators, and organizational decision-making mechanisms. These various sets of applications resulted in different typologies of AI. Correspondingly, a high level of divergence between the scales of AI employed in each study is inevitable, which can be the reason for heterogeneity among firms in terms of consequences and antecedents of AI and AI-related business practices.

As can be seen in Table 1 and Table 3, there are several operationalization types of AI in different business functions. Moreover, on closer inspection, it came to the foreground that there are different typologies of AI adoption in the pertinent literature since the functional domains of AI differ in each study. In this vein, despite the prominent pattern towards more fine-grained and concrete approximation, as a distinct paradigm on a theoretical level, a general conceptualization of AI is problematic. As such, distinct ways of dimensionalization of AI as a construct arises, which indicates that AI is not a "unitary concept". While being cognizant about this fact, the quasi replication of AI can facilitate generation of more generalizable insights and

avoid agnostic and fragmented research findings. Notably, AI and AI related practices or capabilities can show dependency on contextual factors in terms of firm size, industry, location etc. As noted earlier, this study pursues two objectives. Firstly, it is aimed to synthesize the initial research to gain coherence about AI related knowledge in the context of business management. To this end, this systematic synthesis culminates a broad framework to unveil the interaction between AI and other constructs, in which AI plays different roles including as a moderator, mediator, antecedent, and consequence (see Table 3).

In some studies, AI adoption is integrated as a firm capability regarding "digital marketing capability" (Jalil et al., 2024), "AI assisted social media capability" (Basri, 2020), "the level of adequacy for AI adoption including resources, knowledge, technology, and organizational climate such as leadership and managerial support" (Baabdullah et al., 2021; Kopka and Fornahl, 2023; which reflects the extent of organizational readiness to employ AI or AI-related business functions (Denicolai, 2021). Besides, grounded on the Technology Acceptance Model, some studies addressed AI adoption as an orientation or behavioral tendency that indicates the extent of willingness, perceived ease of use, and usefulness that form the perceptual relative advantage of AI Adoption (Chatterjee et al., 2022). In other words, the AI literature in SMEs is interrelated mostly with firm capabilities and performance related outcomes.

Table 3. Nature of the Direct and Indirect Relationships

Reference	Country	Industry	Antecedent	Moderator	Mediator	Outcome
Basri (2020)	Saudi Arabia	Mixed	• AI-Assisted Social Media Marketing		• Effective Business Management	• SMEs Performance
Baabdullah et al. (2021)	Saudi Arabia	Mixed	• SME's AI Readiness • SME's AI Enablers		• SME's AI Practices	• SME's Business customer AI-based interaction ▢ Service experience ▢ Customer engagement • SME's AI-enabled relational governance ▢ Joint planning ▢ Joint problem solving • SME's AI-enabled performance ▢ Financial performance ▢ Non-financial performance
			• AI Related	• Firm Size		• Firm Labor

Damioli et al. (2021)	Worldwide	Mixed	Patent Applications • Non-AI Related Patent Applications			Productivity • Employment Growth • Fixed Capital Growth
Denicolai et al. (2021)	Italy	Mixed	• AI Readiness	• Environ-mental Sustaina-bility Readiness		• Export Intensity
Ingalagi et al. (2021)	India	Mixed	• SME's Top Management Commitment •Organiza-tional Readiness • Competitive Pressure • External Support • Employee Adaptability			• AI Adaptation
Chatterjee et al. (2022)	India	Mixed	• Perceived Ease of Use • Perceived Usefulness • Willingness to Change	• Strategic Planning •Adoption of AI CRM Capability		• Corporate Digital Entrepreneur-ship
Fonseka et al. (2022)	Sri Lanka	Mixed	• E-Commerce Adoption	• AI		• Business Performance
Kumar et al. (2022)	India	Mixed	• Intelligent Information Sharing • Intelligent Risk Management • Intelligent Business and Marketing		• AI Powered Workforce Management	• Effective Revenue Growth
Polas et al. (2022)	Bangladesh	Block-chain Tech-nology	• Knowledge of AI • The Relevant Advantage of AI • Perceived ease of use of AI		• Risk-taking Behavior	• Adoption of Blockchain Technology
Sharma et al. (2022)	Fiji	Mixed	• Technology □ The perceived relative advantage of AI-based chatbots □ The perceived complexity of			• AI Chatbot Implementation Intention

			□ AI-based chatbots □ Cost • Organization □ Top Management Support □ Financial Resource □ Employee Capability • Environment □ Competitive Pressure □ Customer Pressure □ Vendor Support □ AI Chatbot Implementation Intention			
Grashof & Kopka (2023)	Europe	Mixed	• The Amount of AI Knowledge about □ AI Techniques □ AI Application • Relatedness of Firms to □ AI Techniques □ AI Applications	• Firm Size		• Emergence of Radical Innovations in Firms
Lada et al. (2023)	Malaysia	Mixed	• Competitive Pressure External Support • Top Management Commitment • Employee Adaptability • Organization Readiness			• AI Adoption
Roux et al. (2023)	Vietnam	Mixed	• Skills and Expertise • Risk Proclivity • Creativity		• Organizational Change Capability • AI-powered Decision Support System	• Supply Chain Performance • Supply Chain Low Carbon Management • Supply Chain Resilience
Ulrich Et Al. (2023)	Germany	Unknown	• Family Influence			• Relevance • Usage of AI

			• Firm Size			Technologies • AI Integration • Budget Spending on AI
Abrokwah-Larbi & Awuku-Larbi (2024)	Ghana	Mixed	• AI in Marketing			• Financial Performance • Customer Performance • Internal Business Process Performance • Learning and Growth Performance
Badgihsh & Soomro (2024)	Saudi Arabia	Mixed	• Technological Readiness • Organizational Readiness • Environmental Readiness	• Firm Size	• AI Adoption	• Economic Performance • Operational Performance
Dey et al. (2024)	Vietnam	Manufacturing	• Organizational culture • Leadership • Skills and Competencies AI Adoption		• AI Adoption • CE Practices • Supply Chain (SC)Agility • SC Risk Management	• AI Adoption • CE Practices • SC Agility • SC Risk Management • SC Resilience (The Main Outcome)
Jalil et al. (2024)	Malaysia	Mixed	• AI Adoption ☐ Technology Generativity ☐ Technology Openness ☐ Technology Affordance		• Technology Orientation	• Digital Value Creation
Kopka & Fornahl (2023)	Germany	Mixed	• Knowledge of AI Applications • Knowledge of AI Methods	• Firm Size • Market Entry Timing (Latecomers-Frontier Comers)		• Innovative Output • Productivity

Moreover, AI adoption intention is applied under three main dimensions that are the perceptions towards organizational, environmental, and technological factors related to adoption of AI. In this cognitive approach, the inquiry of how organizational members view AI-adoption with its advantages and disadvantages, employees' capabilities, financial resources, and its contribution to deal with the external players including rivals, customers, and suppliers (Sharma et al., 2024). While some scholars view the amount of AI related knowledge accumulated within the organization as the density of AI adoption (Kopka and Fornahl, 2023), some scholars assume the number of AI related patents application as an indication of level of AI

adoption practices (Damaoli et al., 2021). Fonseka et al. (2022) pointed out that the benefits gained by integration of AI practices into e-commerce business functions can reflect the AI adoption intensity.

With respect to the country development level, regardless of the industry type, firms from both developed and developing countries put the integration of AI and AI related capabilities, business practices, strategies, and the appropriate organizational base in order to engage in AI at stake so as to seize its benefits.

5. CONCLUSION, THEORETICAL AND PRACTICAL IMPLICATIONS

Although the existing literature is too preliminary to draw any significant conclusions on this topic, the main point underlined by the studies in this review is the vital necessity of engaging in strategic and organizational change to survive and achieve superior sustainable performance in this global arena of constant change and ever-growing challenges. Accordingly, from a managerial perspective, firms, particularly, SMEs need to engage in more AI focused business practices in order to keep forward and gain competitive advantage in this highly volatile business environment.

This systematic review sheds light on the operationalization of AI within SMEs and identifies the complex, multi-dimensional nature of AI adoption, theoretical background, antecedents, and consequences and in this respect, it answers all research questions. The review reveals that AI adoption is driven by a variety of organizational, technological and environmental factors and serves as a key enabler for SMEs to gain competitive advantage in the dynamic business environment. Additionally, the findings of this systematic review highlight that AI is not a unified concept but rather a dynamic construct with varying applications across business functions, including marketing, innovation, decision-making, and strategic planning. This diversity contributes to the heterogeneity among firms in terms of AI-related outcomes and adoption strategies. Operationalization of AI adoption first concentrates capabilities such as AI Readiness and willingness to change, other capabilities such as business intelligence capabilities and organizational capabilities. Although organizational capabilities such as top management support, AI powered workforce management are relatively less covered in the literature, they should not be overlooked in the AI adoption process of SMEs. The effective use of resources and pressure from vendors, competitors, and customers can also be used to explain the adoption of AI.

Moreover, the antecedents of AI adoption in SMEs include a combination of technological, organizational, and environmental factors. While technological readiness such as AI knowledge, patent applications, and openness to technology is critical for adoption, organizational support plays a key role, with top management commitment, employee adaptability, and internal readiness facilitating the integration of AI. Additionally, market pressures, including competitive, customer, and vendor influences, act as external drivers for adoption. As managerial implementation, SMEs should prioritize investing in AI-related knowledge and practices, foster a positive organizational climate with strong leadership support, and leverage partnerships with external stakeholders to enhance adoption. It is crucial to allocate adequate financial resources and encourage continuous learning to ensure successful implementation.

Finally, the outcomes of AI adoption reflect improvements in multiple areas, such as enhanced operational efficiency through workforce management, financial performance with better customer engagement and increased revenue, and innovation in business processes, including

the development of AI-powered solutions. AI also contributes to supply chain resilience, decision-making capabilities, and sustainability efforts, positioning SMEs to achieve strategic advantages. From the perspective of different sectors, the findings of this study highlight diverse implications for AI adoption in SMEs. In the manufacturing industry, for example, AI can increase operational efficiency by automating production processes and improving supply chain management. For service-oriented industries, AI's involvement in customer engagement, personalization, and market trend analysis is critical to achieving a competitive advantage. Meanwhile, in technology-driven industries, AI adoption can prioritize innovation, data analytics, and strategic decision-making.

Based on the current systematic review, the following propositions, as answers to the fifth research question, are to be investigated in further research:

Table 4. Suggested Research Propositions

Research Propositions	Arguments behind the Propositions
Role of several stakeholders in AI adoption of SMEs	In the literature, there are limited studies focusing on stakeholders' perspective toward AI adoption.
A multidimensional scale is required to measure AI adoption across different business functions.	In the field, researchers are currently measuring AI adoption by integrating existing scales or adapting them to their own context. However, this research has shown that AI adoption is a concept that needs to be measured multidimensionally.
AI adoption enhances export performance by improving market intelligence and customer engagement.	It has been observed that the number of studies addressing the AI concept in terms of exporting firms is very insufficient.
Developing the structural model of factors integrating resource utilization strategies and AI adoption.	The integration of resource utilization strategies with AI adoption is critical for SMEs. However, this issue is more focused on financial resources in the literature. The concept of resource utilization should be considered multidimensional.
AI adoption in SMEs fosters sustainability performance and other performance metrics such as operational efficiency, financial outcomes, and innovation.	AI-powered solutions can facilitate sustainable practices, such as reducing waste, improving energy efficiency. Future research can investigate the dual role of AI adoption on sustainability and performance outcomes.

This study underscores the multifaceted nature of AI adoption in SMEs, highlighting key areas for future research based on several research propositions. First, the role of various stakeholders—such as leadership, employees, customers, vendors, and external partners—proves crucial in shaping AI adoption strategies. Their engagement ensures that AI initiatives align with business objectives and market demands. Second, developing a multidimensional scale to measure AI adoption across different business functions will provide a more accurate assessment of AI's integration, enabling firms to monitor progress and identify improvement areas. The relationship between AI adoption and export performance also presents a promising avenue for research, as AI enhances market intelligence and customer engagement, improving SMEs' competitiveness in global markets. Furthermore, the development of structural models integrating resource utilization strategies with AI adoption will offer insights into how firms can optimize resources while successfully implementing AI technologies. Lastly, the dual role of AI is emphasized, as it drives both sustainability performance and key business metrics, such as

operational efficiency, financial outcomes, and innovation. Future research should explore how SMEs can balance these objectives by embedding AI into both strategic and operational practices. Together, these research propositions contribute to a deeper understanding of how AI can transform SMEs, providing a roadmap for both academic inquiry and practical applications in this dynamic field. Additionally, future research could involve exploratory studies through face-to-face interviews with SMEs to gain deeper insights into the factors influencing AI adoption. Such qualitative research would allow for a nuanced understanding of the challenges and opportunities SMEs face in integrating AI.

This study also has some limitations. First of all, the authors of the study have tried to shed light on a relatively younger concept within business literature. Thus, regardless of the well design of the study, there has been limited empirical studies considering the concepts investigated which means that there will be room for future studies to further investigate these issues.

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