AI Adoption Capabilities and Sustainable Competitive Advantage in Bangladeshi SMEs: The Mediating Role of Innovation Capability

AI Adoption Capabilities and Sustainable Competitive Advantage in Bangladeshi SMEs: The Mediating Role of Innovation Capability

Submitted to:

Mr. Ahmed Imran Kabir

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School Of Business and Economics

United International University

Date of Submission: 21st July 26

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Date: 21 July 2026

To
Ahmed Imran Kabir
Assistant Professor,
School of Business and Administration (SoBE)
United International University (UIU)

Subject: Submission of Project Report on **"AI Adoption Capabilities and Sustainable Competitive Advantage in Bangladeshi SMEs: The Mediating Role of Innovation Capability"**

Dear Sir,

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I have tried diligently to make this report accurate, clear and scholarly. I would appreciate it if you could give me useful comments and suggestions, however, to help me improve in the quality of this research work.

I really hope this report will satisfy the academic requirements and also will be adequately fulfilling its aim when sending over the project. I would like to express my gratitude to you for your ongoing support, guidance and encouragement during the preparation of this report.

Sincerely,

Farhan Labib
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Abstract

Purpose: The aim of this investigation is to explore the effect of AI Adoption Capabilities on Sustainable Competitive Advantage in Small and Medium-Sized Enterprises (SMEs) in Bangladesh. More specifically, the study concentrates on three AI-related capabilities, namely, AI Tool Adoption, Organizational AI Readiness and AI-Driven Decision Making. It also examines the mediating relationship between AI-related capabilities and Sustainable Competitive Advantage via Innovation Capability.

Research type/design and methodology: A quantitative and survey research type is used. The data was gathered from the respondents from SMEs by applying a structured questionnaire, which was developed in a five-point Likert scale in Bangladesh. A total of 118 SME respondents who had completed the questionnaire were selected for a final usable sample. To evaluate the measure model, the structural model, direct effects and mediated effects, the obtained data were analysed with the technique of Partial Least Squares Structural Equation Modelling (PLS-SEM) using SmartPLS software.

Results: Results revealed that AI-related capabilities are important for the enhancement of innovation capability in Bangladeshi SMEs. Organizational AI Readiness and AI Tool Adoption demonstrated a strong linkage with Innovation Capability as well as with innovation development. Results also demonstrate the strong positive relationship between Innovation Capability and Sustainable Competitive Advantage. This indicates that SMEs could enjoy long-term competitiveness when they can learn how to use AI resources to create new products, services, processes and business practices.

Originality/value: This study makes an original contribution to the literature because it takes the perspective of AI adoption capabilities of Bangladeshi SMEs. It emphasises that mere use of AI does not necessarily guarantee industries' sustainable competitive advantage, but rather that industries' innovation capability is a significant mechanism fulfilling the competitive value of AI-related capabilities. The research further offers a practical understanding for SME owners/managers who desire to utilise AI tools in a better way for the innovation and long-term growth of their businesses.

Keywords: Artificial Intelligence, AI Tool Adoption, Organizational AI Readiness, AI-Driven Decision Making, Innovation Capability, Sustainable Competitive Advantage, SMEs, Bangladesh, SmartPLS and PLS-SEM.

Table of Contents

AI Adoption Capabilities and Sustainable Competitive Advantage in Bangladeshi SMEs: The Mediating Role of Innovation Capability

1. INTRODUCTION

Interwoven into manufacturing and industrial or business operations, the use of intelligent digital technologies, particularly artificial intelligence (AI), is very common in the 4th industrial revolution. Cascades of smart digital technology continuously redefine the very foundation of the global business landscape of small and medium enterprises (SMEs). AI in the contemporary world economy has a significant role in adding automation, decision support, innovation and value (Gan and Xiao 2025, Rodríguez Benito, Hernández Zelaya et al. 2026). Especially in all countries, SMEs play the backbone of the economy, and for the benefit of improving employability, innovative ideas, and GDP contribution, they are holding onto the adoption of these tools to make their operations more efficient, engage customers and reach the market (Sohu, Shaikh et al. 2026). By observing the emerging market, AI's adoption can definitely enhance work productivity and is able to build new business models (Abdul Wahab and Radmehr 2024, Sánchez-Rodríguez, García-Vidal et al. 2025).

However, the sustainable competitive advantage (SCA) is one of the significant factors for SMEs who are engaged in volatile environments with limited resources (Lu and Shaharudin 2024). Because of AI, digital transformation is drastically taking position over such advantages by enhancing innovation, agility and resilience (Asa, Nautwima et al. 2026). But the benefits of AI investment in longer-term competitive results are by no means guaranteed or standard. Although they have sufficient resources, data infrastructure, technology and skills on large farms, it is a challenge to share it with SMEs due to limitations in resources or the lack of skilled labour on SMEs (Mumcu and Brieger 2026, Rahmani, Kasmo et al. 2026). This is, after all, a contradiction since many people are interested in AI tools and use them, but the improvements and benefits from using AI tools are not the same everywhere. This is what is known as “adoption without impact” in developing countries (Rahmani, Kasmo et al. 2026).

There has been a surge in interest in AI, but SMEs are finding it challenging to effectively apply AI. The challenge is that organisations are not yet prepared, have low resources and skills, ineffective data management and extra implementation costs. Companies experience different performance in the field: some enhance the effectiveness of operations and the performance of innovation, while others do not achieve significant effects on their business performance. Such issues are particularly prevalent in developing markets such as Bangladesh, where SMEs play a key role in the economy, but are stunted by very inefficient labour, shortage of resources and competitive pressure.

A significant research gap identified is understanding how AI can achieve sustainable competitive advantage in SMEs or how SMEs can leverage AI to grow their competitive advantage in the marketplace. Many studies elaborate on the relationship of profitability and AI deployment in terms of performance, individual productivity and innovation (Sánchez-Rodríguez, García-Vidal et al. 2025, Mumcu and Brieger 2026). But many businesses still don't understand how AI adoption can matter for them to secure a competitive edge (Gan and Xiao

2025). Yet another is the limitation of existing research that takes a rather unrefined look at AI and its potential: While research can be applied to applications, they do not necessarily have these context-specific views based on very high-potential but under-studied areas like Bangladesh.

The objective of this research is to find the mediating role of digital transformation strategy and AI adoption in giving a competitive advantage in the market where SMEs can survive and compete with other SMEs. In particular, it looks at the impact of AI on knowledge creation and innovation processes, how this innovation capability is reflected in SCA (including both economic and operational as well as wider sustainability aspects), and whether a coherent digital transformation strategy enhances these connections. Based upon Resource-Based View (RBV), Dynamic Capabilities Theory (DCT) and Knowledge-Based View the study constructs and tests a moderated mediation model.

This study contributes to the SME market by explaining various insights into the application of AI in the current saturated market and clarifying the in-between role of moderating dimension that is digital transformation system. Using GenAI can improve Supply Chain Agility (SCA) and help competitive advantage decision-making, and in the end, it is determined to increase profitability. But it's a rather indirect process. Generative AI first improve companies' capability and their ability to build innovative and sustainable ideas, products or processes, then it leads to an increase in battery supply chain agility. This research provides huge proof that a company's digital transformation strategy can make its overall relationships (especially on AI adoption) stronger or weaker extending (Gan and Xiao 2025, Sánchez-Rodríguez, García-Vidal et al. 2025). It additionally strengthens resource-based worth (RBV), and this provides an enterprise with a competitive edge. In sum, it could be concluded that the results provide unique knowledge of business studies and have presented to the Bangladeshi SMEs and policymakers some suggestions how companies can effectively use AI in Bangladesh to foster business competitiveness, innovation, resilience, and long-term growth for SMEs in future.

2. LITERATURE REVIEW

2.1AI-Related Capabilities in SMEs

Generative Artificial Intelligence (GenAI) is the category of AI systems which can learn patterns from so many training data and produce new content like text, images, code, music, video and advanced designs on their own. It is not just a regular predictive AI model but can create original, contextually available content that closely competes with human creativity and problem-solving capabilities. This includes large language models like ChatGPT, Claude and Google's Gemini or multimodal tools like DALL-E or Midjourney. The SME context is particularly appealing due to the minimal barriers to entry, accessibility in the cloud, and the potential for quick implementation of GenAI solutions, a convenient fit for businesses with limited IT infrastructure and budgets (Gan and Xiao 2025, Rodríguez Benito, Hernández Zelaya et al. 2026)

Research into GenAI adoption in SMEs has shown mixed feelings and varying levels of implementation. In fact, that's what a survey of Spanish SMEs revealed, with generative applications accounting for around 78.9% of the AI tools adopted, greatly outpacing the use of predictive or prescriptive tools. The primary impetus for adopting is due to needs in content creation, customer service automation, product ideation and simple operational support. A significant number of companies have undergone initial adoption cycles of less than six months, and micro and small enterprises have been the first to experiment with the tools as they are generally user-friendly (Rodríguez Benito, Hernández Zelaya et al. 2026). These trends can be seen throughout emerging economies. There have been studies in Pakistan and Ecuador that document GenAI applications in knowledge creation, decision acceleration, and supporting innovation to varying extents, depending on the firm size, industry and digital readiness (Sánchez-Rodríguez, García-Vidal et al. 2025, Sohu, Shaikh et al. 2026). Research in Indonesia and Lebanon report an “adoption paradox” where achieving performance benefits is not always guaranteed by simply using lots of technology; skill gaps and lack of integration strategies are among the reasons for this (Abdul Wahab and Radmehr 2024, Deveciyan, Alay et al. 2026, Rahmani, Kasmo et al. 2026).

The effects of implementing GenAI in companies are varied. Good results consist of quicker strategic decision-making, better innovation results, increased operational efficiency, and improved customer engagement (Gan and Xiao 2025). The tools of GenAI can help with quick prototyping, idea generation, and cross-functional collaboration – making it easier for SMEs to go head-to-head with large businesses. PLS-SEM results reveal significant positive direct and indirect links between GenAI acceptance and innovation outcomes. For example, GenAI can contribute to the SECI knowledge creation spiral, which helps in the transformation of tacit knowledge to explicit innovations (Gan and Xiao 2025).

However, challenges abound. The issues of integration have been identified as barriers by many SMEs, including data privacy concerns, ethical issues, skill deficiency, high reliance on other platforms and uncertain return on investment. Where resources are scarce, the adoption of GenAI can result in fenced-in implementations if supplemented with other organisational capabilities. Research after research points to the fact that technology must be coupled with human capital development and strategic intent for it to be truly effective (Mumcu and Brieger 2026, Rahmani, Kasmo et al. 2026). In addition, these impacts are further affected by contextual factors such as the lack of reliable internet connectivity, digital literacy (lack thereof), and financial constraints, such as in the SMEs of Bangladesh, where the situation is more likely context-specific.

2.2 Innovation Capability

The term innovation capability generally describes a firm's ability and collative process to create, synthesize and leverage new knowledge, ideas, products, services, processes, and business models that create superior value for customers and stakeholders. It involves innovation on product, process, organization and marketing. Many scholars have tried to

measure it by scales of creativity encouragement, R&D investment (including informal investment), idea implementation success rates and adaptability in changing market situations (Gan and Xiao 2025, Sánchez-Rodríguez, García-Vidal et al. 2025).

A central and intermediate role for innovation capability in the relationship between technological inputs and business performance. It serves as a living and breathing link that bridges the gap between outside technologies (like GenAI) and positive sustainable impact by facilitating companies to reconfigure resources, identify opportunities, and capitalize on risks. Empiricism shows that there are strong positive relationships between innovation capability and a number of key KPI's like revenue growth, profitability, customer satisfaction, and market share (Abdul Wahab and Radmehr 2024, Lu and Shaharudin 2024).In the context of SMEs, where resources are at a premium, the ability of innovation to surmount the “liability of smallness” is also found to be helpful in markets where the environment is volatile and tends to change rapidly (Asa, Nautwima et al. 2026).

There is a growing body of evidence that increasingly connects the dots between the uptake of GenAI and increased innovation capability. Generative tools help humans with ideation, instant scenario simulations and rapid iteration capabilities. Gan and Xiao (2025) found that GenAI has a significant impact on innovation performance, boosting strategic decision-making and knowledge creation speed. A mediation analysis in several scenarios shows that innovation capability mediates the impact of AI technologies on other firm-level scenarios, like competitive performance or sustainability indicators (Sánchez-Rodríguez, García-Vidal et al. 2025, Deveciyan, Alay et al. 2026). GenAI investments have the potential to be costly experiments that are underused if they are lacking in innovation capabilities.

In these emerging markets, such as Bangladesh, innovation capability becomes even more essential because of the high level of competitiveness, fast pace of technology and the need to solve local problems like sustainability and inclusivity. Companies with well-established innovation processes are more likely to use GenAI effectively for addressing local specificities, which could range from product development for specific regions to optimizing the local supply chain.

2.3 Digital Transformation Strategy

Digital transformation strategy (DTS) is an entire organization-wide strategy that incorporates digital technologies into every aspect of the business, such that the entire value creation and delivery is transformed. It's about the adoption of technology, change in culture, commitment from leadership, reskilling the workforce, redesign of processes, and partnership with the ecosystem (Lu and Shaharudin 2024, Asa, Nautwima et al. 2026).

It is hardly an exaggeration to say that DTS plays a crucial role in SMEs. SMEs can also have limited access to resources and do not have specialized digital departments as large corporations do. A well-crafted DTS can enable SMEs to prioritize investments, reduce risks, and get the most out of technology like GenAI, cloud computing, big data, and IoT.

According to a range of systematic literature reviews, for DTS to be effective, it must be aligned with business strategy and is able to overcome common challenges such as resistance to change and shortage of skills to support the initiative, and is therefore a key enabler of sustainable competitive advantage (Lu and Shaharudin 2024).

Empirical studies show that DTS moderates the relationship between technology adoption and performance outcomes. Firms with mature digital strategies experience stronger positive effects from AI implementation because they possess better data governance, change management practices, and complementary resources. In contrast, SMEs without coherent strategies often witness technology "pilot purgatory"—repeated small experiments with little strategic impact. In developing economies, DTS is vital for bridging infrastructural gaps and fostering digital inclusion.

Some challenges affecting the DTS for Bangladeshi SMEs are irregular power supply, limited use of broadband internet, certain regulatory constraints, and the lack of digital competency. These challenges, however, can become opportunities for leapfrogging with careful emphasis on the right GenAI use cases.

2.4 Sustainable Competitive Advantage

Sustainable competitive advantage (SCA) is a firm's ability to gain and hold a superior performance compared to its rivals over time by means of resources and capabilities that are valuable, rare, inimitable, and non-substitutable (VRIN criteria). Modern definitions go beyond economic superiority to include "sustainable" environmental and social aspects in a triple bottom line sense of the word (Lu and Shaharudin 2024, Asa, Nautwima et al. 2026).

For SMEs, it has a significant consequence as it affects their ability to survive, grow and remain resilient in such a hyper-competitive and uncertain business environment. Despite the challenges posed by digital disruption, sustainability demands and globalization, SMEs with SCA can count on customers to keep their business, recruit talent, find financing and stand up to economic shocks. Digital technologies, especially GenAI, play a role in SCA, supporting dynamic capabilities and innovation (Sánchez-Rodríguez, García-Vidal et al. 2025).

There is literature that relates the adoption of AI, the capability for innovation, and the digital strategy to SCA. But most of the relationships are indirect and context-dependent. There is strong empirical support for mediated and moderated pathways, but the number of integrated models is underrepresented (Lu and Shaharudin 2024, Sohu, Shaikh et al. 2026).

The literature review indicates that there is significant evidence for individual relationship elements, with the positive effect of GenAI on innovation processes, innovation capability on performance, and the digital transformation strategy as an important enabler, all three resulting in a sustainable competitive advantage. However, to date, the full moderated-mediation model, which involves the combined effect of AI adoption in the moderate role of innovation capability as a mediator on sustainable competitive advantage in the perception of Bangladeshi SMEs, has not been tested in the empirical context. This gap exists especially in emerging economies where the outcomes of technology can be influenced by distinct institutional, infrastructural and cultural aspects. The purpose of the current study is to overcome these drawbacks and create an integrated framework to be empirically validated by Bangladeshi SMEs.

3. HYPOTHESIS DEVELOPMENT

This study investigates the effect of three AI-related capabilities—**AI Tool Adoption**, **Organizational AI Readiness**, and **AI-Driven Decision Making** on the Sustainable Competitive Advantage of Bangladeshi SMEs with Innovation Capability as a mediator. The proposed relationships are mainly supported by the **Resource-Based View (RBV)** and **Dynamic Capabilities Theory**. RBV looks for valuable, rare, difficult-to-imitate, and difficult-to-substitute resources and capabilities to achieve sustainable competitive advantage (Barney 1991). Enabling AI-related capabilities to be used effectively and as a part of organizational routines, decision-making systems, employee skills and innovation practices can make them critical strategic resources in a digital business context. Yet in the hands of competitors, these Artificial Intelligence tools will not improve the chances of long-term competitiveness. Companies need to know how to translate these knowns and learn to apply AI to concrete innovation results. Dynamic Capabilities Theory also suggests that the firm requires the ability to sense opportunities, seize opportunities and recombine resources to adapt to the changing market conditions (Teece, Pisano et al. 1997, Teece 2007). This is especially relevant to the case of SMEs in Bangladesh, as many of the SMEs lack sufficient finance and have limited skilled staff and tough competition in the market.

3.1 Independent Variables and Innovation Capability

3.1.1 AI Tool Adoption and Innovation Capability

AI Tool Adoption indicates how often SMEs actively employ AI-powered tools for their daily operations, employees, and departments to support their core operations. This can range from ChatGPT and Gemini to Claude, AI-powered automation systems, AI-assisted analytics, customer support bots, and other sophisticated AI applications. AI tools can help SMEs save time on manual tasks, facilitate quicker communication, help with creating content, enhance customer service, and also gather fresh ideas for employees. AI tools can offer cost-effective technology assistance to creativity and problem-solving for many SMEs, which lack large research and development divisions.

Past research indicates that applying generative AI capabilities can alleviate innovation challenges within organizations, such as enhancing knowledge creation and idea generation, speeding up experimentation, and providing decision support (Gan and Xiao 2025). AI tools can assist staff in brainstorming other options, providing an overview of topics, generating new content, and streamline current workflows. These activities involve a close relation with capability to produce and apply innovation since innovation relies on having useful new ideas. In SMEs, innovation does not necessarily refer to large-scale technological invention, but can also include new and better products and services, marketing strategies, customer relationship management (CRM) and internal operations. Thus, the process of active SME adoption of AI tools is more likely to enhance the capacity to innovate of SMEs.

But AI Tool Adoption relies much on how well the tools are utilized. The use of AI in a casual or experimental manner might yield limited results. However, when AI tools are incorporated into daily operations, they can be utilized to address issues, test concepts, and enhance the service provision. Recent research into the use of AI in SME reveals that using AI can lead to improved innovation-related outcomes if the firms can transform technological use into organizational learning and creativity in practice (Mikalef and Gupta 2021, Sánchez-Rodríguez, García-Vidal et al. 2025). Therefore, it is hypothesized that AI Tool Adoption will have a positive influence on Innovation Capability.

H1a: AI Tool Adoption has a positive effect on Innovation Capability in Bangladeshi SMEs.

3.1.2 Organizational AI Readiness and Innovation Capability

Organizational AI Readiness measures the level of leadership support, infrastructure, employee skills, training, and planning that an SME has to adopt and effectively utilise AI. There is a need for AI readiness as technology by itself does not add value. Technological tools for AI may be available to a company, but it can lead to nothing significant if it lacks managerial support, digital infrastructure, employee understanding, and the willingness to implement AI. For SMEs, this is even more critical to the question posed as they are likely to suffer from resource scarcity, have small IT offices and low levels of formal digital training.

With this type of organizational readiness, you can help your firm make the transition from technology adoption to technology utilization. Managers who facilitate AI adoption trigger an increased willingness to learn and adopt AI tools by employees. AI resources make it easier to adopt into business activities when companies offer training and infrastructure. The willingness to be ready forms a solid basis for innovation as employees are able to try and test new concepts, enhance their working processes, and react to market opportunities better. Previous studies indicate that, when combined with other organizational factors like leadership

commitment, employee capabilities, and technological readiness, AI resources can be more beneficial (Chatterjee, Rana et al. 2021, Mikalef and Gupta 2021).

Organizational readiness tends to be a key challenge in the implementation of AI in SMEs of emerging markets. While many companies are interested in AI, not all are sophisticated enough, with the necessary skills as well as operations and strategy, to put on the knowledge. The findings reveal that SME adoption cases suggest there are disparities in the level of AI adoption, partially because of the varying levels of digital literacy, managerial support, infrastructure and implementation capability (Sánchez-Rodríguez, García-Vidal et al. 2025). This means that SMEs with higher Organizational AI Readiness tend to leverage AI across the four areas: creating new products, optimizing processes, delivering innovative customer service, and making strategic changes. This indicates to have an immediate influence on Innovation Capability, which can be directly supported by AI readiness.

H1b: Organizational AI Readiness has a positive effect on Innovation Capability in Bangladeshi SMEs.

3.1.3 AI-Driven Decision Making and Innovation Capability

AI-Driven Decision Making involves making decisions or strategies based on insights derived from AI, data analysis, prediction, suggestion, and intelligent support systems. Many SMEs rely on experience, intuition and informal market knowledge for decision-making. While experience is good to have, it may not be sufficient in the dynamic and competitive business) environment. AI can assist in decision-making by examining consumer habits, patterns, trends and forecasting demand, comparing options, and making better-informed business choices.

Decision quality is a key component of Innovation capability. Businesses should have reliable and timely business data in order to find out market opportunities, determine customer requirements, select appropriate concepts and make improvements. AI-based decision-making should facilitate for SMEs the quick identification of opportunities and to lessen uncertainty in innovation-related decision-making. Generative AI enhances intelligent decision-making through abilities in reasoning, prediction, knowledge integration, and solution evaluation, as proposed by (Gan and Xiao 2025). Similarly, AI capability enables firms to process large amounts of information and turn data into innovation-oriented actions (Mikalef and Gupta 2021, Sánchez-Rodríguez, García-Vidal et al. 2025).

In the case of Bangladeshi SMEs, AI can make a huge difference as many of them are working with high level of uncertainty in the markets and lack advanced business intelligence systems. AI-driven tools can help SME managers make better-informed decisions regarding customers, product offerings, marketing, pricing, and operational management. These choices may help businesses innovate in the way

that they offer their products and services, enhance the old ones, and meet evolving customer needs. So it is believed that AI-Driven Decision Making has a positive impact on Innovation Capability.

H1c: AI-Driven Decision Making has a positive effect on Innovation Capability in Bangladeshi SMEs.

3.2 Innovation Capability and Sustainable Competitive Advantage

The ability of a firm to create new ideas, benefit products and services, promote creativity, and be quick in responding to the changes in the market is called Innovation Capability. It's a crucial ability for SMEs as they tend to work with a shoestring budget and are required to continuously adapt to survive. By having the capability to innovate, an SME can be differentiated from others, enhance the value to customers, reduce the inefficiency in operations and react faster to the competition's moves.

A Sustainable Competitive Advantage is an advantage that is retained over rivals over long period of time. According to the RBV, this advantage is based on factors that are difficult to be imitated by the other companies including resources or capabilities (Barney 1991). Innovation capability is constructed from organisational learning, employees' creativity, market understanding, and internal procedures, making it a strategic capability. Companies that have high innovation capability can create new products, better services, adapt the business model and retain customers.

Previous studies show that innovation capability is an important mechanism to convert digital and AI related resources into business performance (Gan and Xiao 2025, Sánchez-Rodríguez, García-Vidal et al. 2025). An innovative SME is more likely to create superior value and adjust to change in the market. The importance of innovation capability is also significantly highlighted in the context of Bangladeshi SMEs and their situation as they are strongly competitive and limited in resources while facing changing demand of their customers. As a result, it is expected that Innovation Capability will positively affect Sustainable Competitive Advantage.

H2: Innovation Capability has a positive effect on Sustainable Competitive Advantage in Bangladeshi SMEs.

3.3 Mediating Role of Innovation Capability

While AI capabilities can enhance firm performance, these technologies themselves may not guarantee a sustainable competitive advantage. While many SMEs will utilise AI tools, the competitive value can be limited if the SME cannot translate the use of AI tools into innovation. Hence, this study suggests that Innovation Capability is proposed as a mediated mechanism between AI-related capabilities and Sustainable Competitive Advantage. In this model, improving the firm's AI Innovation Capability through AI Tool Adoption,

Organizational AI Readiness, and AI-Driven Decision Making first leads to a better capability to innovate, and this later leads to long-term competitive advantage.

The mediation of Innovation Capability is in line with the Dynamic Capabilities Theory. According to this theory, an enterprise gains an advantage not just because it has resources but because it can be effective in its reconfiguration and use in changing environments (Teece 2007). Innovation Capability is about turning the capabilities of Artificial Intelligence into something that matters to the business. For instance, AI Tool Adoption might foster new ideas for employees, but Innovation Capability will be the key factor in applying and executing these concepts. Likewise, Organizational AI Readiness can make the firm ready for the use of AI; however, Innovation Capability can enable this readiness to better products, services, and processes. While AI-Driven Decision Making might offer enriching insights, Innovation Capability is more apt at delivering data that enables competitive actions.

Previous research has demonstrated the effect of AI and digital technologies on performance is mostly indirect via innovation, learning, and dynamism (Mikalef and Gupta 2021, Gan and Xiao 2025, Sánchez-Rodríguez, García-Vidal et al. 2025). This implies that the innovation capability is a link in the chain mapping AI-related resources onto sustainable competitive outcomes. The mediating effect is crucial in SMEs as it is not sufficient to simply acquire technology. In today's competitive landscape, SMEs need to leverage AI to drive innovation, streamline operations, and meet customer demands. Hence, this study's suggestion is that Innovation Capability is a mediator between each of the AI-related capabilities and Sustainable Competitive Advantage.

H3a: Innovation Capability mediates the relationship between AI Tool Adoption and Sustainable Competitive Advantage in Bangladeshi SMEs.

H3b: Innovation Capability mediates the relationship between Organizational AI Readiness and Sustainable Competitive Advantage in Bangladeshi SMEs.

H3c: Innovation Capability mediates the relationship between AI-Driven Decision Making and Sustainable Competitive Advantage in Bangladeshi SMEs.

Overall, the proposed hypotheses indicate that the capabilities related to AI affect mainly Sustainable Competitive Advantage through their positive impact on Innovation Capability. This framework is applicable for the Bangladeshi SMEs because it acknowledges that implementing AI is not enough, SMEs need to have the capability of AI-based resource-based innovation. Therefore, Innovation Capability is seen as a pivotal capability in how SMEs can convert their journey from AI Tool Adoption to Organizational AI Readiness to AI-Driven Decision Making into long-term competitive gains.

4. CONCEPTUAL FRAMEWORK

The conceptual framework outlines the relationships between various elements of AI-related capabilities, namely AI Tool Adoption, Organizations AI Readiness, and AI-Driven Decision Making, and their impact on Sustainable Competitive Advantage in SMEs in Bangladesh via Innovation Capability. AI Tool Adoption measures how much the firm is using AI tools in daily operations, Organizational AI Readiness evaluates the firm's readiness, leadership support, infrastructure, and employee capability to adopt AI, and AI-Driven Decision Making quantifies the adoption of firm AI insights in strategic and operational decision-making. It is believed that these three independent variables will be able to make Innovation Capability more responsive for SME's in generating new ideas, improving the product/services, designing more innovative solutions, and finding ways to respond to changes quickly. Similarly, it is expected that Innovation Capability will lead to the improvement of Sustainable Competitive Advantage through several factors, such as helping SMEs to offer better value to their customers, withstand competition, and ensure long-term business sustainability (Gan and Xiao 2025, Sánchez-Rodríguez, García-Vidal et al. 2025).

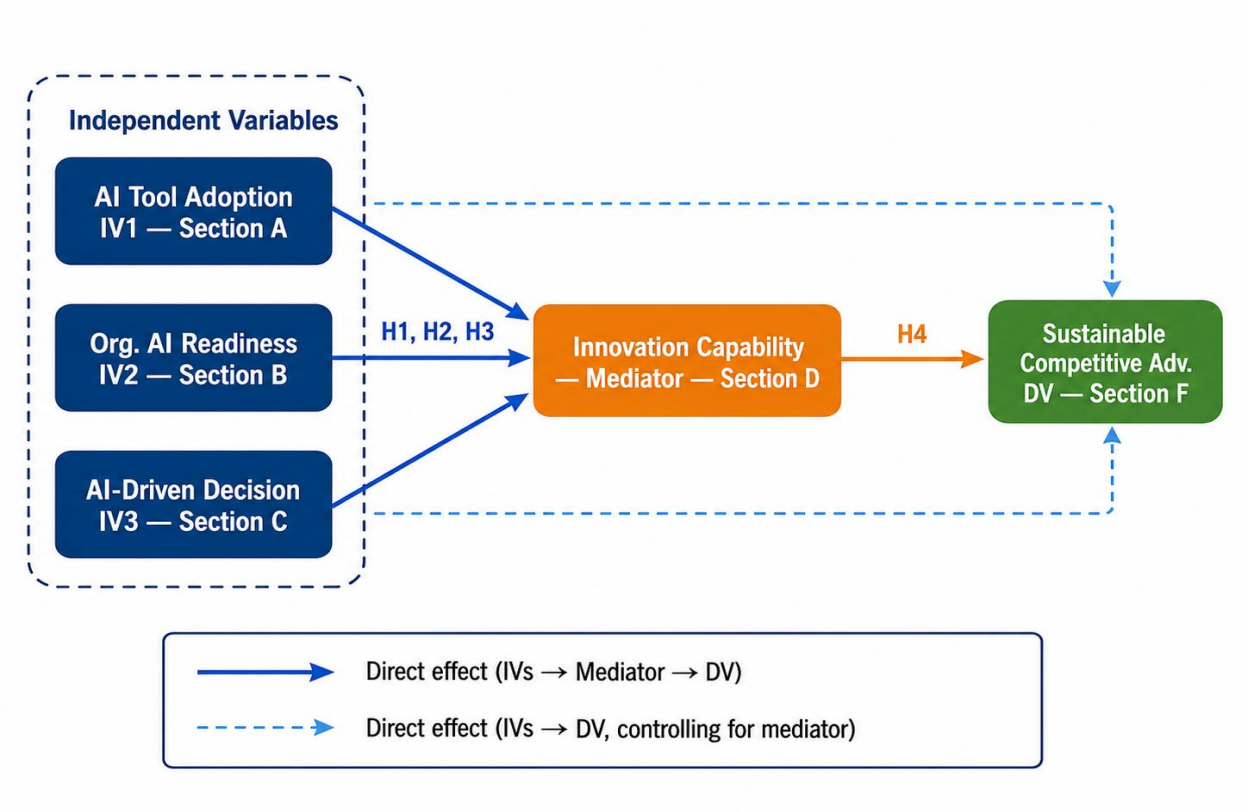

Figure 1 shows that AI-related capabilities influence Sustainable Competitive Advantage through Innovation Capability.

5. METHODOLOGY

5.1 Research Design

In this study, a quantitative type of research was conducted to find the association between an AI-related capability and a sustainable competitive advantage in Bangladeshi SMEs. This study required a quantitative approach in order to measure the degree of relationship between several variables by using numbers of the respondents, and to test specific hypotheses. When the purpose is to explore the relationship between constructs; when testing a conceptual framework; and when generalizing results of a sample to a larger population, quantitative research is appropriate (Creswell & Creswell, 2018). Given the focus of this study is on the impact of **AI Tool Adoption**, **Organizational AI Readiness** and **AI-Driven Decision Making** on **Sustainable Competitive Advantage**, through **Innovation Capability** a quantitative method was found to be most appropriate for the study.

A survey-based research approach was adopted in the study. The data has been collected from respondents (SMEs) through a structured questionnaire. Survey research is widely used in the field of business and management studies because it enables researchers to gather a uniform kind of response from a vast number of participants within a limited period of time. The survey method facilitated the information collection regarding the perception of SME respondents on usage of AI tools, preparedness level of their organizations in adopting AI, practices of AI based decision making, the level of innovation capability, and the competitive advantage. The survey technique helped to provide respondent uniformity and cross validity in the data set because all were given the same questioning.

This type of study was "**cross-sectional**" - this identifies the data taken at only one point in time. The cross-sectional design is appropriate for the purpose of examining existing organizational practices and for understanding the relationships between variables. This was fitting for the current study as its objective was to develop a perspective on the current state of capability regarding AI and its contribution to innovation and competitive advantage for Bangladeshi SMEs. While it does not allow to explain changes over time, the cross-sectional design is considered appropriate when the intent is to test a conceptual model through the use of survey data – as is commonly the case in management or information systems research (Hair, Hult et al. 2022).

This study's conceptual model was created by adopting the rationale that AI-related capabilities may not directly lead to sustainable competitive advantage unless these capabilities are translated to innovation capability. So this study consisted of Innovation Capability as an mediation variable. There were three independent variables: **AI Tool Adoption**, **Organizational AI Readiness**, and **AI-Driven Decision Making**. "**Improvement Capability**" was used as the mediating variable and Sustainable Competitive Advantage was used as the dependent variable. Digital Transformation Strategy has not been explicitly incorporated into the model as it is considered a simpler mediation framework.

5.2 Population Sample & Data Collection

The population of this study was the **small and medium business of Bangladesh**. The participants responding were those involved in SMEs such as owners, co-owners, managers, supervisors, executives, technology officers, and employees who knew information regarding their SME's uses of AI, innovation activities, and their SME's competitive position. These respondents were targeted as they were likely to provide relevant information regarding their firm's AI tool usage and the impact these tools have on innovation and competitiveness.

In the context of Bangladesh, SMEs are playing an important role in the economy; thus, the study focused on SMEs. SMEs are responsible for employment and entrepreneurship, local production and economic growth. However, they are often burdened with constraints like limited manpower of skilled professionals, low digital readiness and keen competition in the market, as well as a lack of economic resources. The difficulties mentioned bring the significance of studying the capability or whether the AI-related capabilities could be used as enablers in SMEs' innovation and sustainable competitive advantage. It is also important to study AI in the SME context, as there are many simple and accessible AI tools, for instance, ChatGPT, Gemini, automation software, AI based analytics applications that are now used by SMEs.

The data was gathered by an organized questionnaire. Both online and direct surveys were used to send a questionnaire to the respondents of the SMEs. Respondents were asked to answer the questionnaire as it concerns their organisation as today. A simple and easy to follow format was adopted for the questionnaire to make it easy to respond and understand the questions to anyone from varied business backgrounds. Prior to taking responses, the respondents were made aware of the reason for the study. The entire process was voluntary and the responses were only for academic research.

Finally, a sample of **118 SME respondents** was usable for this study. These responses were utilised in the last part of the analysis using the SmartPLS software. The study's sample size was determined to be appropriate for PLS-SEM, as a preferred technique for PLS-SEM is typically applied in the context of small to medium-sized samples, particularly for prediction and theory development purposes (Hair, Hult et al. 2022). PLS-SEM can also be used in models containing multiple constructs, direct relationships and for mediation analysis.

Together with the main research variables, a demographic background (information about the respondents characteristics and firm characteristics) was gathered in order to understand the profile of the respondents and the firms. The demographic section provided data like business role, size of the business, industry area, age of the business, annual revenue, location and the time they used AI. The main structural model did not include these demographic variables. These were used just for descriptive analysis, to present the background of respondents and SME context.

5.3 Measurement Scale

The The key constructs of the study were measured on a **five-point Likert scale**. The questions included response items on a continuum from **strongly disagree** to **strongly agree**. The Likert scale is a widely employed measurement tool in social science and management studies as it enables the respondents to indicate their extent of agreement with various statements (Joshi, Kale et al. 2015). The five-point scale was chosen for being easy and understandable; and applicable for people with varying educational and job backgrounds.
study used a **five-point Likert scale** to measure the main constructs. The response options ranged from **strongly disagree** to **strongly agree**. A Likert scale is commonly used in social science and management research because it allows respondents to express the degree of their agreement with different statements (Joshi, Kale et al. 2015). The five-point scale was selected because it is simple, easy to understand, and suitable for respondents from different educational and professional backgrounds.

The following scale was used in this study:
1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

Respondents' perceptions were translated into the numerical values by using this scale to statistical analysis. The study employed a SmartPLS-based data analysis tool, hence an evaluation of all the items in the questionnaires needed a numeric answer.

Multiple items were used to measure each construct. It is preferable to measure by multiple items as some concepts in the original article, like AI adoption, innovation capability and competitive advantage, are complex and should not be measured by only one question. For instance, AI Tool Adoption was assessed using items on usage of AI for day-to-day tasks, within the department, with employees, internal processes, and for increased usage of AI. Likewise, Innovation Capability was assessed with items from the concepts of new ideas, improvement of products and services, creativity, market adjustment, and innovation strategy.

The use of multiple items also was helpful for evaluating reliability and validity of the measurement model. Reliability refers to the consistency of the items while validity refers to the items' correctness in measuring the construct. In this study, Cronbach's alpha, the composite reliability, the Average Variance Extracted, Fornell-Larcker criterion, and HTMT ratio were used to test the SmartPLS for reliability and validity, while outer loadings were also employed.

5.4 Variables & Items

Five major constructs were included in this study namely **AI Tool Adoption**, **Organisation AI Readiness**, **AI-Driven Decision Making**, **Innovation Capability**, and **Sustainable Competitive Advantage**. All the constructs were considered as reflective constructs as the items were assumed to capture the underlying concept. Reflective measurement should be used when indicators are assumed to be indicators of the same underlying construct (latent variable); they should also likely be correlated (Hair et al., 2022).

AI Tool Adoption: The level of utilization of AI-based tools in SMEs' day-to-day business operations. This acronym emphasizes hands-on implementation of AI technologies, like ChatGPT, automation software, AI-enabled systems, and other smart applications. It gauges the adoption of AI resources each day, between departments, amongst workers, and in the fundamental enterprise. Items comprising this construct were coded: **ATA1, ATA2, ATA3, ATA4, and ATA5**.

Organizational AI Readiness is the readiness of an SME in the integration and effective use of AI. Shaping data: It encompasses leadership buy-in, AI-planning tools, technological structure, employee training, and organization readiness. But this construct has significance as it is not access to AI tools that leads to successful AI implementation. There must be internal resources within the organization to effectively implement AI. This construct was coded as **OAIR1, OAIR2, OAIR3, OAIR4 and OAIR5**.

AI-Driven Decision Making is the concept of utilizing AI insights, AI data analysis, AI forecasting and AI recommendations to make informed business decisions. This construct assesses how SMEs employ AI for analyzing their business data, strategic planning, predicting customer or market behaviour, decision-making speed and accuracy, and fostering data-driven decision-making. This construct was coded as: **AIDM1, AIDM2, AIDM3, AIDM4, and AIDM5**.

Innovation Capability indicates the capacity of SMEs to develop new ideas, introduce improvements in products or services, promote creativity, respond to market changes and incorporate innovation into business strategy. Innovation Capability was used as the mediating variable in this study. It clarifies ways that AI-related capabilities can result in a sustainable competitive advantage. Coded items on this construct were labelled **IC1, IC2, IC3, IC4 and IC5**.

Sustainable Competitive Advantage is the sustained capability of the SMEs to continue performing well, delivering better value to customers, having sustainable growth and a steady market position and responding to a competitive environment. With regard to the study, this construct was considered a dependent variable. This construct was labelled **SCA1, SCA2, SCA3, SCA4 and SCA5**

The last research model captures the intentions of examining if AI Tool Adoption, Organizational AI Readiness and AI-Driven Decision Making affect Innovation Capability, with Innovation Capability affecting Sustainable Competitive Advantage. Therefore, the SmartPLS model was extended with direct connections of the AI-related variables to Sustainable Competitive Advantage to ensure testing the mediation appropriately.

5.5 Data Analysis Technique

Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze the collected data by using SmartPLS software. The reasons for the choice of PLS-SEM are as follows: PLS-SEM is appropriate for prediction-oriented research, mediation analysis, and for models with multiple latent constructs. It also can be used in studies involving sample sizes that are relatively small to medium and does not demand strict normality (Hair, Risher et al. 2019, Hair, Hult et al. 2022). PLS-SEM was chosen to analyze the data in this study, because the study wanted to explore both direct and indirect links among AI related capabilities and between AI related capabilities and innovation capability, as well as between AI related capabilities and sustainable competitive advantage.

Data analysis was done in two steps. First, the **measurement model** was analysed to check for the reliability and validity of the constructs. Second, the **structural model** is evaluated to examine and test the presumed relationship between the constructs included in the model. This two-step approach is suggested because it is important to ensure that the measurement model is of good quality before interpreting the structural (Hair, Hult et al. 2022).

With the measurement model, reliability of indicators was considered through outer loadings. Measures for outer loading indicate how much each item represents the construct. Loadings above 0.70 consider to be ideal, those between 0.60 and 0.70 may be retained if reliability and validity of the construct considered satisfactory as a whole. So, it was not only considered which value load an item loaded into, but also measurement quality.

Cronbach's alpha and **Composite Reliability** were used to measure the internal consistency reliability. Cronbach's alpha is frequently used to investigate the relationships between the items of a construct. In addition, Composite Reliability in PLS-SEM is relevant since it also takes into account the actual contribution of each indicator. Scatter plots with values over 0.70 are considered acceptable for both values (Nunnally and Bernstein 1994, Hair, Hult et al. 2022).

Average Variance Extracted (AVE) was used to measure the convergent validity, which indicates the extent to which a construct explains variance of the observed scores. The acceptable convergent validity is labeled by the AVE value of more than 0.5, where the construct explains more than 50% of the variance of the indicators. In order to measure the validity of the discriminant, the Fornell-Larcker Doctrine and the Heterotrait-Monotrait

ratio (HTMT) were applied. The Fornell-Larcker criterion examines the relationship of each construct with its own items with the relationships between each construct with the other constructs. An alternative, more recent and proposed way of testing discriminant validity is HTMT with values below 0.85 or 0.90 being considered acceptable (Henseler, Ringle et al. 2015).

Once the measurement model was demonstrated, the structural model was then evaluated. The structural model analyzed the direct paths between the variables of AI Tool Adoption, Organizational AI Readiness, AI-Driven Decision Making, and Innovation Capability. It also investigated the impact of Innovation Capability on Sustainable Competitive Advantage. The direct effects of the three AI-related variables on Sustainable Competitive Advantage were also studied, which helps to test for mediation.

However, collinearity was tested by the Variance Inflation Factor or VIF before analyzing the path relationships. To make sure that the predictor constructs were not highly overlapping with one another, VIF was used. VIF values below 5 indicate that multicollinearity is not a serious problem, with values below this preferable. Path coefficients were explored after confirming collinearity in order to examine the direction and strength of relationships between the constructs.

We tested the significance of the path coefficients with the bootstrapping in the SmartPLS software. Re-sampling method to estimate relationships' significance in PLS-SEM is called bootstrapping. It gives t-value and p-value to determine each hypothesis. Statistically significant relationships were found using the criterion of $P < 0.05$ in this study.

The explanatory power associated with the model was compared according to **coefficient of determination** (R-square). R-square indicates the amount of variance explained in an endogenous construct by the predictor constructs. In this study, R-square values were calculated to find the amount of explained variance of Innovation Capability with Innovation AI Tool Adoption, Innovation Organizational AI Readiness, and Innovation AI-Driven Decision Making. It was also used to see what proportion of Sustainable Competitive Advantage was explained by the AI-related variables and Innovation Capability.

Finally, mediation analysis was performed to analyse whether **Innovation Capability** is a mediators for the relation between AI related capabilities and Sustainable Competitive Advantage. SmartPLS bootstrapping was used to test the individual indirect effects. Mediation analysis was tested to determine if the relationship between AI Tool Adoption and Sustainable Competitive Advantage, as well as the relationship between Organizational AI Readiness and Sustainable Competitive Advantage are mediated by Innovation Capability. When the indirect path proved statistically significant, it meant there was a mediation effect of Innovation Capability.

Overall the researcher considered that the method of SmartPLS was suitable for this research, as by using SmartPLS, the researcher could analyze the reliability, validity, direct

effect, indirect effect, and amount of explained variation in a single model. The method was helpful to understand the contribution of AI based capabilities toward Innovation Capability and Sustainable Competitive Advantage of Bangladeshi SMEs systematically.

6. DATA ANALYSIS AND RESULTS

The statistical analysis and results of the study are presented in this chapter. 118 useful SME responses were finally obtained. Since the research model comprised multiple latent constructs and was used to observe both direct and indirect relationships, Partial Least Squares Structural Equation Modeling (PLS-SEM) and SmartPLS software have been used for data analysis. The analysis took place in three stages. To summarize the demographic profile of respondents, both the frequency and percentage were utilized. Second, the indicator reliability, internal consistency reliability, convergent validity and discriminant validity were analyzed for the measurement model. Finally, the structural model was assessed to test the hypothesized relationships among AI Tool Adoption, Organizational AI Readiness, AI-Driven Decision Making, Innovation Capability and Sustainable Competitive Advantage.

6.1 Demographic Profile

Out of the 118 useable and final questionnaires, most of the respondents were owners/co-owners of SMEs. This shows that the sources of the responses were primarily those individuals who are directly involved in business decision-making and daily business activity. The majority of the companies involved in the study were micro companies, followed by medium and small companies. Such a structure is found in the SME context of Bangladesh, where many enterprises have few workers and even limited organizational resources. A sectoral distribution indicates that the respondents are from diverse sectors like retail and trading, fashion and garments, food and beverage, education, IT services and manufacturing. This diversity enhances the relevance of the sample as the adoption of AI and the adoption of innovation behavior can differ by industry.

In regard to the age of the firms, majority of firms had less than 3 years experience implying that sample required had majority of young and growing SMEs. The annual revenue profile also indicates that majority of the firms were below BDT 10 Lacs indicating that the sample was predominantly composed of resource-less companies. As far as locations are concerned, Dhaka occupied the most important place followed by other cities like Rajshahi, Sylhet and Chittagong. Lastly, the duration of use among the various SMEs revealed that most of the SMEs were using Generative AI tools for less than one year, suggesting that the adoption of AI tools by the various SMEs was still at its early or developing stage. Table 6.1 presents findings of the respondents' demographic characteristics

Table 6.1: Demographic Profile of Respondents

Constructs	Characteristics	Frequency	%
Role in business	Owner / Co-owner	98	83.1
	Other	15	12.7
	Department Head / Supervisor	3	2.5
	IT / Technology Officer	2	1.7
Business size	Micro Enterprise (1–9 employees)	95	80.5
	Medium Enterprise (50–249 employees)	13	11
	Small Enterprise (10–49 employees)	10	8.5
Industry/Sector	Other	32	27.1
	Retail & Trading	28	23.7
	Fashion & Garments / RMG	16	13.6
	Food & Beverage	11	9.3
	Education & Training	10	8.5
	IT & Technology Services	9	7.6
	Manufacturing	8	6.8
	Financial Services / Fintech	4	3.4
Business age	Less than 1 year	46	39
	1–3 years	46	39
	4–7 years	19	16.1
	8–15 years	5	4.2
	More than 15 years	2	1.7
Annual revenue	Below 10 lakh	88	74.6
	10 lakh – 50 lakh	16	13.6
	1 crore – 5 crore	10	8.5
	Above 5 crore	3	2.5
	51 lakh – 1 crore	1	0.8
Location	Dhaka	87	73.7
	Other	13	11
	Rajshahi	9	7.6
	Sylhet	5	4.2
	Chittagong	4	3.4
AI usage duration	6–12 months	51	43.2
	Less than 6 months	37	31.4
	1–2 years	19	16.1
	More than 2 years	11	9.3

Besides the overall demographic snapshots, the outgrowth assessed which Generative AI tools business respondents employed. This was a multiple-response item, so the

percentages listed for each tool refer to the number of the 118 SME's who checked the specific tool. The most popular tools were ChatGPT, Google Gemini, Canva AI and Claude. This suggests that the majority of SMEs are currently leveraging low-complexity and inexpensive AI solutions, instead of enterprise-grade, highly tailored solutions.

Table 6.2: Generative AI Tools Used by SMEs

AI tool used	Frequency	% of sample
ChatGPT (OpenAI)	98	83.1
Google Gemini	56	47.5
Canva AI	53	44.9
Claude	43	36.4
Other	17	14.4
Midjourney / DALL-E (Image Generation)	7	5.9
Jasper / Copy.ai (Content Writing)	3	2.5
Microsoft Copilot	1	0.8

Note: *Multiple responses were allowed; therefore, percentages do not total 100%.*

6.2 Measurement Model Assessment

According to the PLS-SEM guidelines proposed by (Hair, Risher et al. 2019), this study followed the steps proposed to evaluate the measurement model. Indicator reliability, internal consistency reliability, convergent validity and discriminant validity were used to evaluate the reflective measurement model. Factor loadings were used to check the reliability of indicators. Generally, factor loading of 0.708 and above is recommended but slight lower value may be retained if the results on consistency of the construct and AVE is accurate. ATA2 and IC5 were excluded from the final measurement model because their omission of the model helped to clarify and give increased model credibility. Other indicators had acceptable loadings that ranged between 0.706–0.926. Therefore, the reliability of the measurement model is proven.

Table 6.3: Indicator Reliability and Collinearity Statistics

Constructs and items	Code	Mean	SD	Skew.	Kurt.	FL	VIF
AI Tool Adoption (ATA)	ATA1	3.627	1.148	-0.521	-0.642	0.908	2.212
	ATA3	3.22	1.201	-0.108	-0.881	0.826	2.039
	ATA4	2.661	1.166	0.139	-0.836	0.706	1.544
	ATA5	3.271	1.376	-0.343	-1.109	0.774	1.78
Organizational AI Readiness (OAIR)	OAIR1	3.814	1.282	-0.989	-0.051	0.842	2.332
	OAIR2	3.873	1.124	-0.979	0.28	0.864	2.589
	OAIR3	3.568	1.238	-0.537	-0.797	0.89	3.141
	OAIR4	3.449	1.312	-0.515	-0.92	0.839	2.518

	OAIR5	3.932	1.177	-1.131	0.486	0.895	3.073
AI-Driven Decision Making (AIDM)	AIDM1	3.28	1.192	-0.103	-0.819	0.855	2.608
	AIDM2	3.186	1.186	0.095	-1.085	0.888	3.35
	AIDM3	3.398	1.051	-0.016	-0.717	0.817	2.202
	AIDM4	3.169	1.099	-0.033	-0.579	0.825	3.235
	AIDM5	2.907	1.2	-0.027	-0.606	0.782	2.736
Innovation Capability (IC)	IC1	3.636	1.226	-0.724	-0.294	0.86	2.534
	IC2	3.873	1.116	-0.855	-0.117	0.894	2.87
	IC3	3.746	1.209	-0.839	-0.056	0.926	3.693
	IC4	3.831	1.011	-0.499	-0.417	0.838	2.532
Sustainable Competitive Advantage (SCA)	SCA1	3.314	1.047	-1.019	0.412	0.827	2.456
	SCA2	3.653	1.203	-0.75	-0.222	0.868	2.751
	SCA3	3.636	1.102	-0.812	0.172	0.81	2.292
	SCA4	3.28	0.938	-0.09	-0.319	0.776	1.785
	SCA5	3.517	1.064	-0.858	0.318	0.884	3.003

Note: *SD = Standard Deviation; Skew. = Skewness; Kurt. = Excess Kurtosis; FL = Factor Loading; VIF = Variance Inflation Factor.*

Cronbach's alpha, rho_A and composite reliability were employed to measure internal consistency reliability. All Cronbach's alpha indicated that the parameters had values greater than 0.70 (Table 6.4) which is the acceptable value. Also, all composite reliability values (improved reliabilities) exceeded 0.70 with a range of 0.881 to 0.938. The results validate the internal consistency of the items in each construct and show that the items reliably assess their respective latent variables. The Average Variance Extracted (AVE) was used to determine the convergent validity. All the AVE values were greater than the recommended minimum value of 0.50 (with a minimum value of 0.651 and a maximum value of 0.775). Thus, more than half of the variance of the indicators is explained by the constructs, and this criterion converges to the validity of the constructs.

Table 6.4: Construct Reliability and Validity

Construct	Cronbach's Alpha	rho_A	Composite Reliability	AVE	R^2	Q^2
AI Tool Adoption	0.825	0.931	0.881	0.651		
AI-Driven Decision Making	0.893	0.920	0.919	0.696		
Innovation Capability	0.903	0.915	0.932	0.775	0.673	0.558
Organizational AI Readiness	0.917	0.922	0.938	0.751		
Sustainable Competitive Advantage	0.890	0.893	0.919	0.696	0.741	0.463

Note: *AVE = Average Variance Extrated; R^2 and Q^2 are reported only for endogenous constructs.*

Discriminant validity was tested using the Heterotrait-Monotrait Ratio (HTMT) and the Fornell-Larcker criterion. A value of the square root of AVE for each construct should exceed its correlation with the other constructs per the Fornell-Larcker criterion. As

indicated in Table 6.5, the off-diagonal values did not seem to be very high except for the diagonal ones. Further, the commonly adopted conservative (0.90) and liberal (0.95) HTMT thresholds were also used. While most HTMT values range below 0.90, the maximum value (0.936) is between Innovation Capability and Sustainable Competitive Advantage, which is still under the 0.95 limit value. Thus, it was concluded that the discriminant validity was acceptable for this study.

Table 6.5: Discriminant Validity: Fornell-Larcker Criterion

Construct	AI Tool Adoption	AI-Driven Decision Making	Innovation Capability	Organizational AI Readiness	Sustainable Competitive Advantage
AI Tool Adoption	0.807				
AI-Driven Decision Making	0.483	0.834			
Innovation Capability	0.619	0.522	0.880		
Organizational AI Readiness	0.644	0.467	0.797	0.866	
Sustainable Competitive Advantage	0.604	0.524	0.845	0.751	0.834

Note: *Diagonal values represent the square root of AVE.*

Table 6.6: Discriminant Validity: HTMT Ratio

Construct	AI Tool Adoption	AI-Driven Decision Making	Innovation Capability	Organizational AI Readiness	Sustainable Competitive Advantage
AI Tool Adoption					
AI-Driven Decision Making	0.535				
Innovation Capability	0.656	0.552			
Organizational AI Readiness	0.705	0.485	0.863		
Sustainable Competitive Advantage	0.646	0.562	0.936	0.824	

Note: *HTMT values below 0.90 are preferred; values below 0.95 are considered acceptable in many PLS-SEM applications.*

Figure 6.1: Final PLS-SEM Model

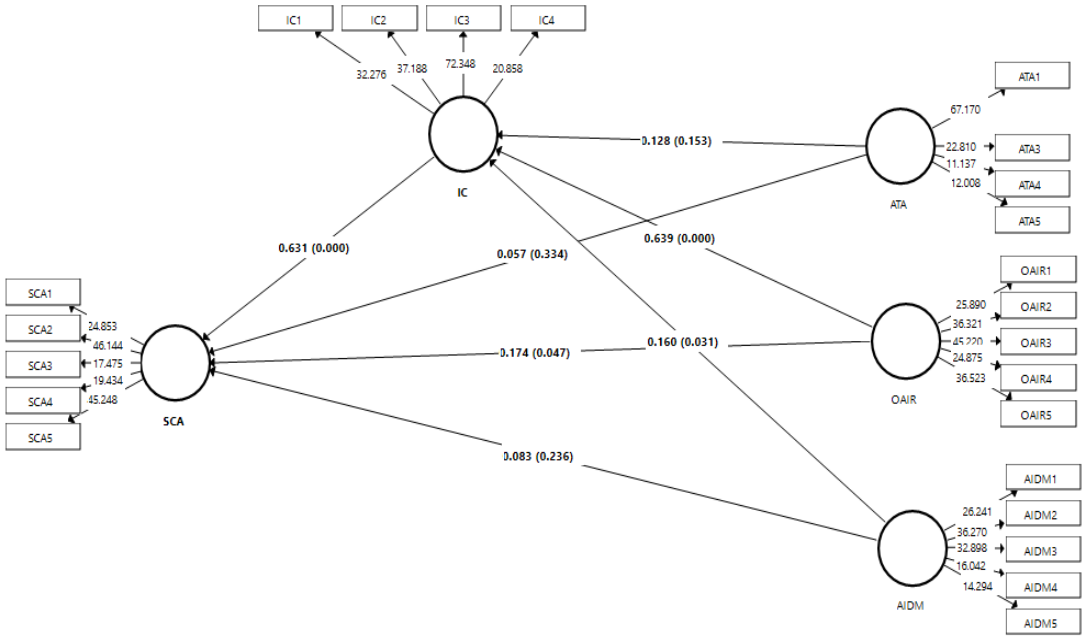

Figure 2: The model shows the retained indicators, path coefficients and R^2 values for the endogenous constructs.

6.3 Structural Model Assessment

Once the second phase, which involved measuring the adequacy of the measurement model, was accomplished, the second phase was examined and this involved testing the structural model. Results that were examined included the coefficient of determination (R^2), predictive relevance (Q^2), path coefficients, t-statistics and p-values estimated with the bootstrapping procedure. The R squared value for Innovation Capability was 0.673, signifying that 67.3% of the variance in Innovation Capability was accounted for by the 3 scale items we set as control variables: AI Tool Adoption, Organizational AI Readiness and AI-Driven Decision Making. Figure 6 shows that the R^2 value of Sustainable Competitive Advantage is 0.741, meaning that 74.1% of the variance of the Sustainable Competitive Advantage is accounted for by the predictors. The results indicate that the model is largely explaining in the context of Bangladeshi SMEs.

The Q^2 values were used to follow up with predictive relevance examining. The Q2 values for Innovation Capability and Sustainable Competitive Advantage were 0.558 and 0.463, respectively. Both values were positive, which indicates the model's predictive relevance. This implies meaningful predictive power of the independent constructs towards the endogenous constructs. The overall result points to the fact that both R2 and Q2 values

show that the proposed model is statistically meaningful in explaining the contribution of AI related capabilities towards innovation and SCA.

Table 6.7: Structural Model Results and Hypothesis Testing

Hypothesis	Relationship	β	T-value	P-value	Decision
H1a	AI Tool Adoption -> Innovation Capability	0.128	1.499	0.134	Not supported
H1b	Organizational AI Readiness -> Innovation Capability	0.639	9.105	0.000	Supported
H1c	AI-Driven Decision Making -> Innovation Capability	0.160	2.198	0.028	Supported
H2	Innovation Capability -> Sustainable Competitive Advantage	0.631	8.389	0.000	Supported
H3a	AI Tool Adoption -> Sustainable Competitive Advantage	0.057	0.939	0.348	Not supported
H3b	Organizational AI Readiness -> Sustainable Competitive Advantage	0.174	1.989	0.047	Supported
H3c	AI-Driven Decision Making -> Sustainable Competitive Advantage	0.083	1.182	0.238	Not supported

Note: *Significance decision is based on $p < 0.05$.*

The results indicate that Organizational AI Readiness had a significantly strong positive influence on Innovation Capability ($\beta = 0.639$, $t = 9.105$, $p < 0.001$). This result confirms that SMEs that possess greater AI leadership support, infrastructure and employee readiness stand a higher chance of improving their innovation capability. AI-Driven Decision Making also showed a significant positive impact on Innovation Capability ($\beta = 0.160$, $t = 2.198$, $p = 0.028$), indicating that utilising AI data-driven suggestions could aid in innovation-related activity. Also, there was no direct significant relationship between AI Tool Adoption and Innovation Capability at the 5% level ($\beta = 0.128$, $t = 1.499$, $p = 0.134$). It also indicates that adopting AI technologies alone may not improve innovation if SMEs do not learn to become ready and make decisions.

The beta coefficient value for Innovation Capability was strong and there was a significant positive relationship (8.389, $p < 0.001$) with Sustainable Competitive Advantage. It is one of the key findings of the study and underpins the main argument that innovation capability will be a mechanism that SMEs can use to secure their long-term competitive strength. For the direct effects on Sustainable Competitive Advantage, the Organizational AI Readiness proved significant ($\beta = 0.174$, $t = 1.989$, $p = 0.047$), whereas the other variables (AI Tool Adoption, AI-Driven Decision Making) were not significant at the 5% level. This indicates that the impact of organizational readiness is both direct and indirect with strategic value, whereas AI tools and AI decision practices seem to have mostly indirect strategic value through innovation capability and total effects.

6.4 Mediation and Total Effects

Specific indirect effects through Innovation Capability were used for examining the mediation analysis. As seen in Table 6.8, the indirect effect of Organizational AI Readiness on Sustainable Competitive Advantage via Innovation Capability was positive and significant (β = 0.403, t = 6.104, p-value <0.001). This validates that Innovation Capability is in the middle of the Organizational AI Readiness and Sustainable Competitive Advantage. Likewise, the indirect path existing among AI-Driven Decision Making and Sustainable Competitive Advantage via Innovation Capability also held significant (β = 0.101, t = 2.193, p = 0.029). This means that AI-based decision-making can lead to the enhancement of the competitive advantage by increasing the capability for innovation. The indirect effect of AI Tool Adoption on Emphasizing Innovation – Innovation Capability, however, was not significant (β = 0.081, t = 1.435, p = 0.152).

Total effects reveal a general overview of the overall influence of the predictors on Sustainable Competitive Advantage. The overall impact of Organizational AI Readiness on Sustainable Competitive Advantage was found to be significant (β = 0.576, t = 7.562, p<0.001). Although its direct effect was not significant, the total effect of AI-Driven Decision Making was significant (β = 0.184, t = 2.465, p = 0.014). This suggests that AI-enabled decision-making is a key driver of competitive advantage primarily related to innovation capability. The total effect of AI Tool Adoption was positive but not significant at the 5% level (β = 0.138, t = 1.705, p = 0.089). As such, findings show that in this sample, skills are not equally strong predictors; organizational readiness and AI-driven decision-making are more impactful than the mere use of AI tools.

Table 6.8: Total Effects on Sustainable Competitive Advantage

Total effect	β	T-value	P-value	Decision
AI Tool Adoption -> Sustainable Competitive Advantage	0.138	1.705	0.089	Not significant
Organizational AI Readiness -> Sustainable Competitive Advantage	0.576	7.562	0.000	Significant
AI-Driven Decision Making -> Sustainable Competitive Advantage	0.184	2.465	0.014	Significant

Note: *Total effects combine direct and indirect effects.*

6.5 Summary of Findings

The findings of all the tests offer substantive support for the proposed model in general. The measurement model met the important criteria for reliability and validity. An R^2 of more than 60% indicated that the model had explained a good amount of variation in both Innovation Capability and Sustainable Competitive Advantage. Organizational AI Readiness proved to be the greatest indicator of Innovation Capability in the structural model and

had an additionally significant direct effect on Sustainable Competitive Advantage. Innovation Capability proved to be another good predictor of Sustainable Competitive Advantage, confirming its centrality in the model.

The results imply that the mere implementation of AI applications should not be the sole focus of Bangladeshi SMEs. They must be organizationally prepared and have employees who are ready, and management that supports the use of AI and the implementation of AI-supported decision-making practices in order to achieve innovation outcomes through the use of AI. The big, practical implication is that sustainable competitive advantage can be realised when the learning potential of AI-related capabilities becomes the capability to innovate. Thus, the study validates the central role of Innovation Capability as an indispensable link between AI-related capabilities and the future competitiveness of SMEs.

7. DISCUSSION

This chapter presents major findings of the study by analyzing the results and comparing them with previous studies and explaining the reasons of this result in the context of Bangladeshi SMEs. Thus, this research aimed to investigate the impact of **AI Tool Adoption**, **Organizational AI Readiness**, and **AI-Driven Decision Making** on **Sustainable Competitive Advantage**, using **Innovation Capability** as a mediator. The results overall suggest that the capabilities related to AI explain a considerable part of the variance in Innovation Capability and Sustainable Competitive Advantage. This indicates that AI is turning into an essential strategic challenge for SMEs, since the appropriateness of AI-related practices fostering innovation hinges on how this innovation is created inside firms.

The results demonstrate that Organizational AI Readiness has a good positive influence on Innovation Capability. This indicates that the SMEs with a higher level of leadership support, employee skills, technological infrastructure, and planning for adoptability of AI will be more able to create new ideas, enhance products and services, and adjust to changes in the marketplace. The findings confirm that innovation is not necessarily a function of technology per se, but depends on the degree of preparedness of a firm and its ability to absorb technology. This confirms earlier research which found that AI-related resources were beneficial when coupled with organizational competencies, employee abilities and strategic readiness (Chatterjee, Rana et al. 2021, Mikalef and Gupta 2021, Sánchez-Rodríguez, García-Vidal et al. 2025). This outcome in the Bangladeshi SME context is reasonable since many of the SMEs have not yet reached the level of full digital infrastructure, skilled employees and AI implementation planning strategies. As a result, the better a company is set up for implementing AI, the more opportunities it opens up for them.

Finally, AI Tool Adoption is also positively correlated with Innovation Capability but has a smaller impact than Organizational AI Readiness. This suggests the possibility of leveraging advanced AI-powered tools like ChatGPT, automated systems, and dashboards for generating ideas, problem-solving, and enhancing creativity within the operations of SMEs. This

discovery dovetails with the ideas of those who stated that AI can aid innovation by enhancing knowledge creation, swift experimentation, and solution development. But the relatively weaker impact indicates that it's not sufficient to only implement AI tools. Some SMEs might be using AI in a very basic or experimental way, such as writing content, automating communication, or using AI in simple situations, without being embedded in innovation activities. So, AI Tool Adoption is key for driving innovation, and its effectiveness is enhanced by the presence of suitable readiness, skills, and implementation support within the organization.

By contrast, AI-Driven Decision Making has a weak and insignificant impact on Innovation Capability. Such a finding implies that a substantial number of SMEs in Bangladesh might not be leveraging AI-generated insights to a great extent in strategic or innovation-oriented decisions. While AI can assist in data analysis, forecasting, and accuracy in decision-making, SME owner-managers may be relying on their intuition, experience, and informal market knowledge. This discovery can be accounted for with the little information that many SMEs have to deal with their data and maturity. Quality data, analytical skills, and trust in AI-generated insights are needed for AI-driven decision-making. Without the conditions, there is a possibility that AI-based decision support has no significant impact on innovation capability. This is also in line with research that indicates that the benefits of AI implementation for performance and innovation cannot simply be assumed, as many businesses lack complementary skills and an approach to the integration mechanism (Abdul Wahab and Radmehr 2024, Rahmani, Kasmo et al. 2026).

A significant discovery is that the impact of **Innovation Capability on Sustainable Competitive Advantage** is positive and strong. One of the strongest findings of the study, which supports the main principle of the research. The SMEs who could innovate and develop new ideas, who would improve the products or services, promote creativity, and adapt to market changes would be more competitive advantage for longtime. This finding is consistent with the Resource-Based View of sustainable competitive advantage, which suggests that valuable, hard-to-imitate resources or capabilities are important for sustainable competitive advantage (Barney 1991). Innovation capability can turn into a capability if it is built up by internal knowledge, employee creativity, market experiences, and organizational learning. The result is also in line with earlier studies that reveal that with innovation capability, SMEs can increase their performance, customer value, adaptability, and competitiveness (Lu and Shaharudin 2024, Gan and Xiao 2025, Sánchez-Rodríguez, García-Vidal et al. 2025).

The direct impact effects of the capabilities related to AI on Sustainable Competitive Advantage do not seem to be as strong as the impact via Innovation Capability. It does not necessarily imply that AI adaptation just by itself must achieve direct competitive advantages, AI readiness and AI-based decision making. Rather, their meaning becomes apparent when they contribute to enhancing the firm's innovation capability. This helps to support the mediation logic of the study. An SME can use AI tools but potentially not gain a sustainable competitive advantage if those tools do not assist them to deliver better products, services, or rectify inefficiencies, or respond faster to customer demands. Innovation Capability is,

thus, the important mechanism that provides the connection between AI-related resources and competitive outcomes.

It seems that the most impactful variable is Organizational AI Readiness among the variables related to AI. It is a significant discovery for the SMEs of Bangladesh. It means that SMEs should prepare themselves internally before considering the benefits of working with AI. This encompasses management backing, staff education, foundational digital systems, the inclination to modify, and a comprehension of the part AI can play in helping fulfil company objectives. The lack of these factors can stop the use of AI or limit it to basic functions. This is the reason why companies are implementing AI with no significant boost in their performance. Problems are not so much with the technology; often, problems lie with the lack of readiness to be able to use it strategically.

One explanation for the lesser role or insignificance of AI-Driven Decision Making might also be the early stage of AI adoption among the SMEs in Bangladesh. Not all SMEs are proficient in AI use and may lack any sort of data structure systems. AI-driven decision-making relies on data quality and analytics capabilities, which means that if your data management is poor, SMEs may not be able to take strong advantage of AI-based decision-making. However, this does not indicate that the application of AI in decision-making is inconsequential. Instead, it proposes that its impact can intensify in the future as SMEs mature and go digital, transforming to more data-driven businesses.

The result sheds light on the fact that, despite the importance of AI-related capabilities for SME competitiveness, their impact does not happen naturally. The results indicate that AI can confer competitive advantage primarily through improved Innovation Capability. This conclusion aligns with Dynamic Capabilities Theory, which states that firms need to reconfigure and effectively deploy resources in order to gain a competitive advantage (Teece 2007). The main takeaway for Bangladeshi SMEs is that AI should be viewed not just as a technological solution. It should be used in association with a wider innovation process that includes employee learning, managerial support, experimentation and continuous improvement. The study thus contributes to the literature by providing evidence that Innovation Capability is a pivotal element linking AI-related capabilities and Sustainable Competitive Advantage in Bangladeshi SMEs.

8. CONCLUSION & IMPLICATIONS

8.1 Conclusion

This study was based on the theory of Artificial Intelligence **AI Tool Adoption**, **Organizational AI Readiness** and **AI-Driven Decision Making (ADDM)** on **Sustainability Competitive Advantage (SCA)** in the context of Bangladeshi SMEs with **Innovation Capability** as the mediating variable. The overall aim of this was to grasp whether there is a positive effect of the AI-related capabilities on SMEs obtaining long-term competitive advantages, and whether this relationship is mediated by innovation capability.

It is concluded that AI-related capabilities play a crucial role in building SMEs' innovation capability. In terms of independent variables, **Organizational AI Readiness** emerged as a prominent one that influences innovation capability. This means that SMEs equipped with AI capabilities and oriented at the adoption of AI, backed by appropriate leadership support and employee skills, and provided with sufficient infrastructure and preparation, are more likely to be able to use AI to generate new ideas, enhance products, develop services and innovate processes. AI Tool Adoption also indicates that SMEs who use **AI tools Adoption** will create innovation capability, which can facilitate the SMEs' more creative and problem-solving level in daily operations. The result, however, suggested that the impact on **AI-Driven Decision Making** is lower, likely signalling that the majority of Bangladesh's SMEs are currently in the nascent stages of adopting AI for strategic and data-informed decision-making.

The results also show that Innovation Capability has a significant positive impact on Sustainable Competitive Advantage. Given this, there is a greater possibility for SMEs to gain long-term competitive advantage if they can innovate new ideas, enhance services, adjust to market changes and add customer value. Overall, the results indicated a potential lack of a lasting competitive advantage for AI alone. Rather, AI-related capabilities are more beneficial when transferred to innovation capability. So, innovation capability can act as a significant enabler that transforms AI adoption and AI readiness into AI competitive outcomes in SMEs.

8.2 Theoretical Implications

The authors of this study make a number of contributions to the literature. First, it extends the discussion on AI adoption in SMEs by dividing AI-related capabilities into three specific AI dimensions: **AI Tool Adoption**, **Organizational AI Readiness**, and **AI-Driven Decision Making**. The studies conducted in the past talk about the adoption of AI in general, while this research sets the level of understanding of how the various AI-related factors contribute to innovation and competitive advantage.

Secondly, the study aligns itself with the **Resource-Based View (RBV)** and suggests that the capability related to AI, upon proper development and application, may be considered a valuable capability in the organization and act as an important resource. The results, however, are also indicative that simply having AI capabilities is insufficient. For companies to use AI resources to create a sustainable competitive advantage, they must develop internal capacities, specifically innovation capability (Barney 1991).

Thirdly, the study adds an important contribution to **Dynamic Capabilities Theory** because of the role of Innovation capability as the mediator. The results indicate that SMEs do not have a comparative advantage just through the use of technology, but also when they rely on the use of AI-related resources to sense opportunities, enhance processes, generate new value and react to shifts in the market environment. As such, the study reinforces the

evidence of the innovation capability as one of the dynamic capabilities that must accompany SMEs in digital transformation and AI adoption.

8.3Practical Implications

The results give useful practical recommendations for SME owners, managers and policy makers. Firstly, SMEs should not consider AI merely as a trendy technology. Instead, they need to make sure that they are looking at how AI tools can augment and assist innovation, customer service, new ideas, and operational issues. While AI-driven tools like ChatGPT, Gemini, automation systems, and AI analytics can be helpful, their real-world clothesline applications hinge on their integration with business operations.

Second, there is a critical need to pay attention to the AI readiness of the organization for SMEs. This implies that business owners and business managers must invest in training their employees, enhance their digital capabilities, promote AI learning, and foster a tech-friendly culture. The results indicated that the priority is readiness than only using the tool. Hence, businesses should be ready to equip their employees and workflows to reap the rewards from AI.

Thirdly, SMEs need to enhance their ability to make data-driven decisions. This suggests that the influence of AI-driven decision-making is not as strong as other factors, indicating that many SMEs might not be leveraging AI advice to its full potential. SMEs should begin gathering valuable data from their business, studying consumer actions, keeping an eye on market developments, and leveraging AI-driven insights for planning and strategy. This can, over time, enhance the quality of decisions made whilst boosting innovation outcomes.

Lastly, the policy makers and SME development agencies of Bangladesh should facilitate AI training, providing SMEs with affordable tools and an awareness-raising campaign. Such ventures could assist SMEs in resolving their skill shortages and leverage the power of AI for innovation and competitiveness.

8.4 Limitations

As with all studies, there are a few weaknesses in this research. First, a study was done on the data of Bangladeshi SMEs only. The results thus may not be completely transferable to SMEs in other countries, which have different economic, technological and institutional contexts. Secondly, the sample was small, so it couldn't capture every SME sector of Bangladesh. Third, the study relied upon a cross-sectional survey design (data were collected at one time). Therefore, the study cannot account for changes in the use of AI and competitive advantage over time. Fourth: Data was the perception of the respondent, and this could include the respondent's bias.

8.5 Future Research

There are several suggestions for a continuation of this research. The first is that in future studies, a larger sample population from diverse parts of the country may be taken to improve the generalizability. Second, comparing Bangladesh with other emerging economies can help researchers gain insights into the impact of country-specific factors on AI implementation in SMEs. Third, longitudinal studies could be conducted in the future to see how the adoption of AI impacts innovation and competitive advantage over the years. Lastly, scholars can incorporate other factors like digital transformation strategy, employee digital skills, organisational learning, or market turbulence. Last, future research can be directed to sector-specific (manufacturing, retail, service, technology-based SMEs) differences to learn whether there are sector-specific differences in the condition of whether AI-related capabilities work or not.

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APPENDICES

The appendices present the supporting materials used in this research project. They include the survey questionnaire, measurement items, cleaned dataset information, SmartPLS model output, and additional statistical tables. These materials support the main analysis and provide transparency regarding the data and measurement structure used in the study.

APPENDIX A: SURVEY QUESTIONNAIRE

This appendix presents the questionnaire items used to collect data from SME respondents in Bangladesh. The questionnaire measured AI Tool Adoption, Organizational AI Readiness, AI-Driven Decision Making, Innovation Capability, and Sustainable Competitive Advantage. All main measurement items were assessed using a five-point Likert scale.

Likert Scale Used

Scale	Meaning
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

Independent Variables (IVs)

AI Tool Adoption (ATA)

Code	Measurement Item
ATA1	Our organization actively uses AI-based tools in daily business activities.
ATA2	AI tools are used across different departments or functions in our organization.
ATA3	Employees in our organization regularly interact with AI-based systems.
ATA4	AI tools are integrated into our core business processes.
ATA5	The use of AI tools in our organization has increased over the past year.

Organizational AI Readiness (OAIR)

Code	Measurement Item
OAIR1	Our organization has a clear plan for AI adoption.
OAIR2	Top management supports the use of AI in our organization.
OAIR3	Our organization has the necessary infrastructure to use AI tools.

OAIR4	Employees are trained or prepared to use AI-based tools.
OAIR5	Our organization regularly assesses its readiness for AI adoption.

AI-Driven Decision Making (AIDM)

Code	Measurement Item
AIDM1	Our organization uses AI tools to analyze business data.
AIDM2	AI-generated insights influence our strategic planning.
AIDM3	AI tools help forecast market or customer behavior.
AIDM4	AI helps our organization make faster and more accurate decisions.
AIDM5	Data-driven decision-making using AI is a priority in our organization.

Mediating Variable (MV)

Innovation Capability (IC)

Code	Measurement Item
IC1	Our organization frequently generates new ideas.
IC2	Our organization improves products or services regularly.
IC3	Employees are encouraged to be creative and innovative.
IC4	Our organization adapts quickly to market trends.
IC5	Innovation is a central part of our business strategy.

Dependent Variable (DV)

Sustainable Competitive Advantage (SCA)

Code	Measurement Item
SCA1	Our organization performs better than competitors.
SCA2	Our organization provides superior value to customers.
SCA3	Our organization has achieved sustainable growth.
SCA4	Our organization maintains a stable competitive position.
SCA5	Our organization adapts well to competitive changes.

APPENDIX B: DATASET INFORMATION AND CODEBOOK

The cleaned dataset used for the final SmartPLS analysis contained 118 usable SME responses. The dataset was structured so that each row represented one respondent and each column

represented one questionnaire item or supporting variable. All Likert-scale responses were coded numerically from 1 to 5.

Dataset Element	Description
Final usable responses	118
Measurement items used in questionnaire	25
Total columns in cleaned Excel file	27
Missing values detected	0
Scale range	1 = Strongly Disagree to 5 = Strongly Agree
Software used for model analysis	SmartPLS / PLS-SEM

Construct Codebook

Construct	Item Codes	Role in Model	Description
AI Tool Adoption	ATA1-ATA5	Independent Variable	Measures practical use of AI-based tools in SME operations.
Organizational AI Readiness	OAIR1-OAIR5	Independent Variable	Measures leadership support, infrastructure, training, and preparedness for AI use.
AI-Driven Decision Making	AIDM1-AIDM5	Independent Variable	Measures use of AI insights, analysis, forecasting, and decision support.
Innovation Capability	IC1-IC5	Mediating Variable	Measures idea generation, creativity, market adaptation, and innovation strategy.
Sustainable Competitive Advantage	SCA1-SCA5	Dependent Variable	Measures long-term competitive position, value creation, growth, and adaptability.

Construct-Level Descriptive Summary

Construct	No. of Items	Mean	SD	Min	Max
AI Tool Adoption (ATA)	5	3.308	1.258	1	5
Organizational AI Readiness (OAIR)	5	3.727	1.244	1	5
AI-Driven Decision Making (AIDM)	5	3.188	1.160	1	5
Innovation Capability (IC)	5	3.746	1.181	1	5
Sustainable Competitive Advantage (SCA)	5	3.480	1.086	1	5

Dataset Preview: First 10 Respondents Using Construct Mean Scores

Respondent ID	ATA Mean	OAIR Mean	AIDM Mean	IC Mean	SCA Mean
R001	4.0	3.8	3.6	4.2	3.2
R002	5.0	4.4	3.2	4.8	4.4
R003	3.8	4.4	3.6	4.0	3.8
R004	2.6	2.4	2.6	3.0	2.2
R005	4.6	5.0	3.4	4.6	4.2
R006	4.4	4.2	5.0	5.0	5.0
R007	3.0	4.4	2.6	2.8	3.0
R008	1.4	1.2	4.0	2.8	2.4
R010	3.6	3.6	3.6	3.0	4.0
R011	3.0	3.4	2.6	3.8	3.8

Note: The preview table shows compact construct-level mean scores for the first ten respondents. The complete cleaned Excel dataset is submitted separately with all item-level responses from the 118 usable respondents.

APPENDIX C: SMARTPLS MODEL OUTPUT

This appendix presents the SmartPLS model output used to support the measurement and structural analysis. The model includes three AI-related independent variables, one mediating variable, and one dependent variable. The retained model output shows the indicator loadings, path coefficients, and R-square values for the endogenous constructs.

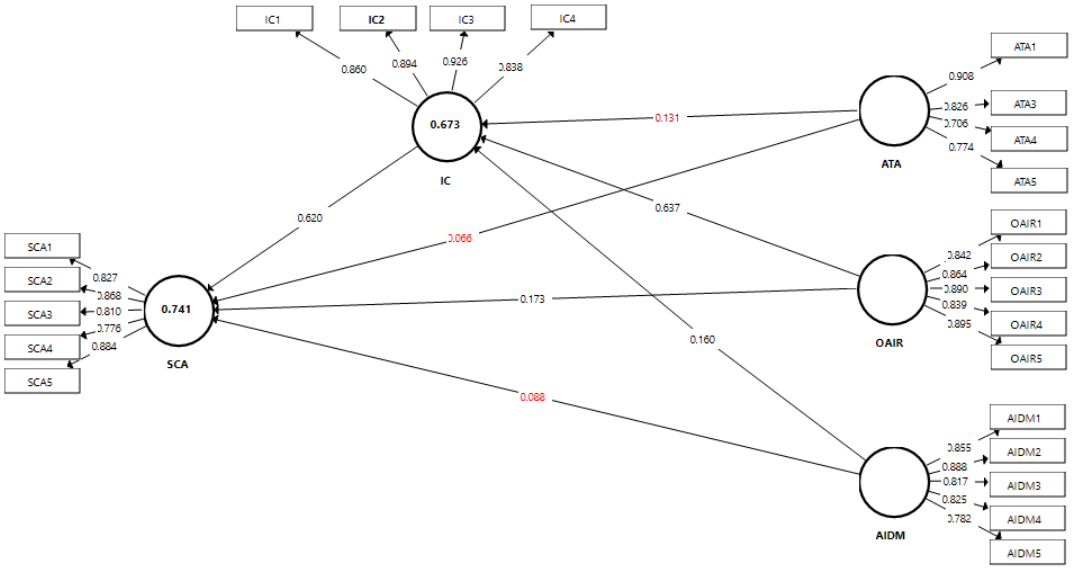

Figure C1: SmartPLS measurement and structural model output

The following conceptual figure provides a clean thesis-style representation of the final mediation framework used in the study.

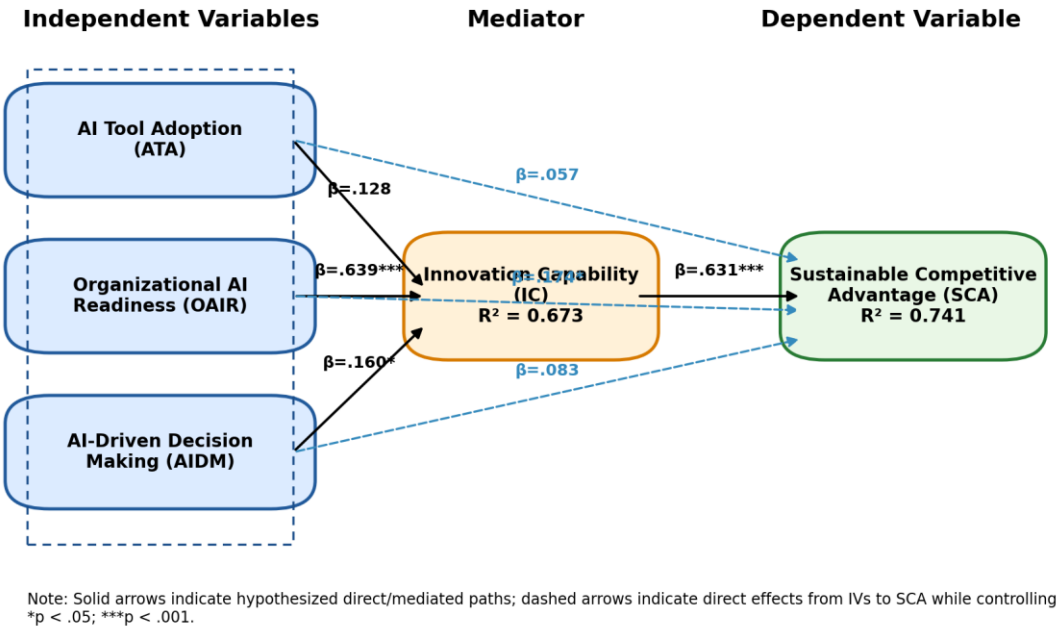

Figure C2: Clean conceptual representation of the final mediation model

APPENDIX D: ADDITIONAL SMARTPLS OUTPUT TABLES

This appendix includes additional SmartPLS output tables that support the results discussed in the main data analysis chapter. These tables provide detailed information on reliability, validity, path coefficients, and mediation effects.

Construct Reliability and Validity

Construct	Cronbach Alpha	rho_A	CR	AVE	R-square	Q-square
AI Tool Adoption	0.825	0.931	0.881	0.651	-	-
AI-Driven Decision Making	0.893	0.920	0.919	0.696	-	-
Innovation Capability	0.903	0.915	0.932	0.775	0.673	0.558
Organizational AI Readiness	0.917	0.922	0.938	0.751	-	-
Sustainable Competitive Advantage	0.890	0.893	0.919	0.696	0.741	0.463

Note: CR = Composite Reliability; AVE = Average Variance Extracted. R-square and Q-square values are reported only for endogenous constructs.

Structural Model Results

Relationship	Beta	T-value	P-value	Decision
AI Tool Adoption -> Innovation Capability	0.128	1.499	0.134	Not supported
Organizational AI Readiness -> Innovation Capability	0.639	9.105	0.000	Supported
AI-Driven Decision Making -> Innovation Capability	0.160	2.198	0.028	Supported
Innovation Capability -> Sustainable Competitive Advantage	0.631	8.389	0.000	Supported
AI Tool Adoption -> Sustainable Competitive Advantage	0.057	0.939	0.348	Not supported
Organizational AI Readiness -> Sustainable Competitive Advantage	0.174	1.989	0.047	Supported
AI-Driven Decision Making -> Sustainable Competitive Advantage	0.083	1.182	0.238	Not supported

Note: A relationship was considered significant when the p-value was below 0.05.

Mediation Results: Specific Indirect Effects

Indirect Relationship	Beta	T-value	P-value	Decision
AI Tool Adoption -> Innovation Capability -> Sustainable Competitive Advantage	0.081	1.435	0.152	Not supported
Organizational AI Readiness -> Innovation Capability -> Sustainable Competitive Advantage	0.403	6.104	0.000	Supported
AI-Driven Decision Making -> Innovation Capability -> Sustainable Competitive Advantage	0.101	2.193	0.029	Supported

Note: The mediation results show whether Innovation Capability transmits the effect of each AI-related capability to Sustainable Competitive Advantage.

APPENDIX E: ITEM-LEVEL DESCRIPTIVE STATISTICS

The following table presents item-level descriptive statistics calculated from the cleaned dataset. These values help summarize the central tendency and dispersion of responses for each measurement item before the SmartPLS analysis.

Construct	Item Code	Mean	SD	Min	Max
AI Tool Adoption (ATA)	ATA1	3.627	1.153	1	5
	ATA2	3.763	1.076	1	5
	ATA3	3.22	1.206	1	5
	ATA4	2.661	1.171	1	5
	ATA5	3.271	1.382	1	5
Organizational AI Readiness (OAIR)	OAIR1	3.814	1.287	1	5
	OAIR2	3.873	1.129	1	5
	OAIR3	3.568	1.244	1	5
	OAIR4	3.449	1.318	1	5
	OAIR5	3.932	1.182	1	5
AI-Driven Decision Making (AIDM)	AIDM1	3.28	1.197	1	5
	AIDM2	3.186	1.191	1	5
	AIDM3	3.398	1.055	1	5
	AIDM4	3.169	1.104	1	5
	AIDM5	2.907	1.205	1	5
Innovation Capability (IC)	IC1	3.636	1.231	1	5
	IC2	3.873	1.121	1	5
	IC3	3.746	1.214	1	5
	IC4	3.831	1.015	1	5
	IC5	3.644	1.304	1	5
Sustainable Competitive Advantage (SCA)	SCA1	3.314	1.052	1	5
	SCA2	3.653	1.208	1	5
	SCA3	3.636	1.107	1	5
	SCA4	3.28	0.942	1	5
	SCA5	3.517	1.068	1	5