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Technological Opportunities and Barriers to Artificial Intelligence Adoption among Small and Medium Enterprises in Mogadishu, Somalia

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Abstract
Artificial intelligence (AI) may help small and medium enterprises (SMEs) automate processes, use data more effectively, improve customer service, and support managerial decisions. This study describes AI-tool use, willingness to invest, perceived adoption factors, barriers, and opportunities among SME owners, managers, supervisors, and employees in Mogadishu, Somalia. A quantitative cross-sectional survey used an adapted questionnaire and convenience sampling. Of 245 questionnaires administered, 244 valid responses were analyzed in SPSS version 24 using frequencies and percentages. Within this sample, 90.2% of respondents reported current AI-tool use; ChatGPT was the most frequently reported single tool, and many respondents used combinations of tools. Only 10.6% described their organizations as willing or very willing to invest, while 45.1% did not specify an investment position. Data accessibility and connectivity (30.3%) and top-management support (17.2%) were the most frequently reported individual adoption factors. Financial constraints (22.1%) and limited technical skills (18.4%) were the leading individual barriers, while efficient data use (18.9%) and process automation (18.4%) were the leading individual opportunities. The results reveal a gap between widespread respondent-level use and formal organizational investment. Because the sample was nonprobability-based and included people already involved with AI, the percentages should not be interpreted as population estimates of AI adoption among all Mogadishu SMEs. Formal strategy, management support, staff capability, reliable data and connectivity, financing, and data-security safeguards are needed for more sustainable organizational adoption.

Keywords: Artificial intelligence, Small and medium enterprises, Technology adoption, Adoption barriers, Mogadishu

1. Introduction

Artificial intelligence is increasingly used to automate business processes, improve operational efficiency, and support decision-making. Large firms often possess the finance, data, infrastructure, and specialist skills required for organized adoption, whereas SMEs may face stronger constraints related to cost, capability, change management, and integration with existing systems (Almashawreh et al., 2023). Accessible generative AI tools have nevertheless lowered some entry barriers and enabled informal experimentation by smaller firms.

AI can augment organizational processes and create competitive value when it is integrated with business objectives and complementary capabilities (Davenport & Ronanki,

2018; Duan et al., 2019; Dwivedi et al., 2021). Its value does not arise from data-processing technology alone; firms also require usable data, appropriate governance, staff skills, and processes that convert AI output into decisions.

AI adoption and its outcomes differ between SMEs and larger firms because of differences in finance, expertise, organizational structure, data, and support systems (Abrokwah-Larbi & Awuku-Larbi, 2024; Czarnitzki et al., 2023; Damioli et al., 2021; Kopka & Fornahl, 2024; Rammer et al., 2022; Schwaeke et al., 2025; Wamba-Taguimdje et al., 2020). A systematic review by Schwaeke et al. (2025) identified infrastructure, culture, compatibility, and regulation as important factors, but gave less attention to specific tools, data requirements, and management support.

For SMEs, AI may support productivity, collaboration, customer service, forecasting, and business-process improvement. The scale of these benefits depends on whether experimentation develops into governed, organization-wide practice rather than remaining ad hoc individual use. SMEs account for a large share of firms and employment globally, but many operate with limited finance, digital infrastructure, and specialist human capital. These constraints are especially relevant in developing economies and justify context-specific research rather than direct transfer of findings from technologically advanced markets.

Prior studies identify recurring barriers: insufficient or poorly structured data, high implementation cost, limited access to suitable solutions, inadequate employee skills, and the complexity of deploying and governing AI systems (Dwivedi et al., 2020; Gartner, 2019). These barriers may interact; for example, weak data systems can raise implementation cost and reduce the value of staff training. Research on enterprise AI has concentrated heavily on large firms and technologically advanced regions. SMEs in resource-constrained markets face different adoption conditions, yet evidence from Somalia remains limited.

This study therefore examines AI-tool use among sampled SME respondents in Mogadishu, their organizations' stated willingness to invest, perceived adoption factors, principal barriers, and perceived opportunities. The analysis is descriptive and does not estimate causal effects or population-wide adoption prevalence.

2. Literature Review

2.1 Definition Scope and Characteristics of Artificial Intelligence

Artificial intelligence refers broadly to computer systems that perform tasks associated with human cognition, including perception, learning, reasoning, language processing, and decision support. In organizational settings, AI includes machine learning, text mining, computer vision, speech recognition, natural-language generation, and related analytical or automation technologies (AlSheibani et al., 2018; Eurostat, 2023; Ingalagi et al., 2021; Joiner, 2018).

From a business perspective, AI combines data, algorithms, and computing infrastructure to interpret events, generate predictions, automate decisions, and support action (Gartner, 2023). Current systems remain largely task-specific and depend on the availability and quality of data, appropriate human oversight, and integration with business processes. AI is therefore better understood as a portfolio of technologies and capabilities than as a single application.

AI has rapidly transformed the world and impacted all areas of business functionality (Budhwar et al., 2023). It encompasses three generations: (1) artificial narrow intelligence, designed for specific tasks, (2) artificial general intelligence, capable of independently solving a wide range of problems, and (3) artificial superintelligence, anticipated to possess scientific creativity along with social and technical skills (Deepa et al., 2024). AI, often referred to as machine-generated intelligence, empowers machines to perform tasks and tackle complex challenges that have traditionally exceeded human cognitive capabilities. AI also comprises various vital subdomains, such as voice recognition, image identification, natural language

processing, expert systems, neural networks, planning, robotics, and intelligent agents (Whitson, 2024). AI is characterized by its multidisciplinary nature (Hermann, 2023) and integration with cutting-edge technologies (Hansen & Bøgh, 2021). Moreover, AI plays a crucial role in the Internet of Things (IoT), which constitutes an interconnected network of physical devices capable of communication and remote monitoring (Ashton, 2009). AI encompasses various methods, including machine learning, an analytical approach applicable to data from IoT devices (Hansen & Bøgh, 2021). AI processes vast volumes of IoT data to generate actionable insights. In addition, AI enhances augmented reality (AR), a human–computer interaction system that merges real and virtual 3D objects in real time (Schwaeke et al., 2025).

SMEs apply machine learning, deep learning, expert systems, and related tools to forecasting, inventory management, customer communication, quality control, predictive maintenance, and process optimization. Generative AI has further expanded access to low-cost tools for writing, analysis, design, and customer support. These applications may improve productivity and responsiveness, but benefits depend on reliability, security, staff competence, and fit with business needs (Chui et al., 2023).

2.2 Key Enablers and Barriers

AI adoption in SMEs is shaped by financial, human, technological, organizational, and environmental conditions. Leadership, digital infrastructure, usable data, skilled staff, compatibility, and external support can increase readiness, while cost, skill shortages, outdated systems, weak governance, and uncertainty can impede adoption. Evidence from developed markets may not fully explain how these factors combine in Mogadishu's resource-constrained SME environment. Several determinants influence SMEs' adoption of AI technologies. Compatibility, readiness, efficiency improvement, and time savings are key factors that directly and indirectly affect AI adoption through accounting automation (Devkota et al., 2022; Lee & Tajudeen, 2020). Chatterjee et al. (2022) emphasize the significance of perceived usefulness, ease of use, willingness to change, and strategic planning for successful applications of AI technology. Dörr et al. (2023) identify various determinants for successful digital transformation, encompassing executive management, strategy, employees, culture, data management, and more. Korherr et al. (2022) outline critical factors for transitioning to analytics-based decision-making involving management behavior, infrastructure, organization, and culture. Importantly, AI offers many opportunities to SMEs. Empirical studies reveal that the application of intelligent communication systems leads to a higher degree of customer experience and satisfaction, thereby providing a higher degree of loyalty and opening new market opportunities due to a higher level of customer data. An increase in organizational innovativeness and capabilities leads to a corresponding increase in the adoption of AI technologies by SMEs (Schwaeke et al., 2025).

According to Bérubé et al. (2021), the obstacles to AI implementation can be categorized into three main areas: (1) insufficient organizational capabilities related to data, (2) a lack of individual competencies specifically in AI, and (3) generic implementation barriers commonly identified in previous research on innovation implementation. Similarly, research by Lada et al. (2023) indicated that top management commitment and organizational readiness significantly influence AI adoption. In contrast, factors such as competitive pressure, employee adaptability, and external support have an insignificant impact on AI adoption. Drmac (2022) identified four barriers across the pre-implementation, implementation, and postimplementation phases of AI: (1) undefined use cases, (2) low levels of AI knowledge, (3) inadequate data, and (4) misalignment with end-user needs. Moreover, AlSheibani et al. (2019) distinguished barriers into three groups based on the level of AI adoption: (1) lack of in-house skills to implement and manage alongside an unclear business case for AI implementations, (2)

the perceived lack of leadership support, and (3) AI talent shortages and employee resistance (Zavodna et al., 2024).

2.3 Artificial Intelligence and Small Business Performance

Research has demonstrated that the application of AI offers numerous benefits for SMEs when well-integrated into the existing IT landscape. Scholars have investigated various use cases and business functions where AI can be effectively applied, such as risk management, human resources, and marketing. For instance, AI can predict credit risks, thereby lowering costs and enhancing decision-making processes. AI tools improve decision-making and insights, contributing to better customer satisfaction (Babucea & Rabontu, 2022; Rizomyliotis et al., 2022). Furthermore, AI in e-commerce boosts market share, efficiency, profitability, and customer satisfaction by providing faster product information and behavior analysis. In the realm of human resources, AI supports administrative tasks and personnel searches, addressing challenges related to employment and education (Weber, 2023). The involvement of top managers in AI initiatives facilitates the implementation of action plans, including human resources training and communication of AI benefits. AI analysis tools play a crucial role in enhancing resource efficiency, reducing costs, and providing extra value for companies (Chaudhuri et al., 2022). In particular, AI enhances efficiency in automating processes, creating innovative insights, engaging with stakeholders, and providing an improved customer experience (Schwaeke et al., 2025).

Artificial Intelligence (AI) adoption in Small and Medium-sized Enterprises (SMEs) has gained growing attention in academic and policy discourse, reflecting both its transformative potential and the persistent barriers SMEs face. Research on AI in business transformation highlights that large enterprises often lead in technology adoption, while SMEs encounter structural and resource-related challenges; studies of the drivers and barriers of AI in business contexts underscore organizational inertia and skill shortages as common constraints in smaller firms (Boonmee et al., 2025).

Artificial Intelligence plays a crucial role in providing accurate and highly efficient information while processing data without human intervention (Cubric & Li, 2024). This not only saves time but also helps customers meet their needs and preferences, leading to increased satisfaction with the website. This includes supporting various aspects of e-commerce, including product marketing, payments, and shipping, ensuring smooth and effortless operations. This can enable organizations to gain valuable insights into the market, customer behavior, and business performance over specific periods (Qi et al., 2023). By analyzing customers' clicks on products, AI tools can provide solutions and suggestions based on their preferences and needs (Sharma et al., 2021). It can also assist in addressing customer inquiries through chat platforms, enhancing the company's ability to respond promptly (Aljarboa, 2024). Enterprises may be motivated to adopt AI within their internal architecture for various reasons, including: the chance to streamline internal processes, make correct or better decisions, boost productivity, improve marketing strategies, gain a competitive advantage or retain employees (Chen et al., 2023). Artificial Intelligence has the potential to transform the business and global economic landscape by bringing forward advantages such as enhancing productivity, minimizing human error, enabling companies to make timely and accurate decisions, predicting customer preferences, and maximizing sales (Apostoaie et al., 2025).

3. Data and Methods

The study used a quantitative cross-sectional survey to describe AI use, investment willingness, adoption factors, barriers, and opportunities among people working in SMEs in Mogadishu. The analysis used frequencies and percentages and did not test causal relationships or effects on firm performance.

Questionnaire items were adapted from earlier studies of AI adoption in SMEs. The target respondents were SME owners, managers, directors, supervisors, and employees with knowledge of AI use in their organizations. Convenience sampling was used to recruit 245 participants, of whom 244 provided valid responses. Because participants were not selected through probability sampling and the target emphasized people involved with AI, the sample is likely to overrepresent AI-aware or AI-using respondents. Data were collected through a 28-item online questionnaire covering respondent and firm characteristics, current AI use, willingness to invest, adoption factors, barriers, and opportunities. SPSS version 24 was used to calculate frequencies and percentages. Of the 245 questionnaires administered, 244 were valid (99.6%).

4. Results and Discussion

4.1 Overview

The analysis included 244 complete responses from SME owners, managers, directors, supervisors, and employees in Mogadishu. One questionnaire was excluded because of incomplete demographic information. Results are presented as descriptive frequencies and percentages for respondent characteristics, AI-tool use, willingness to invest, perceived adoption factors, barriers, and opportunities.

4.2 Respondent Characteristics

Table 1 summarizes the demographic profile of the 244 respondents in terms of gender, age, length of employment, and industry sector. The sample was predominantly male (79.1%) and young: 75.4% were aged 20–30 years. Most respondents had five years or less of employment experience. Banking and logistics or transportation were the largest named sectors, while 29.9% were grouped as "Other," indicating substantial sectoral diversity. These figures describe respondents rather than the population of Mogadishu SMEs.

Table 1: Demographic Characteristics of Respondents (N = 244)

Demographic Factor	Frequency	Percent
Gender		
Male	193	79.1%
Female	51	20.9%
Age		
20–30 years	184	75.4%
31–40 years	47	19.3%
41–50 years	11	4.5%
51 years and above	2	0.8%

Length of Employment		
1–2 years	91	37.3%
3–5 years	82	33.6%
6–9 years	38	15.6%
More than 10 years	33	13.5%
Industry Sector		
Banking	55	22.5%
Logistics and Transportation	39	16.0%
Retail	19	7.8%
Sports	13	5.3%
Construction	13	5.3%
Manufacturing	12	4.9%
Agriculture	12	4.9%
Energy and Utilities	4	1.6%
Fisheries	3	1.2%
Insurance	1	0.4%
Other	73	29.9%

Source: Primary data (2026).

4.3 AI Use Tool Preference and Willingness to Invest

Table 2 addresses the first and second research objectives by reporting the extent to which SMEs currently use AI tools, which specific tools are used, and the willingness of organizations to invest in AI technologies. Because respondents were able to name more than one AI tool, entries reflecting a combination of two or more tools are grouped as “Multiple tools used” to

preserve clarity of presentation; the individual combinations are available in the underlying dataset.

Table 2: AI Usage, Tool Preference, and Organizational Willingness to Invest in AI (N = 244)

Item	Frequency	Percent
Currently uses AI tools		
Yes	220	90.2%
No	24	9.8%
Primary AI tool used		
ChatGPT	101	41.4%
Multiple tools used (combination of two or more)	91	37.3%
Google Gemini	16	6.6%
Claude AI	13	5.3%
None of the above	12	4.9%
Microsoft Copilot	4	1.6%
Notion AI	2	0.8%
Canva AI	2	0.8%
Perplexity AI	2	0.8%
Elicit	1	0.4%
Willingness to invest in AI		
Not Willing	89	36.5%
Less Willing	19	7.8%

Willing	13	5.3%
Very Willing	13	5.3%
Not Specified	110	45.1%

Source: Primary data (2026).

Current AI-tool use was reported by 90.2% of respondents. ChatGPT was the most frequently reported single tool (41.4%), while 37.3% reported using a combination of tools. Only 10.6% described their organizations as willing or very willing to invest, 36.5% reported no willingness, and 45.1% did not specify a position. The high nonresponse or unspecified rate means that investment willingness should be interpreted cautiously and not treated as a firm conclusion about the SME population.

4.4 Factors Associated with AI Adoption

Table 3 presents the factors respondents identified as most influential in shaping AI adoption decisions within their organizations. Data accessibility and connectivity were the most frequently identified individual adoption factor (30.3%), followed by top-management support (17.2%) and technology selection (12.7%). Another 17.6% selected combinations of factors. These descriptive frequencies indicate perceived importance; they do not estimate the statistical effect of each factor on adoption.

Table 3: Factors Influencing AI Adoption in SMEs (N = 244)

Factor	Frequency	Percent
Data Accessibility and Connectivity	74	30.3%
Top Management Support	42	17.2%
Multiple factors selected jointly	43	17.6%
Selection of Appropriate Technology	31	12.7%
Organizational Readiness	28	11.5%
Compatibility with Existing Systems	14	5.7%
Competitive Pressure	12	4.9%

Source: Primary data (2026).

4.5 Barriers to AI Adoption

Table 4 reports the barriers respondents regarded as the greatest obstacle to AI adoption in their organizations. Financial constraints were the most frequently identified individual barrier

(22.1%), followed by limited technical skills (18.4%) and data-security concerns (10.2%). Another 23.0% selected multiple barriers jointly, showing that respondents often experienced overlapping financial, capability, and trust-related constraints.

Table 4: Barriers to AI Adoption in SMEs (N = 244)

Barrier	Frequency	Percent
Financial Constraints	54	22.1%
Lack of Technical Skills	45	18.4%
Multiple barriers selected jointly	56	23.0%
Data Security Concerns	25	10.2%
Human Resource Shortages	17	7.0%
Complexity of AI Systems	17	7.0%
Organizational Resistance to Change	13	5.3%
Lack of Strategic Vision	11	4.5%
Infrastructure Limitations	6	2.5%

Source: Primary data (2026).

4.6 Opportunities Associated with AI Adoption

Table 5 presents the opportunities respondents considered most important among the benefits AI offers their organizations. Efficient data use (18.9%) and process automation (18.4%) were the most frequently identified individual opportunities. Better decision-making and new business models were each selected by 10.2%, while 23.0% selected combinations of opportunities. These results describe respondent perceptions rather than measured organizational outcomes.

Table 5: Opportunities Provided by AI Adoption in SMEs (N = 244)

Opportunity	Frequency	Percent
Efficient Use of Data	46	18.9%
Automation of Processes	45	18.4%
Multiple opportunities selected jointly	56	23.0%

Acceleration of Processes	20	8.2%
Better Decision-Making	25	10.2%
Development of New Business Models	25	10.2%
Streamlining Operations	14	5.7%
Improvement of Risk Management	13	5.3%

Source: Primary data (2026).

5. Discussion

This discussion interprets the findings presented above in relation to the study's four research objectives and situates them within the existing literature on AI adoption in SMEs.

5.1 AI Use among Sampled SME Respondents

Within this AI-oriented convenience sample, 90.2% reported using at least one AI tool. This percentage is higher than adoption levels often reported for SMEs and probably reflects both the accessibility of generative AI and the recruitment of respondents familiar with AI. It should not be interpreted as the prevalence of formal AI adoption among all Mogadishu SMEs. The dominance of ChatGPT and tool combinations suggests that much current use may be informal, individual, and based on free or low-cost applications.

5.2 Willingness to Invest in AI

Only 10.6% reported that their organizations were willing or very willing to invest, while 45.1% did not specify a position. This pattern is consistent with a gap between individual tool use and formal organizational commitment. However, the large unspecified category prevents a definitive estimate of unwillingness and may reflect questionnaire design, respondent uncertainty, or limited authority to speak for organizational investment decisions.

5.3 Factors Associated with AI Adoption

Respondents most frequently identified data accessibility and connectivity, management support, and technology selection. These findings align with research emphasizing data readiness and leadership, but the survey did not statistically test their relationship with actual adoption. The results should therefore be presented as perceived factors rather than determinants.

5.4 Barriers to AI Adoption

Financial constraints, technical skill shortages, and data-security concerns were prominent perceived barriers. Multiple barriers were often selected together, indicating that cost, capability, infrastructure, and trust may reinforce one another. Future analysis should test these relationships using validated multi-item constructs and an inferential model.

5.5 Opportunities Perceived by Respondents

Respondents emphasized operational opportunities—efficient data use and process automation—more often than strategic opportunities such as new business models. This pattern suggests that sampled SMEs currently view AI primarily as a productivity tool. Objective performance data are needed to determine whether these perceived opportunities translate into measurable benefits.

5.6 Synthesis

Taken together, the results suggest widespread respondent-level experimentation alongside limited evidence of formal investment. Perceived adoption conditions include data and connectivity, management support, and appropriate technology, while finance and skills remain important barriers. The study provides a useful descriptive baseline but does not establish population prevalence, causal effects, or firm-level performance gains.

Several limitations affect interpretation. The convenience sample targeted respondents with AI involvement and therefore cannot represent all SMEs in Mogadishu. Responses were self-reported and may reflect individual rather than organizational practice. The high "Not Specified" rate for investment willingness introduces uncertainty. Some questions permitted multiple responses even where a single priority may have been intended. Finally, the cross-sectional descriptive analysis cannot test causal relationships. Future studies should use a defined SME sampling frame, probability or stratified sampling, firm-level respondents authorized to report organizational practice, validated scales, and inferential or longitudinal analysis.

6. Conclusion and Practical Implications

This study described AI use, investment willingness, adoption factors, barriers, and opportunities among 244 SME-related respondents in Mogadishu. The sample was recruited through convenience methods and was oriented toward people familiar with AI; the findings therefore characterize the sample rather than the wider SME population. Respondents reported extensive use of accessible AI tools, especially ChatGPT, but much less evidence of formal organizational willingness to invest. Data and connectivity, management support, and technology selection were prominent perceived adoption factors. Finance, skills, and data security were prominent barriers, while data efficiency and automation were prominent perceived opportunities.

SME managers should distinguish informal employee experimentation from approved organizational adoption. Formal adoption requires defined use cases, data governance, security controls, staff training, budgets, and management accountability. Policymakers and business-support organizations can assist through affordable finance, connectivity, practical training, cybersecurity guidance, and sector-specific AI support. Stronger probability-based research is needed before population-wide conclusions are drawn.

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Ethics Approval and Informed Consent

This study was approved by the Institutional Review Board of Hormuud University. Informed consent was obtained from all participants.

Conflict of Interest

The author confirms that there is no conflict of interest related to the manuscript.

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