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# The Role of Artificial Intelligence in Enhancing Decision-Making in Ghanaian Small and Medium Enterprises (SMEs)

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**Abstract**

The study evaluates the extent to which small and medium-sized enterprises in Ghana implement artificial intelligence tools to facilitate business decision-making using concurrent triangulation mixed-methods descriptive survey design. A multi-stage sampling technique was employed to select a sample of 400 SME owners and administrators, but 4 responses were invalid and misleading, which resulted in 396 responses. To guarantee inclusiveness, structured questionnaires (open and closed questions) were implemented, which included both online and paper-based formats. Descriptive statistics and PLS-SEM were employed to analyze quantitative data, while thematic analysis was implemented to analyze qualitative responses. The results indicate that small and medium-sized enterprises in Ghana are progressively utilizing artificial intelligence tools to enhance decision-making, automate routine tasks, and facilitate long-term planning. Though the adoption levels of AI differ among SMEs, many regard it as a practical instrument, contingent upon their digital skills and resources. Businesses that possess superior infrastructure and digital expertise are employing AI more efficiently to enhance strategic decisions, operations, and customer service. Nevertheless, adoption is still hindered by a variety of obstacles, such as inadequate infrastructure, funding constraints, a scarcity of competent personnel, low awareness, and ambiguous regulations. These obstacles are particularly severe for small and medium-sized enterprises that are resource-limited. Given these results, it is imperative that policymakers and stakeholders allocate resources to the development of digital infrastructure in small and medium-sized enterprises. It is recommended that capacity-building programs be implemented

to enhance digital literacy and offer participants practical AI training.

**Keywords:** Artificial Intelligence, Small and Medium Enterprises, Digital Adoption, Business Decision-Making, Technological Infrastructure

## 1. Introduction

Small and medium enterprises in Ghana are essential to the country's economic development, as they substantially contribute to local industries, innovation, and employment. SMEs employ approximately 85% of the workforce and account for approximately 92% of enterprises in the nation (Owusu et al., 2024). Despite their critical role, Ghanaian SMEs encounter a variety of obstacles, such as inadequate infrastructure, limited access to finance, and challenges in strategic decision-making, which impede their growth and sustainability (Abrokwah-Larbi & Awuku-Larbi, 2024). The absence of sophisticated strategies and data-driven instruments to facilitate decision-making is one of the primary challenges. Ghanaian SMEs must enhance their decision-making processes to remain competitive in the face of the rapid evolution of technology and the intensification of global competition (Ibrahim & Aduah, 2024). Artificial Intelligence (AI) has emerged as a transformative solution, providing machine learning, predictive analytics, and automation capabilities that materially improve business operations. AI has already demonstrated its benefits in data-intensive industries, enabling businesses to process enormous quantities of information, identify patterns, and make more informed decisions (Fatawu et al., 2024). Although AI adoption in Ghana is still in its infancy, there is an increasing acknowledgement of its potential to facilitate decision-making in small and medium-sized enterprises. Quaye et al. (2024) predict that the adoption of AI among African SMEs will increase by 40% over the next five years. This trend is indicative of the increasing recognition of the advantages of AI in terms of operational efficiency, customer service, and market competitiveness.

The incorporation of AI into Ghanaian SMEs is confronted with numerous obstacles, despite the increasing interest in this field. The adoption of AI technologies is impeded by a lack of technical expertise, financial constraints, and resistance to change in many SMEs (Fabian et al., 2024). Additionally, Ghana's cultural factors necessitate customized strategies to guarantee the successful implementation of AI, as there may be skepticism towards new technologies. Agyapong et al. (2024) conducted a study that indicated that approximately 70% of SMEs in the country were not conversant with artificial intelligence applications, and only 20% had implemented digital technologies that would facilitate AI integration. Nevertheless, AI has the potential to transform several critical components of business decision-making, including financial analysis, marketing strategies, and supply chain management. AI can assist businesses in optimizing inventory management, improving cash flow forecasting, and enhancing customer engagement by analysing large datasets and providing real-time insights (Magableh et al., 2024; Amoako et al., 2021). Furthermore, SMEs can enhance their marketing campaigns and better align their products and services with customer requirements by leveraging AI-driven insights into consumer behavior and market trends (Kumar et al., 2021). Although the benefits of AI are evident, substantial obstacles persist in its complete integration. To surmount these challenges, small and medium-sized enterprises may establish strategic partnerships with technology providers, capitalize on government initiatives that provide subsidies or grants for AI adoption, and invest in local expertise through training programs (Agbo-Adediran et al., 2025). The role of AI in augmenting decision-making within Ghanaian SMEs will become increasingly significant as it continues to evolve and becomes

more accessible, thereby providing them with a competitive advantage in both local and global markets. The complete potential of SMEs can be unlocked by the incorporation of AI, which allows them to make informed and expeditious decisions that promote growth and long-term sustainability (Ebuka et al., 2025; Fabian et al., 2024).

While there is an increasing global interest in AI and its potential to enhance decision-making, there are substantial research voids that persist in the adoption and utilisation of AI by small and medium-sized enterprises in Ghana. Although AI is being implemented in numerous countries for business decision-making, there is a lack of empirical data regarding the extent of its adoption among Ghanaian SMEs, particularly in terms of sector-specific awareness and adoption rates (Agyapong et al., 2024). In Ghana, the adoption of AI is impeded by factors such as cultural barriers, resource limitations, and limited awareness of AI's benefits (Asante Boakye et al., 2024; Tetteh et al., 2023). Additionally, challenges associated with the integration of AI systems into existing business operations, infrastructure, and technical expertise are not adequately investigated in the current literature (Fabian et al., 2024; Agyapong et al., 2024). Moreover, additional research is required to pinpoint the precise obstacles to AI adoption, such as the complexity of AI systems, financial constraints, and the absence of a supportive regulatory environment (Wahab & Radmehr, 2024). Furthermore, despite the potential of AI-driven analytics to revolutionise business operations, research is scarce on the effects of AI on business outcomes in Ghanaian SMEs, including efficiency, profitability, and competitive advantage (Kumar et al., 2021; Opoku et al., 2024). To comprehend how AI is being implemented in various industries and the variations in AI-driven decision-making processes across sectors, sector-specific studies are indispensable (Mensah & Adukpo, 2025). Moreover, the incorporation of AI with traditional decision-making frameworks in Ghanaian SMEs is an underexplored area, particularly in terms of skill deficits in AI-related knowledge and organisational resistance to change (Abrokwah-Larbi, 2024). The adoption of AI in Ghanaian SMEs is further complicated by the absence of high-quality data and the difficulties associated with data management (Azigi & Baffour, 2024). Based on these established gaps, the study addressed the following research questions

RQ1: To what extent are AI tools adopted by SMEs in Ghana for business decision-making?

RQ2: How do AI-driven analytics impact operational and strategic decisions within Ghanaian SMEs?

RQ3: What challenges do SMEs in Ghana face in integrating AI into their decision-making processes?

Addressing these research questions, the research informs policy recommendations, such as the implementation of government initiatives or incentives to support AI adoption, and provides frameworks for capacity-building programs that are designed to improve AI-related skills within the SME sector. Furthermore, by comprehending the sector-specific obstacles to AI adoption, SMEs can customize AI applications to their distinctive operational contexts and requirements. In addition, conducting comprehensive research on the impact of AI on decision-making reveals its true potential to enhance the efficiency, profitability, and competitive advantage of SMEs, thereby enabling them to thrive in a digital economy that is

swiftly evolving. Finally, this research stimulates sustainable development and innovation in small and medium-sized enterprises in Ghana.

## 2. Literature Review

The study employs the Technology-Organisation-Environment (TOE) Framework, which was first introduced by Tornatzky and Fleischer in 1990, to investigate the factors that influence the adoption of Artificial Intelligence in Ghanaian Small and Medium Enterprises. This theory contends that the adoption and implementation of technological innovations within an organisation are influenced by three critical contexts: environmental, organisational, and technological (Kumar et al., 2024). The technological context encompasses the internal and external technologies that are pertinent to the organisation, such as the perceived advantages, complexity, and compatibility of AI tools (Anomah et al., 2024). Innovation adoption is influenced by firm-specific characteristics, including size, managerial structure, resources, and capabilities, which are all part of the organisational context. Lastly, the environmental context includes external pressures, including regulatory requirements, competition, and industry trends, that may either facilitate or impede the adoption of AI (Anim et al., 2024). The TOE framework is especially pertinent for Ghanaian SMEs, as the adoption of technology is significantly influenced by internal organisational constraints and external environmental pressures (Friday et al., 2024). The TOE framework offers a comprehensive perspective on the multifarious influences that influence AI-driven decision-making processes, as a result of the fact that numerous SMEs in Ghana operate in resource-constrained and highly dynamic environments (Mustapha et al., 2024).

In addition to the TOE framework, this study implements the Resource-Based View (RBV), which was initially introduced by Wernerfelt in 1984 and subsequently expanded upon by Barney in 1991. The RBV posits that a company's competitive edge is contingent upon its capacity to acquire and effectively deploy valuable, rare, inimitable, and non-substitutable (VRIN) resources (Menzies et al., 2024). The RBV emphasises the strategic significance of internal capabilities, including data management systems, competent personnel, and organisational learning, as essential enablers of innovation in the context of AI adoption (Amankwah-Amoah & Lu, 2024). The capacity of Ghanaian SMEs to leverage AI tools for enhanced decision-making is contingent upon their internal resource endowment, which encompasses human capital and technological infrastructure (Adomako et al., 2021; Menzies et al., 2024). The RBV framework is particularly relevant in explaining the disparities in AI adoption among SMEs. Firms with more robust internal resources are more likely to utilize AI to improve operational efficiency, increase customer engagement, and maintain a competitive advantage (Anomah et al., 2024). The RBV provides a more profound theoretical foundation for comprehending the conditions under which SMEs adopt AI and how they can strategically leverage it to enhance performance outcomes and establish long-term resilience in a competitive marketplace when it is integrated with the TOE framework.

### *2.1 Artificial Intelligence and Decision-Making in SMEs*

Artificial Intelligence is the term used to describe the simulation of human intelligence in machines that are designed to reason, learn, and make decisions (Fabian et al., 2024). These

systems combine a variety of technologies, such as machine learning, natural language processing, predictive analytics, and autonomous process automation, to allow computers to analyze data, identify patterns, and produce actionable insights (Owusu et al., 2024). In the context of Small and Medium Enterprises, decision-making is frequently centralized, intuitive, and influenced by limited access to resources, time, and information (Abrokwah-Larbi & Awuku-Larbi, 2024). This is a significant constraint, as strategic and operational decisions are frequently made based on conjecture or experience, rather than reliable data. In the swiftly changing business environment of the present day, data-driven decision-making has become indispensable to assure long-term business sustainability, minimizing risks, and improving efficiency (Ibrahim & Aduah, 2024). Empirical research has demonstrated that organisations that incorporate data analytics into their decision-making processes are more adaptable and responsive to market fluctuations (Fatawu et al., 2024). AI technologies are essential in the implementation of data-driven strategies, as they automate routine decisions, forecast market trends, and provide real-time insights. Industries across sectors are employing AI to enhance customer service, streamline operations, and obtain competitive advantages, as the role of AI in business environments is expanding exponentially on a global scale. A 20% enhancement in operational efficiency and a 10% increase in profitability are reported by businesses that implement AI (Abrokwah-Larbi & Awuku-Larbi, 2024). AI enables SMEs to personalize consumer experiences, innovate product offerings, and scale operations, despite their often-limited resources. Quaye et al. (2024) and Magableh et al. (2024) have conducted studies that demonstrate that the implementation of AI improves the competitiveness of SMEs by enabling more effective financial planning, optimizing supply chains, and facilitating wiser marketing. Consequently, AI is not only pertinent but also becoming increasingly essential for SMEs that are pursuing sustainable growth, adaptability, and innovation in competitive markets.

### *2.2 AI Adoption Trends Among SMEs Globally and in Developing Economies*

The adoption of Artificial Intelligence among SMEs is on the increase worldwide, driven by the need for competitive advantage and the increasing digital transformation. SMEs in developed economies are utilizing AI to optimize operations, improve consumer experiences, and obtain insights from large data (Amoako et al., 2021). Kumar et al. (2021) reports that nearly 45% of SMEs in high-income countries have initiated the integration of AI tools, with a particular emphasis on areas such as automated financial reporting, predictive maintenance, and customer relationship management. This global transformation is being driven by the development of affordable AI solutions, cloud computing, and supportive digital ecosystems. Conversely, the adoption of AI in developing economies, particularly in Africa, is still relatively nascent and inconsistent. Limited technical skills, high costs, and inadequate digital infrastructure are persistent obstacles (Agbo-Adediran et al., 2025). For example, a study conducted by Ebuka et al. (2025) in Ghana revealed that less than 25% of SMEs had any exposure to AI tools. The adoption of AI tools was predominantly concentrated in metropolitan centres, where digital connectivity and training opportunities were more abundant (Agyapong et al., 2024). However, numerous African SMEs have initiated the integration of AI in novel manners. Retail SMEs in Kenya are employing AI-powered chatbots to manage customer

enquiries and improve engagement, while Nigerian SMEs in manufacturing are utilizing predictive analytics to forecast demand and optimize inventory (Magableh et al., 2024). AI applications have also been observed in the service sector in financial technology (fintech), where SMEs are utilizing AI algorithms to evaluate creditworthiness and provide customized loan products (Tetteh et al., 2023). The transformative potential of AI is emphasized by these examples, even in resource-constrained environments. Nevertheless, the success of adoption is contingent upon digital readiness, which encompasses access to data systems, mobile technology, and the Internet. As noted by Asante Boakye et al. (2024), SMEs that possess a more robust ICT infrastructure and a higher level of digital literacy are considerably more inclined to implement AI technologies. Therefore, it is imperative to improve digital ecosystems to increase the adoption of AI among small and medium-sized enterprises in developing economies.

### *2.3 Extent of AI Adoption in Ghanaian SMEs*

The adoption of AI among SMEs in Ghana remains in its early stages, despite the sector's pivotal role in national economic development. Although SMEs account for more than 90% of businesses in Ghana, less than 10% of them presently implement AI technologies in their operations (Agyapong et al., 2024). The Ghana National Artificial Intelligence Strategy (2023–2033), which aims to democratize AI access and promote inclusive innovation, is influencing the broader digital landscape (Agyapong et al., 2024). In urban areas with more developed infrastructure and digital literacy, SMEs are more likely to be aware of and apply AI. In 2025, predictive analytics for demand forecasting, automation platforms for streamlining operational processes, and chatbots for customer service are among the most prevalent AI tools in use (Wahab & Radmehr, 2024). For instance, the Ghana National Artificial Intelligence Strategy has implemented artificial intelligence-powered accounting analytics to improve financial transparency and efficiency (Mensah & Adukpo, 2025). Inadequate access to AI tools and platforms, high costs, and limited technical expertise are among the factors that impede widespread adoption (Abrokwah-Larbi, 2024). These obstacles are especially prevalent in rural regions and among micro-enterprises. Additionally, there is a substantial skills divide, as a significant number of business proprietors and employees lack formal training in artificial intelligence or data-driven technologies. A multi-stakeholder approach is necessary to address these issues, which includes government support through training and subsidies, partnerships with technology providers, and initiatives to improve digital infrastructure.

### *2.4 AI-Driven Analytics on SME Decision-Making*

AI-driven analytics have emerged as a powerful tool for enhancing both operational and strategic decision-making within SMEs, offering a competitive edge through data-informed insights. This tool provides a competitive advantage by providing data-informed insights (Mustapha et al., 2024). By analysing transactional data, customer preferences, and market fluctuations in real-time, AI tools enable SMEs to optimize resource allocation, improve inventory management, expedite supply chains, and enhance customer service at an operational level (Tetteh et al., 2023). AI facilitates long-term planning by identifying emergent trends, forecasting demand, and evaluating the profitability of new ventures from a

strategic perspective (Mustapha et al., 2024). The efficacy of AI in enhancing decision-making is supported by empirical evidence. For example, a study conducted by Friday et al. (2024) demonstrated that AI analytics considerably enhanced the quality, efficiency, and performance outcomes of SMEs. In the Ghanaian context, a few forward-thinking SMEs in the retail and agro-processing sectors have implemented AI-driven market intelligence tools to gain a more comprehensive understanding of consumer behavior and to make more agile decisions regarding pricing and product offerings (Anim et al., 2024).

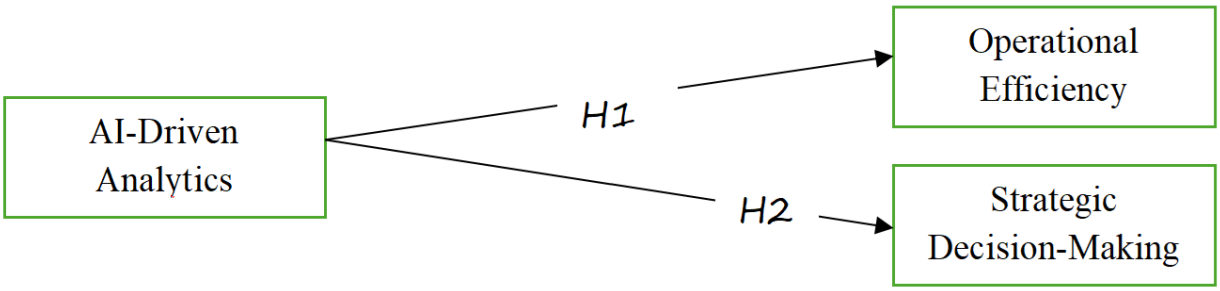


Figure 1. Conceptual Framework

Source: Author Design, 2025.

Furthermore, Anomah et al. (2024) contend that the incorporation of AI analytics into strategic management frameworks enables SMEs to more effectively align their resources with market opportunities. Nevertheless, the potential of AI is frequently underutilized as a result of low awareness of AI benefits, inadequate data infrastructure, and limitations in digital literacy. According to research conducted by Abrokwah-Larbi (2024) and Azigi and Baffour (2024), numerous SMEs in developing economies are underperforming not as a result of market conditions, but rather as a result of inadequate data utilisation in business decision-making. It is anticipated that the incorporation of AI technologies into the decision-making processes of SMEs will increase as they become more accessible, resulting in a transformative change in the way these businesses plan, operate, and expand. Therefore, the hypothesis proposed is:

H1: AI-driven analytics positively influence operational efficiency in Ghanaian SMEs

H2: AI-driven analytics positively influence strategic decision-making in Ghanaian SMEs

### *2.5 Challenges of AI Integration in SME Decision-Making Processes*

Despite the immense potential of AI to transform decision-making in SMEs, several persistent challenges hinder its effective integration, particularly in developing economies such as Ghana. The absence of technical proficiency and digital literacy among employees and proprietors of small and medium-sized enterprises is one of the most significant obstacles (Menzies et al., 2024). As Amankwah-Amoah and Lu (2024) have noted, the limited comprehension of AI tools and their applications by many SME managers impedes their informed adoption and implementation. The steep cost of procuring and maintaining AI technologies further exacerbates this challenge. Adomako et al. (2021) observed that in resource-constrained

environments, SMEs frequently prioritize imminent operational requirements over long-term digital investments. They reported that cost-related barriers were among the top deterrents for technology adoption in Ghanaian businesses. Furthermore, the deployment of AI is further restricted by infrastructure constraints, including unreliable electricity supply and inconsistent internet connectivity, particularly in rural and peri-urban regions, where the majority of Ghanaian SMEs are located (Mustapha et al., 2024). Furthermore, there is a cultural component to resistance, as individuals frequently hesitate to adopt automation due to their skepticism regarding the value of AI and their apprehension regarding employment losses. Fatawu et al. (2024) underscored the necessity of internal preparedness and leadership commitment in technology-driven transformations, as organizations' inertia and the absence of change management frameworks within SMEs further impede progress. Data quality and availability are also significant obstacles; the absence of structured data acquisition processes in numerous SMEs renders it challenging to effectively employ AI (Quaye et al., 2024). Additionally, the absence of national AI implementation guidelines and regulatory uncertainties contributes to a lack of confidence in AI systems. As Magableh et al. (2024) have noted, the establishment of an enabling environment for AI integration is contingent upon institutional support. The inclusive impact of AI-driven growth may be restricted by the potential for the digital divide between large enterprises and SMEs to widen in the absence of targeted policies, training programs, and financial incentives.

## 3. Research Methodology

This study employed a mixed-methods approach using the Concurrent Triangulation Descriptive Survey Design. The reliability and profundity of the findings are improved by the simultaneous collection and analysis of both quantitative and qualitative data, which is facilitated by this design (Creswell & Plano Clark, 2018). The internal validity of the study is enhanced by the concurrent triangulation design, which allows the researcher to validate and corroborate the results from the two datasets. The descriptive survey design component assists in the provision of a comprehensive overview of the present adoption patterns, levels of awareness, and impacts on decision-making in Ghanaian SMEs. The mixed-method approach is especially relevant for technology adoption studies, as it encompasses both measurable outcomes (e.g., adoption rates, categories of tools used) and contextual factors (e.g., perceptions, motivations, barriers) that influence SME behavior (Adomako et al., 2021). Quantitative data was employed to evaluate the extent and impact of AI tools in this investigation, while qualitative data provided a more comprehensive understanding of strategic implications and user experiences. The incorporation of both data types was essential for comprehending the “why” and “how” of AI use in SMEs, in addition to the “what.”

### *3.1 Population and Sample*

The study targeted SME owners, managers, and decision-makers across Ghana. The inclusion criteria necessitated that the SMEs be formally registered, operational for a minimum of two years, and have a minimum of five employees. To guarantee the reliability and relevance of the responses, SMEs that were informal or had been in operation for less than two years were excluded. As per the Ghana Enterprise Agency Report 2023, which was further emphasized by

Quaye et al. (2024), the number of SMEs in Ghana that satisfy these criteria is estimated to be between 500,000 and 700,000. At a 95% confidence level and a 5% margin of error, Yamane's (1967) formula was employed to determine a statistically significant sample size;

$$\frac{N}{(1+N(e)^2} \tag{1}$$

$$n = \frac{600000}{(1+600000(0.05)^2}$$

$$n = 399.7 \cong 400$$

Thus, a minimum of 400 respondents were required. A multi-stage sampling technique was employed to ensure adequate representation across various sectors (retail, manufacturing, services, agriculture) and regions (e.g., Greater Accra, Ashanti, Western, Eastern, and Northern Regions). The initial stage entailed the selection of regions based on economic activity and population size, thereby guaranteeing a representative sample across geographic areas. The second stage entailed the selection of specific sectors within each region to guarantee that important industries were represented diversely. Lastly, a simple random sampling technique was implemented to select SMEs within each sector, guaranteeing an impartial selection of respondents. This multi-stage approach improved the generalizability of the findings by integrating both sectoral and geographic diversity (Mensah & Adukpo, 2025).

### *3.2 Data Collection Instrument and Procedure*

Data was gathered through a well-structured questionnaire containing both open-ended and closed-ended questions to capture both quantitative metrics and qualitative insights. The questionnaire items were derived from validated instruments that were previously employed in studies (such as Mustapha et al., 2024; Friday et al., 2024; Kumar et al., 2024). The questionnaire was pretested with 30 SMEs and reviewed by the researcher to guarantee content validity and reliability. Anonymous responses and neutral language in the questionnaire were implemented to mitigate social desirability bias concerns. The marker variable technique was implemented to assess Common Method Bias (CMB), and the results did not reveal any substantial issues. The data was collected over six weeks across the selected regions. The survey was administered directly by the researcher using a combination of Google Forms (online link) and paper-based questionnaires to accommodate the varying levels of digital literacy and internet accessibility among SMEs across different regions. The paper-based method guaranteed inclusivity for participants in semi-urban and rural areas who had limited or no internet access, while the use of online surveys facilitated efficient distribution to digitally connected respondents, particularly in urban areas. To optimize response rates and guarantee comprehensive coverage of the intended SME population, this dual-mode approach was implemented. Informed consent was obtained from all respondents before participation, and ethical protocols, including confidentiality, anonymity, and voluntary participation, were rigorously adhered to. The reliability and validity of the study's findings were improved by the

accurate capture of diverse SME perspectives through this ethically sound, inclusive, and multi-regional data collection strategy.

### *3.3 Data Analysis*

The study employed a quantitatively-led data interpretation model to examine the adoption and influence of AI on decision-making within Ghanaian SMEs. Quantitative data were analyzed using descriptive statistics to profile respondents and summarize patterns of AI tool usage. Partial Least Squares Structural Equation Modelling (PLS-SEM) was employed to evaluate predictive relationships among variables due to its robustness in managing complex models and its suitability for small to medium sample sizes (Menzies et al., 2024). This analytical method facilitated the examination of the operational and strategic implications of AI in a variety of small and medium-sized enterprises. Parallel to this, thematic analysis was employed to analyze qualitative data from open-ended questionnaire items, which allowed for the identification and categorization of recurring patterns, including perceived benefits, challenges, and strategic insights related to AI use. To enhance the interpretation of statistical outcomes and offer a more comprehensive perspective, these qualitative findings were incorporated with the quantitative results. The validity of the conclusions derived was improved, and consistency across data sources was guaranteed by this methodological triangulation, which was guided by Fetters et al. (2013). The study revealed more nuanced and actionable insights into the incorporation of AI within SME decision-making processes in Ghana by integrating contextual narratives with statistical precision.

## 4. Results and Discussion

The demographic and organisational profiles of the SMEs surveyed are underscored by the respondent characteristics. The sample was composed of 58.6% males and 41.4% females. The age group of respondents with the highest percentage of responses was 35–44 years (33.3%), followed by 25–34 years (27.3%) and 45–54 years (18.2%). The respondent cohort was comparatively well-educated, as 42.4% of respondents held a Bachelor's degree, 22.7% a Master's degree, and 19.7% a Diploma/HND. In terms of company roles, 39.4% were owners, 30.3% managers, and 13.6% IT officers, suggesting that decision-makers and technically inclined staff participated in the study. This indicates that decision-makers and technically inclined staff were involved. Retail/trade accounted for the majority of SMEs (25.8%), with manufacturing (19.7%) and technology/ICT (16.7%) following closely behind. Finance, agriculture, and other sectors were also represented. The majority of enterprises had been in operation for 6–10 years (33.3%) or 2–5 years (30.3%), which suggests that the respondents were mature and stable.

Table 1. Respondent Characteristics

| Variables | Categories | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 232 | 58.6 |
| | Female | 164 | 41.4 |
| Age Group | 18–24 years | 42 | 10.6 |
| | 25–34 years | 108 | 27.3 |
| | 35–44 years | 132 | 33.3 |
| | 45–54 years | 72 | 18.2 |
| | 55 years and above | 42 | 10.6 |
| Highest Level of Education | Secondary/High School | 36 | 9.1 |
| | Diploma/HND | 78 | 19.7 |
| | Bachelor's Degree | 168 | 42.4 |
| | Master's Degree | 90 | 22.7 |
| | Doctorate (PhD) | 12 | 3.0 |
| | Other (Specify) | 12 | 3.0 |
| Current Position in Company | Owner | 156 | 39.4 |
| | Manager | 120 | 30.3 |
| | IT Officer | 54 | 13.6 |
| | Administrator | 42 | 10.6 |
| | Other (Specify) | 24 | 6.1 |
| Sector of SME | Retail/Trade | 102 | 25.8 |
| | Manufacturing | 78 | 19.7 |
| | Technology/ICT | 66 | 16.7 |
| | Finance/Insurance | 60 | 15.2 |
| | Agriculture | 54 | 13.6 |
| | Other (Specify) | 36 | 9.1 |
| Years of Operation | Less than 2 years | 60 | 15.2 |
| | 2–5 years | 120 | 30.3 |
| | 6–10 years | 132 | 33.3 |
| | More than 10 years | 84 | 21.2 |
| Number of Employees | 5–10 employees | 90 | 22.7 |
| | 11–30 employees | 120 | 30.3 |
| | 31–50 employees | 84 | 21.2 |
| | 51–100 employees | 60 | 15.2 |
| | More than 100 employees | 42 | 10.6 |

Source: Field Data, 2025.

The number of the workforce also differed, with 30.3% of firms employing 11–30 individuals and 22.7% having 5–10 employees. This variation is indicative of the varying operational dimensions among the SMEs. In general, the profile indicates that a group of SME representatives who are diverse, educated, and experienced is capable of offering informed perspectives on topics such as AI integration and digital transformation.

### *4.1 RQ1: To What Extent Are AI Tools Adopted by SMEs in Ghana for Business Decision-Making?*

The results suggest that SMEs in Ghana are gradually incorporating AI tools, with differing degrees of integration across business functions. The most widespread recognition of AI's strategic value was demonstrated by the highest agreement on the improvement of decision-making processes through AI (Mean = 3.74; SD = 0.91). This implies that numerous small and medium-sized enterprises have transitioned from the perception of AI as a futuristic concept to its integration as a practical solution for enhancing business decisions. The owner of a technology firm, who responded, observed,

> "Since integrating AI into our operations, we have experienced a substantial decrease in the amount of time spent on repetitive analysis. This has provided us with additional opportunities for innovation." (Field Data, 2025)

This comment is consistent with the observed adoption of AI for automating routine tasks (Mean = 3.62; SD = 0.89), suggesting a shift towards operational efficiency. Moreover, the personalization of the customer experience is on the rise (Mean = 3.68; SD = 0.90), indicating that SMEs are utilizing AI-driven insights to customize services, a critical strategy in competitive markets. According to a retail SME owner,

> "We employ AI tools to monitor customer preferences and purchase histories, which enables us to suggest the most appropriate products and enhance customer satisfaction." (Field Data, 2025)

Similarly, AI employs predictive analytics to analyze customer behavior (Mean = 3.45; SD = 0.95), data-driven marketing decisions (Mean = 3.58; SD = 0.93), and financial decision-making, which includes budgeting and forecasting (Mean = 3.49; SD = 0.98). These patterns indicate that SMEs are not solely implementing AI to enhance efficiency; rather, they are also utilizing it to gain a more comprehensive comprehension of their finances and market.

Table 2. AI Tool Adoption by SMEs for Business Decision-Making in Ghana

| Statement | Mean | SD |
|---|---|---|
| My business has adopted AI tools for automating routine tasks in decision-making. | 3.62 | 0.89 |
| The implementation of AI technologies has enhanced the decision-making process in my business. | 3.74 | 0.91 |
| AI is used in my business for predictive analytics related to customer behavior. | 3.45 | 0.95 |
| My business uses AI tools for data-driven decision-making in marketing strategies. | 3.58 | 0.93 |
| AI tools have been adopted by my business to optimize inventory and supply chain decisions. | 3.36 | 1.01 |
| AI tools are used in my business for financial decision-making, including budgeting and forecasting. | 3.49 | 0.98 |
| My business uses AI to make strategic decisions regarding product development and innovation. | 3.55 | 0.96 |
| My business has adopted AI to personalise customer experiences and tailor offerings based on data insights. | 3.68 | 0.90 |
| My business uses AI tools to analyse competitors' actions and inform competitive strategies. | 3.30 | 1.02 |
| My business uses AI for business intelligence tasks, such as generating reports and dashboards for decision-making. | 3.60 | 0.94 |

Source: Field Data, 2025.

The implementation of AI in strategic innovation and product development is also evident (Mean = 3.55; SD = 0.96), which confirms the interest of SMEs in long-term growth through technology. Nevertheless, the mean scores for inventory and supply chain optimization (Mean = 3.36; SD = 1.01) and competitor analysis (Mean = 3.30; SD = 1.02) were lower, suggesting that there are still voids. One IT officer noted,

> "We would be delighted to monitor competitor trends using AI; however, we are unable to establish such systems due to a lack of budget and skilled personnel. AI for inventory is ideal, but integration with our current system has been a challenge." (Field Data, 2025)

These viewpoints underscore the financial and technological constraints that small and medium-sized enterprises encounter, particularly when implementing sophisticated artificial intelligence solutions. The relatively high standard deviations ranging from 0.89 to 1.02 indicate that adoption levels are subject to variability, which is likely influenced by sector, business size, and resource availability, despite these challenges. Overall, the responses indicate that although small and medium-sized enterprises in Ghana are progressively utilizing AI to assist in business decision-making, the extent of their adoption is inconsistent.

### *4.2 RQ2: What Challenges Do SMEs in Ghana Face in Integrating AI into Their Decision-Making Processes?*

The incorporation of AI into the decision-making processes of small and medium-sized enterprises (SMEs) in Ghana is not without substantial obstacles. The cost of implementing AI tools (Mean = 4.12; SD = 0.79) was identified as a significant barrier, with the highest level of

agreement among respondents. The investment in AI technologies is less feasible for many SMEs due to their limited budgets. One respondent, a manager of a small agribusiness, stated,

> "We comprehend the benefits of AI; however, the expense of acquiring and maintaining the systems is simply too high for a business of our size." (Field Data, 2025)

This financial constraint is further exacerbated by the absence of skilled personnel who are capable of administering AI tools (Mean = 3.94; SD = 0.83), indicating a substantial human resource gap. A respondent from the manufacturing sector stated,

> "We frequently encounter obstacles when attempting to investigate AI due to the absence of an internal technical expert who can operate or interpret the systems." (Field Data, 2025)

In addition to financial and human capital challenges, there is a pervasive issue with comprehending the application of AI to business processes (Mean = 3.81; SD = 0.86). This implies that a significant number of small and medium-sized enterprise proprietors are cognizant of artificial intelligence but encounter difficulty in converting its potential into actionable strategies. The educational and informational disparities that persist are indicated by the high scores for limited awareness and knowledge of AI technologies (Mean = 3.92; SD = 0.84). According to an IT officer at a technology start-up,

> "A significant number of our colleagues continue to perceive AI as a technology that is exclusively utilized by large corporations, failing to recognize that it can be adapted to benefit smaller enterprises as well." (Field Data, 2025)

Table 3. Challenges Faced by SMEs in Integrating AI into Decision-Making

| Statement | Mean | SD |
|---|---|---|
| My business faces challenges in understanding how AI can be applied to decision-making processes. | 3.81 | 0.86 |
| The cost of implementing AI tools is a significant barrier for my business. | 4.12 | 0.79 |
| The lack of skilled personnel to manage AI tools is a major challenge for my business. | 3.94 | 0.83 |
| My business lacks sufficient infrastructure to support AI technology integration. | 3.70 | 0.88 |
| Resistance to change within my business hinders the adoption of AI-driven decision-making. | 3.55 | 0.91 |
| Data privacy and security concerns prevent my business from fully utilizing AI in decision-making. | 3.48 | 0.95 |
| The complexity of AI tools makes it difficult for my business to integrate them into decision-making processes. | 3.60 | 0.90 |
| My business lacks access to relevant AI solutions that are suitable for its size and needs. | 3.77 | 0.87 |
| Limited knowledge and awareness of AI technology are barriers to its adoption in my business. | 3.92 | 0.84 |
| Regulatory challenges and a lack of clear policies on AI adoption in my industry hinder the use of AI in decision-making. | 3.66 | 0.89 |

Source: Field Data, 2025.

Furthermore, SMEs frequently reported that they do not have access to AI solutions that are specifically designed to meet their operational requirements (Mean = 3.77; SD = 0.87). Typically, off-the-shelf AI tools are designed for larger organisations, rendering them either too complex or insufficiently adaptable for smaller enterprises. Infrastructure continues to be a significant issue, particularly in regions with inadequate internet connectivity and inadequate technological support systems (Mean = 3.70; SD = 0.88). One respondent in the retail sector observed,

> "The issue is not always cost, but rather whether we have the appropriate infrastructure, such as cloud storage or fast internet, to support AI." (Field Data, 2025)

Additionally, resistance to change within organisations presents a challenge (Mean = 3.55; SD = 0.91), as certain employees are hesitant to transition from conventional decision-making processes to data-driven models. This internal resistance may be a result of apprehension regarding job displacement or a lack of familiarity with technology. Another moderately rated concern was the complexity of utilizing AI tools, particularly when businesses lack intuitive, user-friendly platforms (Mean = 3.60; SD = 0.90). In industries that handle sensitive customer information, some SMEs are additionally discouraged from implementing AI solutions due to concerns regarding data privacy and security (Mean = 3.48; SD = 0.95). Finally, the absence of defined policies on AI usage and regulatory barriers (Mean = 3.66; SD = 0.89) was identified. SMEs frequently operate in a regulatory environment that has not fully adapted to technological advancements, resulting in risk aversion and uncertainty. Although SMEs in Ghana are becoming more receptive to the use of AI, their progress is impeded by a multifaceted combination of internal resistance, regulatory ambiguity, infrastructure, skills, and cost. To resolve these concerns, industry stakeholders, educational institutions, and policymakers must collaborate to ensure that AI is more accessible, affordable, and tailored to the specific requirements of SMEs.

### *4.3 RQ3: How Do AI-driven Analytics Impact Operational and Strategic Decisions Within Ghanaian SMEs?*

Table 4 summarises the reliability and validity evaluations of the constructs employed in the investigation: AI-Driven Analytics, Operational Efficiency, and Strategic Decisions. The factor loadings for all items are within the range of 0.707 to 0.807, which suggests that the indicator has good reliability. Values exceeding 0.70 are considered acceptable. The constructs' Cronbach's Alpha (CA) values are all greater than 0.70, which is indicative of their robust internal consistency. Operational Efficiency has a CA of 0.741, AI-Driven Analytics has a CA of 0.824, and Strategic Decisions has a CA of 0.797. The composite reliability (CR) values also meet the recommended threshold of 0.70, which further substantiates construct reliability. Operational Efficiency has a CR of 0.745, Strategic Decisions has a CR of 0.797, and AI-Driven Analytics has a CR of 0.827. The minimum permissible level of 0.50 is exceeded by the Average Variance Extracted (AVE) for each construct, suggesting that the convergent validity is adequate. The AVE of AI-driven analytics is 0.532, with an operational efficiency of 0.561 and a strategic decision-making score of 0.621. The Variance Inflation Factor values, which are employed to evaluate multicollinearity, are all less than 5, with a

range of 1.328 to 1.801. This confirms the absence of multicollinearity issues among the items. The data analysis's robustness is substantiated by the results, which indicate that the measurement model employed in the study is both valid and reliable.

Table 4. Reliability and Validity

| Construct | Items | Loadings | CA | CR | AVE | VIF |
|---|---|---|---|---|---|---|
| AI-Driven Analytics | AIA1 | 0.763 | 0.824 | 0.827 | 0.532 | 1.668 |
| | AIA2 | 0.707 | | | | 1.704 |
| | AIA3 | 0.727 | | | | 1.745 |
| | AIA4 | 0.729 | | | | 1.582 |
| | AIA5 | 0.73 | | | | 1.616 |
| | AIA6 | 0.719 | | | | 1.61 |
| Operational Efficiency | OE2 | 0.782 | 0.741 | 0.745 | 0.561 | 1.485 |
| | OE3 | 0.769 | | | | 1.505 |
| | OE4 | 0.72 | | | | 1.449 |
| | OE6 | 0.723 | | | | 1.328 |
| Strategic Decisions | SD2 | 0.781 | 0.797 | 0.797 | 0.621 | 1.52 |
| | SD3 | 0.789 | | | | 1.582 |
| | SD4 | 0.807 | | | | 1.801 |
| | SD5 | 0.774 | | | | 1.61 |

Source: Field Data, 2025.

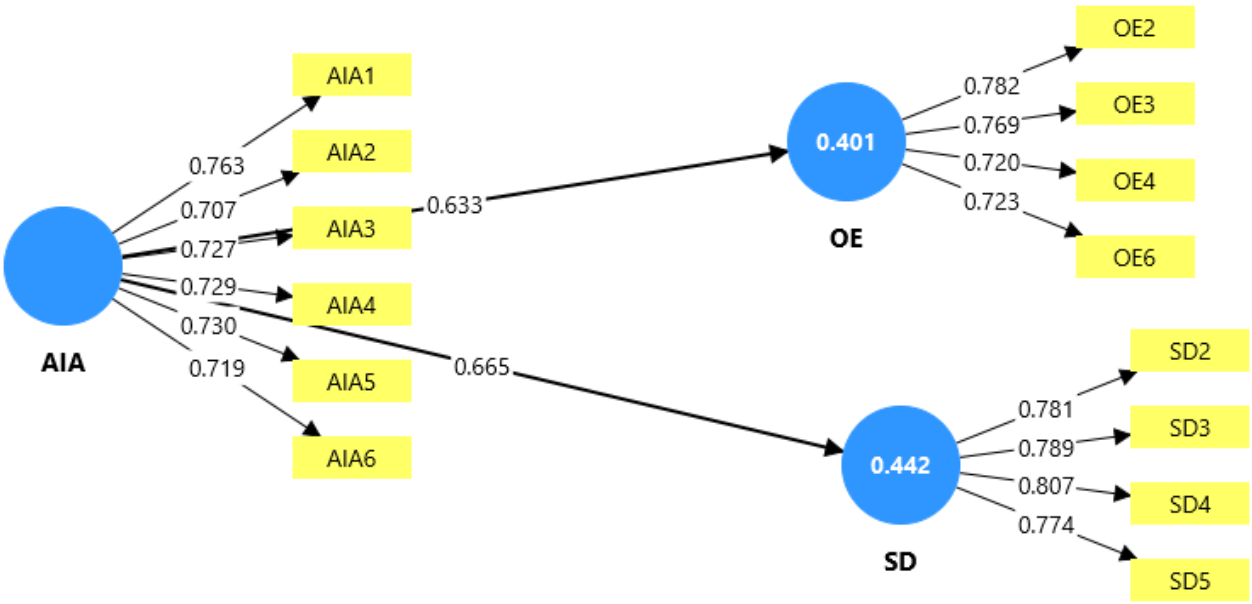


Figure 2. Measurement Model

Table 5. Discriminant Validity Test-Fornell-Larcker criterion

| | AIA | OE | SD |
|---|---|---|---|
| AIA | [0.729] | | |
| OE | 0.633 | [0.749] | |
| SD | 0.665 | 0.694 | [0.788] |

Source: Field Data, 2025.

The discriminant validity of the constructs in the study was assessed using two established methods: the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio of correlations. Table 5 displays the Fornell-Larcker results, which are represented diagonally in parentheses by the square root of the Average Variance Extracted (AVE) for each construct. A comparison is made between these values and the correlations between constructs. For a construct to exhibit discriminant validity, the square root of its AVE must exceed the correlations it shares with other constructs. The square root of the AVE for AI-driven analytics (AIA) in this study is 0.729, which is higher than its correlation with Operational Efficiency (OE) at 0.633 and Strategic Decisions (SD) at 0.665. Similarly, OE's square root AVE of 0.749 surpasses its correlation with AIA and SD. SD also exhibits acceptable discriminant validity, as evidenced by a square root AVE of 0.788, which is greater than its correlation with AIA (0.665) and OE (0.694). These findings verify that each construct is empirically distinct from the others.

Table 6. Discriminant Validity Test- Heterotrait-Monotrait ratios of correlations

| | AIA | OE | SD |
|---|---|---|---|
| AIA | 1 | | |
| OE | 0.795 | 1 | |
| SD | 0.811 | 0.755 | 1 |

Source: Field Data, 2025.

For Table 6, the HTMT ratios were examined to further verify discriminant validity. The HTMT values for all construct pairs are below the prescribed threshold of 0.90, suggesting that there is no significant multicollinearity or overlap between constructs. In particular, the HTMT between AIA and OE is 0.795, between AIA and SD is 0.811, and between OE and SD is 0.755. These values serve to substantiate the assertion that the constructs employed in the investigation, including AI-Driven Analytics, Operational Efficiency, and Strategic Decisions, are distinct. The Fornell-Larcker and HTMT tests collectively verify that the model meets the criteria for discriminant validity, guaranteeing that the constructs measure distinctive concepts within the research framework.

Table 7. Common Method Bias Analysis, Using Maker Variable Method

| Variables | Coefficient | Standard error | T stat. | P values |
|---|---|---|---|---|
| MV->AIA | 0.041 | 0.037 | 1.108 | 0.268 |
| MV->OE | 0.029 | 0.035 | 0.829 | 0.407 |
| MV->SD | 0.033 | 0.036 | 0.917 | 0.360 |

Source: Field Data, 2025.

The results indicate that the model does not exhibit any significant bias, as indicated by the common method bias analysis using the marker variable method. The marker variable's impact on AI-driven analytics (MV → AIA) is statistically insignificant (B = 0.041, p = 0.268). This suggests that the measurement of this construct has not been influenced by common method bias, as any shared variance between the marker variable and AI-driven analytics is not significant. Similarly, the path coefficient from the marker variable to Operational Efficiency (MV → OE) is also low and insignificant (B = 0.029, p = 0.407), which further implies that the responses related to operational efficiency are not systematically biased as a result of the measurement method.

Furthermore, the marker variable and Strategic Decisions (MV → SD) were determined to be statistically insignificant and feeble (B = 0.033, p = 0.360). This suggests that the study's measurement of strategic decision-making is also free from substantial common method bias. These findings collectively substantiate the assertion that the data capture method does not substantially influence the observed relationships among the primary constructs, including AI-Driven Analytics, Operational Efficiency, and Strategic Decisions. Consequently, the results can be regarded as dependable and not inflated or distorted as a result of common method variance.

### *4.4 Structural Equation Model*

The results indicate a strong positive relationship between these constructs, as the path coefficient from AI-driven analytics to Operational Efficiency is significant (B = 0.633, p = 0.045). This discovery suggests that as small and medium-sized enterprises implement artificial intelligence-driven analytics, they tend to enhance their operational processes, resource management, and overall efficiency. Businesses can reduce waste and increase productivity by automating routine tasks, predicting demand, and optimizing logistics with the help of AI tools. For example, one respondent underscored,

> "The integration of AI into our inventory system has resulted in a reduction in human error and a more accurate monitoring of stock levels, thereby enhancing our operational flow." (Field Data, 2025)

Another participant stated,

> "AI has facilitated the optimization of our daily operations by offering real-time insights into customer orders and supply levels." (Field Data, 2025)

These perspectives corroborate that AI analytics tools have practical applications that considerably influence the day-to-day business operations of SMEs, in addition to their theoretical contributions to efficiency.

Table 8. Path Coefficients

| Construct | Coefficient | St. Error | T statistics | P values | Decision |
|---|---|---|---|---|---|
| AIA -> OE | 0.633 | 0.64 | 0.045 | 13.984 | Supported |
| AIA -> SD | 0.665 | 0.669 | 0.046 | 14.606 | Supported |

Source: Field Data, 2025.

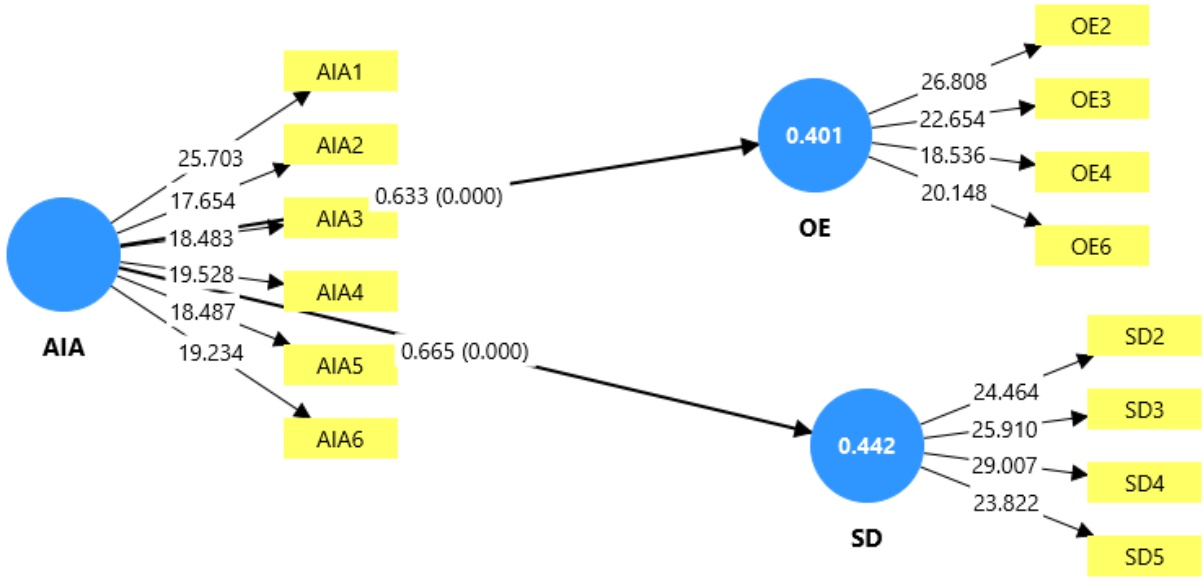


Figure 3. Hypothesis Model

Similarly, the findings indicate a substantial path coefficient from AI-Driven Analytics to Strategic Decisions, with a value of (B = 0.665, p = 0.046). This suggests that AI-driven analytics have a significant and advantageous impact on the strategic decision-making processes of SMEs. AI provides businesses with sophisticated data analysis capabilities that facilitate long-term planning, product innovation, market expansion, and risk assessment. SMEs can make more informed and forward-thinking decisions as a result of their capacity to interpret large datasets. One respondent observed,

> "We have been able to predict sales trends and adjust our strategies accordingly, which has enabled us to remain competitive." (Field Data, 2025)

Another respondent stated,

> "AI has eliminated the uncertainty from our strategic planning; we now rely more on data than instinct." (Field Data, 2025)

These statements illustrate that AI-driven analytics is not only beneficial for operational duties but also plays a critical role in determining the strategic direction of businesses.

### *4.5 Discussion of Findings*

The results indicate that SMEs in Ghana are gradually incorporating artificial intelligence tools to improve their business decision-making processes. These tools are particularly useful for customer personalisation, the automation of routine tasks, and long-term strategic planning. The high mean scores for AI usage suggest that many SMEs now regard AI as a practical instrument rather than a futuristic concept, although the depth and velocity of adoption differ across firms. These results are in strong agreement with the Technology-Organisation-Environment framework, which posits that a firm's internal technological readiness, organisational capacity, and external environmental pressures all contribute to technological adoption (Fabian et al., 2024; Abrokwah-Larbi & Awuku-Larbi, 2024). The integration of AI tools was more effective for Ghanaian SMEs with moderate digital literacy and foundational infrastructure, which illustrates the influence of internal capabilities on adoption outcomes. Similarly, the results are consistent with the Resource-Based View, which underscores the strategic significance of firm-specific resources, including technological expertise and innovation capabilities, in the acquisition and maintenance of a competitive edge (Fatawu et al., 2024). The relevance of RBV in the SME context was confirmed by the fact that firms with greater digital competence and human capital employed AI in more strategic and value-adding ways. These insights collectively confirm that the successful deployment of AI technologies in small business settings is contingent upon both internal resources and external enablers. The transformative potential of AI in SMEs is further underscored by a growing corpus of literature, which further supports the results of this study. Quaye et al. (2024) discovered that the incorporation of AI in small enterprises substantially improves productivity and the quality of customer service. Magableh et al. (2024) underscored the importance of data analytics in fostering innovation and agility. These global findings are consistent with the trends that have been observed in Ghanaian SMEs, where AI is being employed to enhance market responsiveness, expedite logistics, and support product development. Nevertheless, this study also underscores a persistent digital divide, which is consistent with the findings of Amoako et al. (2021) and Kumar et al. (2021). The cost, lack of technical expertise, and inadequate infrastructure are among the factors that impede the adoption of AI tools by certain SMEs, particularly those that are smaller or resource-constrained. These constraints are prevalent in developing economies, where systemic issues, including inadequate digital literacy, inadequate financing, and fragmented regulatory frameworks, impede the full-scale digital transformation. Consequently, despite the immense potential of AI, its adoption is still unequal. This dual perspective is substantiated by the present study, which illustrates the structural constraints and facilitating factors that influence the adoption of AI in Ghana's SMEs. It also emphasizes the necessity of more inclusive strategies that bridge this digital divide through targeted support and policy interventions.

Additionally, the results pinpoint numerous persistent obstacles, including inadequate infrastructure, financial constraints, a scarcity of qualified personnel, limited awareness, and a

lack of regulatory clarity, that hinder the integration of AI to a significant extent. The TOE and RBV frameworks are intricately linked to these obstacles. Innovation diffusion is impeded by environmental gaps such as regulatory uncertainty, which are further exacerbated by limited technological infrastructure and organisational preparedness (Agbo-Adediran et al., 2025). Simultaneously, organisations that lack essential internal resources, including qualified labor, strategic IT alignment, and digital tools, are incapable of effectively utilizing AI to generate value (Ebuka et al., 2025). These results reinforce the earlier research conducted by Agyapong et al. (2024), which asserts that the adoption of AI is not solely a matter of awareness; it necessitates domain-specific tools, expertise, and an ecosystem that fosters innovation. The congruence between this study and the extant global and regional literature emphasizes that, despite the extensive opportunities that AI offers, a comprehensive approach is necessary to fully realize its benefits within SMEs. It is imperative to address these systemic constraints by investing in digital infrastructure, capacity-building programs, and policy reforms to facilitate sustained, AI-driven transformation. The study ultimately asserts a cogent argument in favor of an ecosystem-based approach to AI adoption, which is consistent with the theoretical foundations of both TOE and RBV. This approach is characterized by technological innovation that is facilitated by organisational preparedness and a favorable external environment.

Furthermore, the results indicate that Ghanaian SMEs are considerably impacted by AI-driven analytics in terms of strategic decision-making and operational efficiency. Artificial intelligence tools are primarily employed to automate repetitive duties, enhance consumer targeting, expedite daily operations, and support long-term strategic planning. These results are consistent with the Technology-Organisation-Environment framework, which posits that the successful implementation of innovative technologies is contingent upon the readiness of technological infrastructure, organisational capabilities, and environmental facilitators (Agyapong et al., 2024). SMEs that were moderately technologically literate and had access to digital platforms were more likely to incorporate AI tools into their business processes in this study. This is also consistent with the Resource-Based View, which contends that firms with valuable, uncommon, and inimitable resources such as AI expertise and digital infrastructure are better positioned to benefit from technology for a competitive advantage (Ebuka et al., 2025). As a result, the results are consistent with both theoretical frameworks in that they illustrate the critical role that internal capabilities and environmental support play in the adoption of AI among SMEs. These findings are supported by numerous prior investigations. For example, Wahab and Radmehr (2024) underscore that the implementation of AI improves the efficacy and agility of decision-making processes, particularly in small businesses. In the same vein, Maroufkhani et al. (2022) discovered that SMEs that implement AI and big data analytics are more adaptable to market fluctuations. Additionally, Opoku et al. (2024) emphasize that AI can substantially enhance the performance of a firm, provided that there is organisational commitment and sufficient availability of resources. Nevertheless, the present results also align with cautionary statements in the literature, including those by Azigi and Baffour (2024), which identify infrastructural and pedagogical deficiencies as impediments to digital transformation in developing economies. Those insights are further substantiated by this study, as Ghanaian SMEs encounter comparable obstacles, despite acknowledging the value of AI. These parallels underscore the fact that the advantages of AI adoption are contingent upon

tangible support systems, including accessible infrastructure and training programs, in addition to their willingness to adopt.

## 5. Conclusion and Recommendations

This study investigated the extent, patterns, and obstacles associated with the adoption of AI by small and medium-sized enterprises in Ghana. The results indicate that the increase and extent of integration differ substantially among firms, although AI is being increasingly implemented for tasks such as strategic decision-making, automation, and consumer personalization. The findings confirm that AI is no longer perceived as a futuristic instrument, but rather as a practical element of contemporary business processes, particularly among SMEs with moderate digital literacy and foundational infrastructure. The study affirms the relevance of the Technology-Organisation-Environment framework, which emphasizes the significance of technological readiness, organisational capability, and external environmental support in the adoption of AI. Similarly, the Resource-Based View theory is validated, as SMEs that possessed more robust internal resources, including human capital, digital competence, and innovation capacity, were more effectively able to strategically employ AI to gain a competitive edge. Nevertheless, the widespread adoption of this technology is still impeded by systemic barriers, such as regulatory uncertainty, skill shortages, limited financing, and inadequate infrastructure, particularly among smaller or less-resourced SMEs. Based on the results, the study recommends the following. First, to guarantee equitable access to AI technologies, particularly in underserved regions, the government and private sector should allocate resources to the development of a robust digital infrastructure. The second step is to implement targeted capacity-building initiatives, such as mentorship programs and training, to enhance the technical expertise and digital literacy of SME proprietors and staff.

Third, to assist small and medium-sized enterprises (SMEs) in the acquisition and implementation of artificial intelligence (AI) tools, financial institutions should establish innovation grants and flexible funding models. Fourth, regulatory bodies must establish policies that are both explicit and supportive, as this will reduce uncertainty and foster a favorable environment for the adoption of technology. Furthermore, collaboration among stakeholders, including government, academia, technology providers, and business associations, should be bolstered to cultivate an ecosystem that encourages continuous learning, resource sharing, and innovation. To guarantee affordability and scalability, AI solutions should be customized to account for the unique operational requirements and constraints of SMEs. These coordinated endeavors will assist in the bridging of the digital divide and the empowerment of SMEs to strategically employ AI, resulting in enhanced competitiveness, efficiency, and decision-making. Without these supportive measures, the potential benefits of AI will be unequally distributed, which will restrict its transformational impact on Ghana's SMEs. Finally, future research should explore sector-specific AI adoption patterns among SMEs, assess the long-term impact of AI on firm performance, and examine the role of policy interventions in accelerating digital transformation. Comparative studies across different developing countries could also provide deeper insights into contextual factors influencing AI integration.

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