



AI-Augmented Decision Intuition and SME Strategic Adaptability among SMEs: The Mediating Role of Human–AI Collaboration Quality and the Moderating Role of Technological Anxiety

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Received: 31 January 2026

Accepted: 24 April 2026

DOI: <https://doi.org/10.32479/irmm.23878>

ABSTRACT

South Asian small and medium-sized enterprises (SMEs) are actively implementing artificial intelligence (AI) in their management operations, but the cognitive and behavioural consequences of AI-enhanced decision-making are under research. This research, based on the socio-technological systems theory and the dynamic capabilities theory, evaluates the effects of AI-enhanced intuition in decision-making on SMEs strategic adaptability, exploring the mediating factor of human-AI collaboration quality, and the moderating factor of technological anxiety. A total of 412 Pakistan, India and Bangladesh SME managers and owners were sampled and structured online questionnaires were administered to collect the data. The proposed relationships and model fit were tested with the help of SPSS 26.0 and AMOS 24.0. The results indicate that AI-enhanced decision intuition positively impacts SME strategic adaptability significantly. Furthermore, human–AI collaboration quality is found to partially mediate this relationship, indicating that effective interaction between human judgment and AI systems enhances adaptive strategic outcomes. Moreover, technological anxiety plays a critical role in moderating the association between AI-augmented decision intuition and human-AI collaboration quality, whereby the association is smaller in the cases of high technological anxiety. It also mediates the direct impact, indicating that the psychological resistance to technology may impede the advantages of the AI-enabled decision-making. These outcomes add to the emerging literature on the digital transformation and SME development by emphasizing the significance of cognitive-technological integration in the strategic adaptability. In practice, the research indicates that managers of SMEs in South Asia should invest not only in AI tools but also in the confidence of their employees and alleviating anxiety about the new technologies. Lastly, theoretical implications, management recommendations and future research directions are addressed.

Keywords: Small Medium Size Enterprises, Technological Anxiety, Human-AI Collaboration, Artificial Intelligence, Decision-Making

JEL Classifications: O33, M15, L25

1. INTRODUCTION

Over the recent years, the extensive spread of AI technologies has radically transformed the process of decision-making in the context of SMEs, especially in South Asian emerging economies like Pakistan, India, and Bangladesh. SMEs are the largest contributors to total enterprises and nearly 40-50% of GDP in South Asia, but

they are very sensitive to environmental instability, resource, and technological shocks (Abositta et al., 2024; Mendy et al., 2025). In this regard, strategic adaptability of SMEs, which refers to the firm-level capacity to sense, respond, and rearrange resources in changing environments, has come to be key to their survival and expansion (Wang et al., 2025; Dahri et al., 2025). Nonetheless, even as more and more SMEs invest in digital tools, a significant number

of organizations cannot convert AI usage into effective strategic results, which begs the question of the cognitive and relational processes that contribute to adaptability. To solve this problem, the present paper presents AI-augmented decision intuition, a new construct that reflects the combination of human intuitive judgment and AI-generated insights in the process of managerial decision-making. In contrast to data-driven or intuition-based methods, AI-augmented decision intuition can be seen as a hybrid thinking ability that can increase decision speed, accuracy, and conceptuality (Raisch and Krakowski, 2021; Zhang et al., 2026). This variable can be especially important in cases of SMEs, where the decision process is frequently centralized and time-sensitive. Nevertheless, previous research has mostly looked at the adoption of AI through a technological or performance perspective, failing to consider the cognitive augmentation mechanisms underlying strategic adaptability (Chumwichan and Meesing, 2025; Raisch and Krakowski, 2021).

Hence, the choice of AI-augmented decision intuition as the independent variable addresses a gap that is crucial in terms of conceptualization because it connects human thinking and digital intelligence in the context of SME. In addition, the paper suggests that the quality of human-AI collaboration can be used as a mediator of the study. This construct signifies the effectiveness, trust and complement in interactions between human decision-makers and AI systems. The rationale behind this mediator is the socio-technical view that emphasizes the fact that technology in itself does not generate value unless it is significantly absorbed into human capacities (Mendy et al., 2025; Dahri et al., 2025). Quality partnership facilitates the delivery of high-quality AI products into context, which can be interpreted, contextualized and applied effectively. The role of human-AI interaction in large organizations has been emphasized in previous studies but the same has not been thoroughly mediated in SMEs establishing a considerable research gap (Shafiq et al., 2024; Gupta and Gupta, 2025). Moreover, technological anxiety is also introduced as a moderating factor in this research paper and can be defined as the fear or concern that people have towards working with high-tech technologies. This is one variable where the digital literacy level, the lack of sufficient training facilities, and cultural resistance remain barriers to technology assimilation, especially in South Asia (Kim et al., 2024; Chumwichan and Meesing, 2025). The positive impacts of AI-augmented decision intuition may be undermined by technological anxiety because it diminishes user engagement and confidence in AI systems.

Although literature has discussed technology acceptance and resistance, Wang et al. (2025); Kusetogullari et al. (2025), not many studies have looked at how psychological factors mediate the efficacy of AI-assisted decision processes in SMEs thereby warranting its consideration as a mediating variable. The decision of South Asia to focus on SMEs with the specifics of manufacturing, retail and IT-enabled services is timely and strategic. All these industries combined make up a significant part of the working population and the economy, but have high competitive pressures, supply chain impacts, and are changing fast digitally. As an example, the SME sector in Pakistan has its contribution to GDP of about 40% and more than 80% of the

non-agricultural labor force, and the SME ecosystem in India is estimated at more than 1 trillion dollars and is experiencing faster digitalization (Wang et al., 2025; Kim et al., 2024). Regardless, the implementation of advanced AI tools is still not universal, and a significant number of companies work in hybrid or transitional digital space. This renders these industries an ideal way to study the application of AI-based cognitive abilities to strategic flexibility when placed in a real-world setting. Critical analysis of the previous literature shows that there are a number of gaps in the literature. Most of the studies address the issue of AI adoption and firm performance without discussing decision-making cognition (Carayannis et al., 2024). Also, there is a dearth of research that integrates a moderated mediation model that simultaneously accounts for both enabling and limiting factors (Dahri et al., 2025; Wang et al., 2025). All these gaps emphasize the necessity of a more subtle and contextual investigation. In this regard, the main research questions of this study are: (1) to investigate the impact of AI-enhanced decision intuition on the SME strategic adaptability; (2) to determine the mediating role of the quality of human-AI collaboration; and (3) to explore the moderating role of technological anxiety on both direct and indirect relationships. By fulfilling these goals, this study provides a clear picture of the interaction of cognitive, relational, and psychological variables in the context of AI-facilitated SMEs.

The relevance of this study is that it is theoretically integrated and relevant to the context. The study integrates the DCT and STS to move a multidimensional approach to digital transformation in the SMEs. Its originality lies in the fact that it presents a new construct AI-enhanced decision intuition and empirically supports a moderated mediation model in a developing economy setting. This is driven by the fact that SMEs are in dire need of improving their adaptability due to the rise in uncertainty and technological change. Finally, the research can add to the theory and practice by closing the gap between the adoption of AI and strategic performance, providing practical information to SME managers, policymakers, and technology developers. It offers a comprehensive framework by which not only the effects of AI on adaptability are explained, but also when and when these effects are enhanced or limited, contributing to the ongoing discussion on the development of SMEs in the digital era.

2. THEORETICAL BACKGROUND

The proposed work is based on the dynamic capabilities theory (DCT) and socio-technical systems (STS) theory that collectively offer a solid and complementary framework of how AI-based cognitive processes can be converted into strategic adaptability in SMEs. The combination of two theoretical lenses especially suits the dual focus of the model on the reconfiguration of capabilities as well as the human-technology interaction, which, in turn, allows perceiving digital transformation in resource-bound and unstable environments in a holistic manner. DCT, as introduced by Teece et al. (2018), and focuses on the capacity of a firm to recognize opportunities and exploit them, as well as to re-align internal and external capabilities in response to the environment that rapidly changes. DC offers a strong explanation of strategic adaptability, the critically important outcome variable of this

study, in the context of the SME, where flexibility and speed are of utmost importance.

The AI-enhanced decision intuition corresponds strictly to the sensing and seizing levels of DCT as it improves the capacity of managers to comprehend sophisticated data, foresee the changes in the market, and make strategic choices in time (Abositta et al., 2024; Mendy et al., 2025). Previous studies have demonstrated that companies that utilize high-level analytics and insights powered by AI are in a better capacity to create the adaptive capabilities and maintain competitive advantage (Zhang et al., 2026; Jain et al., 2025). Nevertheless, a great deal of this literature sees AI as a fixed asset as opposed to a dynamic cognitive facilitator, thus ignoring the presence of augmented intuition in strategy response (Zhang et al., 2026). In addition, DCT allows the introduction of the quality of human-AI collaboration as a mediating factor. On the capability level, the combination of human knowledge and AI systems is a higher-level organizational capability that enables the integration of knowledge and the orchestration of resources (Cavusoglu et al., 2026; Yadav et al., 2025). Research has pointed to the fact that the usefulness of AI depends on its ability to be integrated into the decision-making process and congruence with human belief (Kim et al., 2024). In this way, the quality of human-AI collaboration is a channel via which AI-enhanced intuition is converted into strategic adaptability that can be acted upon.

The mediating role fills a significant gap in the literature of DCT, as the theory has traditionally been underspecific to the interactional and behavioural aspects of the human-technology interaction (Dahri et al., 2025; Zhang et al., 2026). Although DCT is a theory of the capability-building- and strategy-building-dimension, it has not been adequately used to STS eliminates this limitation by assuming that organizational performance is a result of joint-optimization of social and technical subsystem (Bostrom and Heinen, 1977; Trist, 1981). The STS theory can be especially applied to the study of the quality of human-AI collaboration because it underlines the significance of the trust, usability, and alignment of human actors and technological tools (Yadav et al., 2025; Ghouri et al., 2026). When it comes to the adoption of AI, STS would imply that the success of decision-making processes hinges not only on the level of technological complexity but also the degree to which users are familiar, engaged and communicating with AI systems (Noerman et al., 2025). This view is a strong reason why the technological anxiety is a moderating variable. Technological anxiety is a socio-psychological obstacle that may interfere with the fit between human and technical systems and undermine the quality of collaboration and the scope of advantages in AI-enhanced decision intuition (Kim et al., 2024; Trivedi, 2025). Empirical research has always indicated that the anxiety about new technologies will diminish the user acceptance, trust, and successful use (Cavusoglu et al., 2026; Wang et al., 2025). This anxiety can be a critical hindrance to achieving digital capabilities in SMEs where formal training and support systems are frequently scarce (Salem et al., 2024).

This paper adds to the STS theory by introducing technological anxiety as a moderator and proves that the success of socio-technical incorporation is dependent on psychological factors in the case of emerging economies. Notably, the existing literature offers solid

empirical evidence to support the integrated framework suggested in this paper. As an example, Kim et al. (2024) show that data-driven capabilities are important in improving firm performance by enhancing decision-making, whereas, Zhang et al. (2026) and Mulwa and Segawa (2025) demonstrate the importance of human-AI collaboration in boosting managerial cognition. Equally, technological acceptance and resistance research prove that the psychological elements of anxiety and perceived complexity have a substantial impact on the results of technology-facilitated ones (Ghouri et al., 2026; Trivedi, 2025). But these streams of research are still disjointed, and there is little integration along the capability, interactional and psychological dimensions. Thus, integrating DCT and STS theory, the present study create a multi-layered and consistent theoretical framework that represents the interactions of AI-enhanced cognition, collaborative operations, and psychological states. This combination addresses the gaps that exist in the literature, but also offers a more subtle account of utilization of AI in the SMEs to promote strategic adaptability. The resulting framework provides a solid theoretical foundation to the hypotheses proposed, with the mechanism connecting AI-augmented decision intuition (input), quality of human-AI collaboration (process), technological anxiety (boundary condition), and strategic adaptability (outcome) logically and empirically.

2.1. AI-augmented Decision Intuition and ME Strategic Adaptability

AI-augmented decision intuition is a cognitive process combining managerial intuition with AI-generated information to make more informed, timely and context-specific decisions (Salem et al., 2024; Kim et al., 2024). Such augmented cognition is a vital source of strategic adaptability, which is the capacity of the firm to re-optimize strategies to suit changing market conditions, in environments of SMEs with resource limitations and high levels of environmental volatility (Dahri et al., 2025). In contrast to the classical methods of decision making, which apply the intuition principle based on the experience or the retrospective data analysis, the AI-enhanced intuition combine the predictive analytics and human judgment, and, therefore, empower the opportunity recognition and quick response (Noerman et al., 2025; Trivedi, 2025). In terms of capability building, SMEs that utilize AI-supported intuition can be more capable of predicting changes in demand, allocating resources optimally, and changing competitive strategies in real time (Mulwa and Segawa, 2025; Carayannis et al., 2024). This especially applies in South Asian markets, where informality, uncertainty, and institutional gaps necessitate a quick and responsive decision-making process. Empirically, it has been indicated that the companies that apply AI-enhanced analytics show a higher level of strategic flexibility and innovation results than companies that use traditional approaches (Mendy et al., 2025; Ghouri et al., 2026). Further, the interaction of AI with the intuitive judgment at the managerial level to affect the adaptability outcomes, in particular in SMEs, has not received due attention in prior studies (Wang et al., 2025; Dahri et al., 2025). By filling this gap, the current hypothesis is that AI-enhanced decision intuition is an enabling principle of adaptive capability, which enables more resilient and future-oriented strategic behavior in even more complex business contexts.

H₁: AI-augmented decision intuition will positively influence SME strategic adaptability.

2.2. AI-augmented Decision Intuition and Human–AI Collaboration Quality

AI-enhanced decision intuition promotes a more synergistic process between human cognition and intelligent systems, thus increasing the quality of human-AI collaboration. The more decision-makers engage in incorporating AI-generated information into their intuitive thinking processes, the greater chances they have to view AI as a complementary partner but not as a substitutive tool (Abositta et al., 2024; Yadav et al., 2025). This intellectual conformity reinforces the interdependence, comprehensibility, and trust in AI products, which are vital aspects of successful cooperation (Kusetogullari et al., 2025; Trivedi, 2025). Such alignment is especially essential within the context of SMEs, where power to make decisions is frequently centralized and informal, thus making it critical to guarantee that AI systems are relevantly integrated into everyday managerial routines (Abositta et al., 2024). Furthermore, AI-enhanced intuition promotes feedback loops between users and systems, enhancing the learning process, transparency, and system refinement over time (Raisch and Krakowski, 2021; Chepkutwo, 2025). Having a more profound involvement with AI-assisted insights, managers gain a better idea of the abilities and constraints of the system that improves communication and coordination between human and algorithmic agents (Noerman et al., 2025). Empirical evidence suggests that organizations with more cognitive integration between people and AI are more prone to better collaboration and decision-making (Ghouri et al., 2026; Zhang et al., 2026). Notably, most of the previous studies focused on human-AI interaction through a technological usability lens but paid little or no attention to the role of augmented cognitive processes in collaboration (Balasubramanian et al., 2022). This leaves a knowledge gap on the antecedents of collaboration quality. This hypothesis places AI-enhanced decision intuition as an essential motor by emphasizing that an increase in the cognitive interactions with AI enhances not only the decision-making process but also the relational and functional connections between humans and intelligent systems in the context of SMEs.

H₂: AI-augmented decision intuition will positively influence human–AI collaboration quality.

2.3. Human–AI Collaboration Quality and ME Strategic Adaptability

The quality of human-AI cooperation allows SMEs to convert the scattered information and analytical results into consistent strategic decisions, enhancing strategic agility (Zhang et al., 2026). Higher quality of collaboration, which can be achieved by mutual trust, interpretability of outputs and flawless coordination, allows decision-makers to better synthesize machine-generated insights with contextual knowledge and make strategic adjustments faster and more accurate (Balasubramanian et al., 2022; Raisch and Krakowski, 2021). This combination is especially crucial in the context of SMEs, where not very formal structures necessitate effective coordination of human judgment and technology inputs to adjust to the changes in the environment (Mendy et al., 2025). Successful teamwork also contributes to the overall sensemaking,

which enables companies to identify weak signals in the market and re-allocates the resources (Gupta and Gupta, 2025; Raisch and Krakowski, 2021). AI systems are scalable to handle large volumes of data, and without a high-quality collaboration the results might not be effectively used or understood. On the other hand, in cases where managers are actively involved in interacting with AI systems by questioning, validating, and contextualizing outputs, the organization build more effective adaptive routines and learning cycles (Shafiq et al., 2024). This results in better responsiveness in product innovation, supply chain changes, and market repositioning. There are empirical indications of the existence of higher agility and innovation performance rates in firms that have established mechanisms of human-AI collaboration that are extremely well-integrated (Zhang et al., 2026; Kusetogullari et al., 2025). Nevertheless, the existing literature has mostly concentrated on large organizations, creating a gap on the impact of collaboration quality on adaptability in SMEs that are resource-constrained and uncertain (Dahri et al., 2025). This gap can be filled by the fact that collaboration quality is not only an operational phenomenon but also a strategic enabler that directly improves the adaptability, competitiveness, and performance sustainability of SMEs in dynamic settings.

H₃: Human–AI collaboration quality will positively influence SME strategic adaptability.

2.4. Mediating Role of Human–AI Collaboration Quality

The mediating effect of the quality of human-AI collaboration justifies the manner in which AI-enhanced decision intuition is converted to strategic adaptability in SME. Although AI-enhanced intuition helps managers to process complex data and make informed decisions, the cognitive benefits do not necessarily result in the adaptability of the firm unless they are properly implemented in the form of close cooperation between human participants and AI-based systems (Balasubramanian et al., 2022; Mulwa and Segawa, 2025). In this respect, the quality of collaboration serves as a pivotal channel of transformation that transforms cognitive improvement on an individual level into strategic performance on an organizational level (Kusetogullari et al., 2025). Process wise, AI-based insights need to be strategically useful by being human validated, contextually adapted, and executed. When collaboration is high, all these steps are taken without any hitches and this means that the organizations can incorporate the algorithmic outputs into decision making processes and into their strategic planning process (Chepkutwo, 2025; Mulwa and Segawa, 2025). The absence of this mediating process can ensure that AI-enhanced intuition is either not used fully or not well integrated to affect adaptability. The mediation also follows empirical research indicating that the value of AI in organizations is frequently indirect, facilitating through better coordination, integration of knowledge, and alignment of decisions but not through direct performance impact (Gupta and Gupta, 2025; Mendy et al., 2025). Also, the mediation can be aligned with socio-cognitive views, which suggest that the impacts of technological capabilities on the. The quality of collaboration in SMEs is even more important in terms of embedding the AI-based insights into the adaptive strategic responses as the decision structures are less formalized. Nonetheless, this mediating route has not been thoroughly considered in current literature, especially

in the context of emerging economies in which the level of digital maturity differs considerably (Abositta et al., 2024; Raisch and Krakowski, 2021). Therefore,

H₄: Human–AI collaboration quality will mediate the relationship between AI-augmented decision intuition and SME strategic adaptability.

2.5. Moderating Role of Technological Anxiety

Technological anxiety is a psychological obstacle that defines the attitude, engagement with, and dependence on sophisticated online systems of people. When applied to SMEs, where employee and managerial levels of digital literacy may not always be homogeneous, this anxiety can greatly interfere with the process of building an effective human-AI cooperation (Noerman et al., 2025; Yadav et al., 2025). The application of AI-enhanced decision intuition, even in case of its existence, is conditioned by the emotional and cognitive preparedness of the user to communicate with intelligent systems to be translated into high-quality collaboration (Jain et al., 2025; Singh and Pandey, 2024). High technological anxiety leads people to show avoidant behavior, decreased engagement with systems, and diminished trust in algorithmic recommendations, undermining interactive learning between human and AI elements (Gupta and Gupta, 2025). This minimizes the level of critical review of AI-generated insights and meaningful consideration in the decision-making process, thus reducing the quality of collaboration. Conversely, reduced anxiety enables transparency, exploration, and trial and error communication with AI systems, reinforcing the feedback loop between human and machine intelligence and enhancing human judgment and AI intelligence (Noerman et al., 2025; Balasubramanian et al., 2022). Behavioral systems-wise, the psychological resistance may disrupt the socio-technical alignment, which restricts the usefulness of digital tools, irrespective of their technical complexity (Yadav et al., 2025; Jain et al., 2025). Empirical data also indicate that the constructs related to anxiety play a major role in determining the level of assimilation and the level of usage of technology within an organizational background (Abositta et al., 2024; Noerman et al., 2025). Nonetheless, the previous studies have seldom investigated how these psychological limitations precondition the cognitive-to-collaborative channel in AI-based SME settings. Therefore,

H₅: Technological anxiety will moderate the relationship between AI-augmented decision intuition and human–AI collaboration quality, such that the relationship is weaker when technological anxiety is high and stronger when it is low.

The research hypotheses can be visually demonstrated in Figure 1.

The conditional indirect effect represents the effect of psychological barriers on the whole cognitive-to-strategic pathway in SMEs in

digitally intensive settings. Even though AI-enhanced decision intuition improves managerial cognition and helps them to better interpret complex information, its final effect on strategic adaptability does not apply to all people or firms (Noerman et al., 2025; Yadav et al., 2025). Rather, it dependent on the degree to which technological anxiety influences the interaction with AI systems and the quality of the mutual interaction that take place (Kusetogullari et al., 2025; Abositta et al., 2024). In case of high levels of technological anxiety, people are more prone to feeling inconvenienced, uncertain, and less certain about depending on AI-generated products, which interferes with the process of effective interaction and lessens the transformation of cognitive advantages into collaborative activities (Jain et al., 2025; Wang et al., 2025). This interference weakens the mediating mechanism, hence reducing the overall indirect impact on strategic adaptability. On the other hand, the level of anxiety is lower, thus, the users are more trustful, engaged, and ready to include the insights of AI in the decision-making processes, which enhances the quality of collaboration and increases the influence of downstream results on the adaptive strategic outcomes (Abositta et al., 2024; Singh and Pandey, 2024). In the socio-technical interaction sense, psychological preparedness is a defining boundary condition that can decide the full activation of technological capabilities in organizational activity (Carayannis et al., 2024; Noerman et al., 2025). Empirical research also proves that affective and cognitive barriers are also one of the most important to consider the scale of digital transformation initiatives and its performance results (Balasubramanian et al., 2022). Nevertheless, there is scanty research on this conditional mediation process in the context of SMEs especially in emerging economies where technological adoption is not uniform and psychologically based resistance is rampant. Therefore,

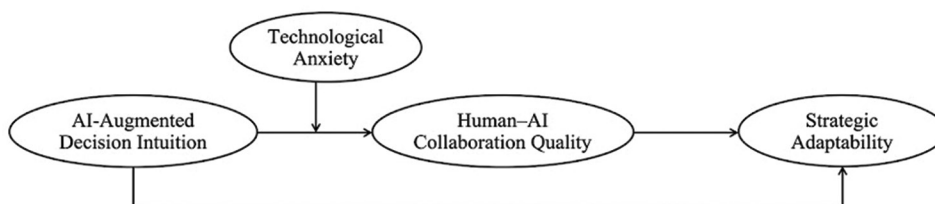
H₆: Technological anxiety will moderate the indirect relationship between AI-augmented decision intuition and SME strategic adaptability via human–AI collaboration quality, such that the indirect effect is weaker when technological anxiety is high and stronger when it is low.

3. METHOD AND DATA

3.1. Procedure and Participants

In this study, convenience sampling was used to sample the data of SMEs that are in operation in South Asia, in particular Pakistan, India and Bangladesh. The data were collected during a period of between March 2025 and June 2025. The survey tool was created based on the Qualtrics online data collection tool (www.qualtrics.com) which has been known to be reliable and valid in the research world. The survey link was sent to professional networking

Figure 1: Conceptual model



platforms such as LinkedIn, WhatsApp business groups, and forums of SME associations, allowing the researcher to access owners, managers, and decision-makers in various sectors of the SME community including manufacturing, retail, information technology services, and trade-based businesses. Before engaging in the study, the respondents were made aware of the fact that the study was focused on SME managers and owners who were actively involved in decision-making processes and AI-supported or digitally-assisted operations. Participation was restricted to those people who had 1 year managerial or operational experience in SMEs. The ethical aspects were taken seriously, and all the questions were answered voluntarily, anonymously, and the data was not to be used in any other way than academic. A small reward of PKR 500 (equivalent to USD 1.80) was given after completing the survey to enhance the motivation to respond and complete the survey. There were 500 questionnaires that were first distributed. Among them, 428 responses were obtained, which reflects the initial response rate of 85.6%. Following the process of screening data, recordings with large volumes of missing data, inconsistency, and those with unrealistically short periods of time (<3 min to complete) were filtered. Also, answers that did not succeed in attention-check questions and those that did not fit the requirements of SME ownership or managerial were eliminated. In the end, only 412 valid questionnaires were left after this stringent filtering process. The Survey System Sample Size Calculator was used to determine the sufficiency of the sample size, 95% confidence and 5% margin of error, which reveals that the minimum required sample is about 384 respondents. Thus, the resulting sample of 412 responses was found as statistically adequate to conduct structural equation modelling and hypothesis testing.

3.2. Demographic Characteristics of Respondents

Frequency distribution was used to analyse the demographic profile of the respondents. The sample was distributed according to the country, with Pakistan (38.83, n = 160), India (35.68, n = 147), and Bangladesh (25.49, n = 105) equally representing the South Asian SME ecosystems. In terms of gender, 61.89% (n = 255) of the respondents were males and 38.11% (n = 157) were female respondents. Regarding the age groups, 39.08% of the participants were in the 2534 group (n = 161), 28.64% in 3545 (n = 118), 19.17% in 4554 (n = 79), and 13.11% in 55 and above (n = 54), which means that the population in regard to educational attainment, a majority of the respondents had a bachelor degree (54.37%, n = 224), then there were master degree (26.21%, n = 108), diploma/associate (16.26%, n = 67), and doctoral (3.16%, n = 13) holders. In terms of managerial experience, 10.19% (n = 42) had <2 years of experience, 18.45% (n = 76) had 2-5 years, 24.27% (n = 100) had 6-9 years, and 47.09% (n = 194) had more than 10 years of experience, indicating a highly experienced SME sample base. In terms of industry sectors, the respondents were selected in manufacturing (31.55, n = 130), retail and wholesale trade (28.64, n = 118), information technology and digital services (21.12, n = 87), and other service-based SMEs (18.69, n = 77). This sector heterogeneity enhances the generalizability of the results to important domains of SMEs in South Asia. In general, the sample structure a sound, cross-sectional representation of SMEs in three large South Asian economies, with sufficient variability in the level of digital adoption, managerial experience, and industry

environment, which is critical to test the proposed, moderated mediation model.

3.3. Instruments

The measurement scales to be applied in the current research were modified based on the well-known sources published in the international well-established academic journals. The questionnaire has been prepared using a translation-back translation process based on Brislin (1986) to guarantee language accuracy and suitability in context to South Asian SME respondents. The original English text was examined and optimized by a doctorate level scholar of management and well-versed in organizational behavior and digital transformation. A pilot test was done where a small sample of the SME managers were used to ensure that there is clarity, relevance and contextual suitability before final data collection. Measures were on all constructs through a 5-point Likert scale that ranged between 1 = strongly disagree and 5 = strongly agree.

3.3.1. AI-augmented decision intuition

A multi-item scale based on the recent literature on digital cognition and AI decision-making was used to measure this construct (Jain et al., 2025; Wang et al., 2025). The scale help to understand how much of the AI-generated insights and intuitive judgment are integrated by the managers of SMEs in the process of decision-making. One of the samples is: I use AI-based insights together with my intuitive judgment to make faster business decisions. The alpha of this scale was 0.941 which is excellent internal consistency.

3.3.2. Human-AI collaboration quality

The measurement of this variable was based on an adapted scale that was developed based on the research regarding human-machine interaction and effectiveness of digital collaboration (Cavusoglu et al., 2026; Mendy et al., 2025). The scale is used to measure trust, coordination, and perceived synergy between human decision-makers and AI systems. One of the samples is: AI systems and I collaborate successfully to make better business decisions. The alpha of this construct was 0.903.

3.3.3. Technological anxiety

The scale of technological anxiety was assessed with a revised version of technology-related psychological resistance scales (Sikiru et al., 2021; Dahri et al., 2025). It embodies fear, discomfort and reluctance to use AI-enabled tools. One of the examples is: I am nervous to have to make business decisions based on AI-based systems. The alpha of this scale was 0.887.

3.3.4. SME strategic adaptability

The scale to measure this dependent variable was modified based on the dynamic capabilities and strategic flexibility literature (Tece, 2018; Clauss et al., 2021). It is indicative of how the firm can change its strategies due to changes in the environment. An example question is: Our business adapts its strategies fast according to the changes in the market. The alpha of this construct was 0.916.

3.4. Data Analysis

Descriptive statistics and correlation analysis were performed in the SPSS 26.0 and measurement model testing and structural equation modeling (SEM) were performed in AMOS 24.0. In

particular, the confirmatory factor analysis (CFA) was used to test the reliability and validity of the measurement model. Model fit was further evaluated based on well-known indices, such as 2/df, Comparative Fit Index (CFI), Tucker Lewis Index (TLI), root mean square error of approximation (RMSEA), and Standardized root mean square residual (SRMR). To test the hypothesized direct relationships in the structural model, path analysis was used and bootstrapping and interaction term analysis used to test the mediation and moderation effects.

4. RESULTS

4.1. Measurement Model Testing

As all constructs were measured in terms of self-reported data, the risk of common method bias was studied based on the single-factor test offered by Harman (Podsakoff et al., 2012). Everything was put into an exploratory factor analysis where the findings, as mentioned in Table 1, implied that the first factor had a 38.742% of the total variance which is lower than the critical value of 50. This indicates that the common method variance is not a major issue in the current study. Cronbach alpha and composite reliability

Table 1: Demographic characteristics of sample (South Asian SMEs, n=412)

Characteristics	Category	Frequency (n)	Percentage
Country	Pakistan	160	38.83
	India	147	35.68
	Bangladesh	105	25.49
Gender	Male	255	61.89
	Female	157	38.11
Age group	25-34 years	161	39.08
	35-44 years	118	28.64
	45-54 years	79	19.17
	55 years and above	54	13.11
Education level	Diploma/Associate or less	67	16.26
	Bachelor's degree	224	54.37
	Master's degree	108	26.21
	PhD/Doctorate	13	3.16
Managerial experience	<2 years	42	10.19
	2-5 years	76	18.45
	6-9 years	100	24.27
	10+years	194	47.09
Industry sector	Manufacturing SMEs	130	31.55
	Retail & Wholesale	118	28.64
	IT & Digital Services	87	21.12
	Other Services	77	18.69
Total	—	412	100

Table 2: Reliability and convergent validity

Variable	Cronbach's α	Factor loading	CR	AVE
AI-augmented decision intuition	0.936	0.702-0.748	0.905	0.528
Human-AI collaboration quality	0.903	0.681-0.842	0.891	0.621
Technological anxiety	0.887	0.694-0.821	0.876	0.598
SME strategic adaptability	0.916	0.759-0.876	0.922	0.684

CR: Composite reliability, AVE: Average variance extracted

(CR) were then used to perform the Reliability analysis. Values are considered to be acceptable as reliability is 0.70-1.00, as per Hair et al. (2011). Standardized factor loadings and average variance extracted (AVE) were used to measure convergent validity with the 0.50 mark being a good value (Fornell and Larcker, 1981). The results are as shown in Table 2 and confirm satisfactory reliability and convergent validity of all constructs. The Fornell-Larcker criterion was used to measure discriminant validity. The AVE of each construct was compared to the inter-construct correlations. As depicted in Table 3, all square root AVEs were greater than the associated correlation coefficients, which not only indicates high discriminant validity of constructs but also validates strong validity. A correlation analysis and descriptive statistics also indicated that there were significant relationships between variables. The human-AI collaboration quality ($r = 0.612, P < 0.01$) and SME strategic adaptability ($r = 0.538, P < 0.01$) were positively correlated with AI-augmented decision intuition. The quality of human-AI collaboration also positively correlated with SME strategic adaptability ($r = 0.624, P < 0.01$). Technological anxiety was significantly negatively related to AI-augmented decision intuition ($r = -0.401, P < 0.01$) and human-AI collaboration quality ($r = -0.467, P < 0.01$), which is the initial support of the hypotheses.

4.2. Model-Data Fit

A desirable model-data fit must have 3/df value of below 3, RMSEA value of below 0.08, SRMR value of below 0.05, and TLI, CFI, GFI and AGFI of above 0.90 (Hu and Bentler, 1999; Kline, 2015). The fit indices of the current model were $\chi^2/df = 1.468$, RMSEA = 0.034, SRMR = 0.031, TLI = 0.986, CFI = 0.989, GFI = 0.958, and AGFI = 0.941, all reaching or approaching the recommended threshold values. Thus, the suggested model was observed to fit well with the available data, hence validating the sufficiency of the structural model in further testing hypothesis.

4.3. Hypothesis Testing

Structural equation modeling (SEM) was used to test the hypothesized relationships in the theoretical framework. Path analysis findings in Table 4 show that the positive impact of AI-augmented decision intuition on SME strategic adaptability ($\beta = 0.416, P < 0.001$) were significant, which confirms H_1 . Moreover, AI-enhanced decision intuition was also found to have a strong positive impact on the quality of human-AI collaboration ($\beta = 0.692, P < 0.001$), which validates H_2 . Moreover, the quality of human-AI collaboration had a strong positive influence on the strategic adaptability of the SME ($\beta = 0.471, P < 0.001$), thus supporting H_3 .

The indirect effect was estimated with a bootstrapping method with 5,000 resamples to determine the mediation effect. Table 5 shows the results. The correlation between the quality of human-AI collaboration and AI-enhanced decision intuition and SME strategic adaptability was significant (estimate effect = 0.318, 95% confidence interval [0.201, 0.462]). As zero is not within the confidence interval, the mediating effect of the quality of human-AI collaboration is proved, thus, proving H_4 . In line with Aiken et al. (1991), multiple hierarchical regression analysis was used to test the moderating role of technological anxiety. The results in Table 6

Table 3: Correlation coefficient matrix and discriminant validity

Variables	M	SD	1	2	3	4
1. AI-augmented decision intuition	3.642	0.812	0.727			
2. Human–AI collaboration quality	3.814	0.903	0.612**	0.788		
3. Technological anxiety	2.941	0.881	−0.401**	−0.467**	0.773	
4. SME strategic adaptability	3.688	0.845	0.538**	0.624**	−0.356**	0.827

n=412. Figures in bold on diagonals represent the square root of AVE of each construct. P<0.01 (two-tailed test)

Table 4: Results of path analysis

Hypotheses	Standardized path coefficient	SE	t-value
H ₁ : AI-ADI → SSA	0.416***	0.089	4.682
H ₂ : AI-ADI → HAI-CQ	0.692***	0.076	9.105
H ₃ : HAI-CQ → SSA	0.471***	0.082	5.744

AI-ADI: AI-augmented decision intuition, HAI-CQ: Human–AI collaboration quality, SSA: SME strategic adaptability. ***P<0.001

Table 5: Indirect effect of AI-augmented decision intuition on SME strategic adaptability via human–AI collaboration quality

Indirect effect	SE	LLCI	ULCI
AI-ADI → HAI-CQ → SSA	0.318	0.062	0.462

AI-ADI: AI-augmented decision intuition, HAI-CQ: Human–AI collaboration quality, SSA: SME strategic adaptability, LLCI: Lower limit confidence interval, ULCI: Upper limit confidence interval

Table 6: Multiple hierarchical regression analysis (human–AI collaboration quality as DV)

Variables	Model 1	Model 2	Model 3
Control variables			
Gender	−0.039	−0.032	−0.030
Age	−0.021	−0.044	−0.028
Managerial experience	−0.033	−0.019	−0.017
Educational level	0.006	0.012	0.009
Tenure	0.004	0.021	0.015
Nature of enterprise	0.008	0.014	0.011
Independent variable			
AI-augmented decision intuition		0.684***	0.701***
Moderator			
Technological anxiety		−0.052	−0.036
Interaction effect			
AI-ADI × Technological anxiety			−0.146*
R ²	0.008	0.441	0.458
Adjusted R ²	−0.006	0.428	0.442
F	0.512	36.214***	34.907***

*P<0.05. ***P<0.001

show that the interaction term between AI-augmented decision intuition and technological anxiety on human–AI collaboration quality was significant ($\beta = -0.146$, $P < 0.05$). To further define this effect, simple slope analysis was carried out where the positive correlation between AI-enhanced decision intuition and the quality of human–AI collaboration was significantly high when technological anxiety was low as compared to when it was high. Based on this, H5 was accepted. The PROCESS macro of SPSS was employed (Model 7) to measure the conditional indirect effect, and used 5,000 bootstrap samples. The moderated mediation index was noteworthy ($\beta = -0.058$, 95% confidence interval $[-0.102, -0.014]$) whereby technological anxiety is a significant moderator of the mediating mechanism. Moreover, the indirect impact of the

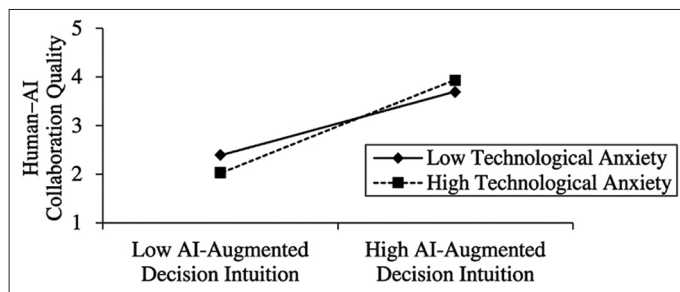
AI-enhanced decision intuition on the strategic flexibility of SMEs through human-AI collaboration quality was more pronounced in the situation of low levels of technological anxiety ($\beta = 0.354$, 95% CI $[0.241, 0.498]$) than in the situation of high levels of technological anxiety ($\beta = 0.261$, 95% CI $[0.152, 0.336]$) These results prove the fact that the mediating process is conditional upon the degree of psychological resistance against technology, thus justifying H₆ (Figure 2).

5. DISCUSSION

The current research paper gives a detailed account of the process by which AI-enhanced decision intuition can boost SME strategic flexibility, through the mediating effect of human-AI cooperation quality, and conditional upon technological anxiety in South Asian SMEs. This series of results is consistent with a buffered mediation model, providing both theoretical and contextual confirmation of AI-based decision-making in the emerging economies. The initial important result validates that AI-enhanced decision intuition has a significant and positive impact on strategic adaptability of SMEs (H₁). This finding is in line with previous studies that have stressed the importance of AI-enhanced thinking abilities in terms of accelerating managerial decision-making, its precision, and environmental sensitivity (Abositta et al., 2024; Raisch and Krakowski, 2021). The result also points to the dynamic capabilities perspective, which states that the companies that have stronger sensing and seizing capabilities are more suited to rearrange resources during dynamic environments (Wang et al., 2025; Jain et al., 2025).

The current study however builds on the previous ones by placing AI as a cognitive augmentation tool thus filling the gap between strategic responsiveness and adoption of technology (Chepkutwo, 2025). This is more so applicable in SMEs in South Asia, where environmental uncertainty and institutional instability call upon fast strategic adaptation. The second result indicates that AI-enhanced decision intuition has a significant positive effect on the quality of human-AI collaboration (H₂). It aligns with earlier research that indicated that cognitive interaction with AI systems leads to superior integration, trust and quality of interactions between humans and machines (Zhang et al., 2026; Jain et al., 2025). Balasubramanian et al. (2022) also found similar results, noting that the consistent use of AI systems enhances interpretability and coordination. Nonetheless, other previous researches suggest that the introduction of AI can lead to dependency or cognitive overload Abositta et al. (2024), which might possibly undermine the results of collaboration. The present results refute the anxiety by proving that when AI becomes part of the intuitively based decision-making, it fortifies instead of dilutes collaborative dynamics, particularly in the context of SMEs where

Figure 2: Visualization of moderation analysis



the form of decisions is less rigid and bureaucratic. The third result reveals that the quality of human-AI collaboration has a positive impact on SME strategic adaptability (H_3). This upholds the socio-technical systems theory that suggests that organizational performance is determined by the compatibility between the social and technical subsystems (Bostrom and Heinen, 1977). The quality of collaboration is high, which is why SMEs can better interpret AI outputs, organize decision actions, and execute strategic changes (Abositta et al., 2024). The finding aligns with those of Trivedi, (2025), who emphasized that the success of AI implementation remains dependent on both technology and human interpretation and integration in organizations. Nonetheless, there have been studies in large corporations that indicate that AI systems are able to drive performance improvement on their own, Raisch and Krakowski (2021), but the current study reiterates that in SMEs, collaborative quality is essential in converting AI insights into strategic action.

The mediation analysis supports the assertion that the quality of human-AI collaboration is a significant mediator between the AI-enhanced decision intuition and strategic adaptability (H_4). This observation aligns with process-based approaches to digital transformation, which contend technological capabilities do not have a direct impact but instead generate effects via intermediary organizational processes (Zhang et al., 2026; Dahri et al., 2025). It also helps Balasubramanian et al. (2022), who underlined that it is human interpretation and embedding in the context that makes AI value a reality. Nevertheless, this mediation was hardly tested in SME settings in previous research, particularly in developing economies where digital maturity disparity exists (Jain et al., 2025). Therefore, the paper presents an important gap in the literature, as it empirically confirms the cognitive-to-collaborative-to-strategic pathway among South Asian SMEs. The moderation results show that technological anxiety weakens the relationship between AI-augmented decision intuition and human-AI collaboration quality (H_5). This observation is consistent with the literature on technology acceptance, emphasizing the importance of emotional barriers on technology use behaviors (Trivedi, 2025; Balasubramanian et al., 2022; Mohammad et al., 2025). The same results were reported by Abositta et al. (2024), who concluded that anxiety decreases the engagement and trust in the system. Nevertheless, although the previous literature mainly centered on adoption intention, the present study builds on the previous findings that anxiety influences the quality of collaboration as well, a more complex and relational measure. This underscores that psychological resistance is not only impactful on usage but also reduces the quality of human-AI integration.

Lastly, the findings of the moderated mediation indicate that technological anxiety plays a significant role as a conditioning factor of the indirect impact of AI-enhanced decision intuition on strategic flexibility through the quality of collaborations (H_6). This underlines socio-technical interaction theory that highlights that both psychological and social aspects influence the success of technological systems (Balasubramanian et al., 2022; Raisch and Krakowski, 2021). The results align with Dahri et al. (2025), who contended that the results of digital transformation rely on the level of technological preparedness as well as human acceptance. Nevertheless, unlike earlier studies that consider psychological factors as discrete moderators, the present study proves that they can be used to construct an overall mediated pathway, thus adding a more integrated and complex picture of AI-driven change in SMEs. On the whole, the results indicate a regular and logically designed process: AI-enhanced decision intuition positively influences collaboration quality, which, in its turn, positively affects the quality of strategic adaptability, and technological anxiety interferes with such a route. This combined description helps in filling knowledge gaps in the dynamic capabilities, socio-technical systems, and adoption of AI research, especially in understudied South Asian SME contexts.

5.1. Theoretical Implications

The research has substantial theoretical implications since it combines the DCT with the theory of STS to illustrate the ways AI technologies can improve the adaptability of SME strategies in South Asian contexts. First, the study expands the framework proposed by Teece (2018) by means of introducing AI-augmented decision intuition as a new micro-foundation of dynamic capabilities. Although earlier research focused mostly on sensing, seizing, and reconfiguring capabilities, at an organizational level Dahri et al. (2025), Raisch and Krakowski (2021), this research illustrates that AI is able to enhance these capabilities by enhancing managerial cognitive processes. This changes the theoretical emphasis of routines at the firm level to cognition-driven formation of capabilities, thus contributing to dynamic capabilities research with AI-powered decision logic (Trivedi, 2025; Gupta and Gupta, 2025). Second, the research contributes to the development of STS theory by empirically confirming the importance of the quality of human-AI collaboration as an essential socio-technical process of integration. Although the STS theory focuses on the joint optimization of social and technical systems Bostrom and Heinen (1977), previous studies have not completely operationalized the quality of collaboration as a mediating variable in AI-mediated SME contexts. This research bridges that gap by illustrating that AI value is not explicit but is formed as the result of effective human-machine interaction (Shafiq et al., 2024; Carayannis et al., 2024). Third, the combination of the two theories offers a multi-level explanatory system, which correlates cognition (AI-enhanced intuition), interaction (quality of collaboration), and psychological boundaries (technological anxiety). This helps to overcome the historical divide of capability-based and socio-technical viewpoints (Abositta et al., 2024; Noerman et al., 2025). Lastly, the study increases theoretical generalizability to non-Western and large-firm contexts, responding to the call to greater research on emerging-economy digital transformation contexts (Dahri et al., 2025; Trivedi, 2025).

5.2. Practical Implications

This research has a number of valuable practical implications to SME managers, policy-makers, and technology developers. To begin with, the leaders of SMEs need to understand that the adoption of AI does not necessarily lead to better performance but instead AI should be incorporated into managerial intuition and decision-making. The training programs should consequently be directed to come up with hybrid cognitive skills which integrate human judgment with the AI generated cognitions. Second, organizations need to take a proactive role in enhancing the quality of human-AI collaboration. This can be done through improving the usability of the system, fostering transparency in AI output, and establishing trust between digital systems and employees. To enhance learning and decision alignment, managers need to promote the cyclic interaction with AI tools. Third, the results emphasize the need to address technological anxiety in the context of SMEs. To minimize psychological resistance, policymakers and industry associations ought to embark on the introduction of digital literacy programs, AI awareness workshops, and practical training programs. This is especially important in South Asia, where the digital divide is still important. Lastly, AI vendors and developers must create systems that are easy to use, understand and context sensitive to help ease anxiety and enhance the quality of collaboration. Overall, the human-centered approach to AI should be chosen by SMEs instead of a technological one.

6. CONCLUSION

The present study outlines in detail the role of AI-enhanced decision intuition in maximizing the strategic flexibility of SMEs by human-AI collaboration quality, and is influenced by technological anxiety. The results are based on the dynamic capabilities theory and the socio-technical systems theory and show that AI can bring in value not directly, but through cognitive and relational processes that are part of the organization processes. These findings prove that SMEs can become much more strategic in their adaptability through the introduction of AI into managerial cognition and the enhancement of human-machine cooperation. But such pathway may be undermined by psychological obstacles like technological anxiety, which explains the significance of human-focused digital transformation. Altogether, this research contributes to the theoretical knowledge and provides valuable information on how SMEs in South Asia can successfully overcome the obstacles of AI-driven change.

Although it has made its contributions, this research has some limitations. To begin with, this research design is a cross-sectional design, which restricts the possibility of making causal conclusions. Longitudinal designs are necessary in future research studies to investigate the development of AI-augmented decision intuition over time. Second, the use of self-reported information can be biased, and statistical tests reported acceptable common method variance. Third, the sample of SMEs in South Asia, which increases the contextual relevance, constrains the external validity to developed economies or other institutional settings. This model needs to be replicated in other geographical areas in future studies to prove external validity. Fourth, this paper discusses a single mediator and a single moderator. The model may be enriched

by including other mechanisms like the organizational learning capability, digital leadership, or data governance maturity in future research. Lastly, the industry-specific dynamics, especially in high-tech industries or government-based organizations, could be investigated in future research to gain a better insight into the contextual variations in the outcome of AI adoption.

7. ACKNOWLEDGEMENT

This work has been carried out in the framework of doctoral program of [psychology of communication and change] of the Universitat Autònoma de Barcelona.

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