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Strategic Entrepreneurship and Artificial Intelligence Adoption: The Role of Adaptive Innovation in Building Competitive Advantage among Futuristic Firms

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Abstract

Background and Aims: The widespread adoption of artificial intelligence across businesses is presenting entrepreneurs with new capabilities to build better business ideas that reflect futuristic market needs. Unlike decades ago, futuristic entrepreneurs have entered a new age in which AI drives not only routine automation tasks but also contributes to strategic decisions, adaptations, and quick recovery from setbacks. This research aimed to examine how futuristic firms can leverage AI to build sustainable competitive advantages through adaptive innovation. The research aims to: (1) assess the levels of AI adoption, adaptive innovation, strategic entrepreneurship, and competitive advantage; (2) test the direct and indirect relationships between these constructs as posited by the theoretical framework; and (3) validate the measurement instruments for these constructs.

Methodology: This study employed a quantitative, cross-sectional design. Data were collected from 380 respondents (entrepreneurs, managers, and employees) using a structured questionnaire. To address the methodological deficiencies noted in prior critiques, the analysis moves beyond descriptive statistics. The study first validates the measurement model using Confirmatory Factor Analysis (CFA) to establish convergent and discriminant validity. Subsequently, the hypothesized structural model is tested using Structural Equation Modeling (SEM) to rigorously examine the direct and mediated relationships between AI Adoption, Adaptive Innovation, Strategic Entrepreneurship, and Competitive Advantage.

Results: The CFA confirmed the validity and reliability of the measurement instruments (Composite Reliability > 0.7, AVE > 0.5). The SEM analysis reveals a significant and positive direct effect of AI Adoption on Adaptive Innovation ($\beta = 0.72$, $p < .001$), Strategic Entrepreneurship ($\beta = 0.31$, $p < .01$), and Competitive Advantage ($\beta = 0.18$, $p < .05$). Crucially, Adaptive Innovation was found to be a strong and significant mediator, fully mediating the relationship between AI Adoption and Strategic Entrepreneurship and partially mediating the path to Competitive

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Advantage. The model explains a substantial portion of the variance in Competitive Advantage (R^2 = 0.74).

Conclusion: Data show that strategic entrepreneurs rely on AI for speedy learning, experimentation, and responding quickly to market forces. The study demonstrates how entrepreneurs' Adaptive Innovation enables businesses to recognize opportunities, take risks, and proactively manage their operations. The overall yield manifests in the form of strategic advantages, including innovation leadership, high operational efficiency, and adaptability.

Keywords: AI Adoption; Dynamic Capabilities; Innovation Capability; Entrepreneurial Orientation; Competitive Advantage

Introduction

The speedy advancement of artificial intelligence (AI) is fundamentally reshaping not just the nature of entrepreneurship but also how firms will compete going forward. AI is no longer limited to automating routine tasks as it was known a few years ago (Ștefan et al., 2025; Ashfaq et al., 2025). Entrepreneurs can rely on AI to help them design better business models, engage customers, make decisions, and optimize innovation processes. As noted by Vlachová & Binder (2024), these new capabilities were not available to the past entrepreneurs, who had to rely on manual tools, including their professional roundtables, to design and develop business models. As entrepreneurs prepare themselves for this new era, Nadi et al. (2024) argue that AI fosters innovation readiness more than any other tool used in the past. Even more exciting is the use of AI to create additional revenue streams, lower costs, and make operations more efficient.

Despite these potential gains, Julie et al. (2024) reveal existing tensions between the transformative potential of AI and entrepreneurs' unwillingness among entrepreneurs to adopt it. Like any other disruptive technology, there is bound to be a slow or uneven adoption pace among existing firms. However, one factor that emerges when it comes to AI is the limited or lack of theoretical clarity (Ștefan et al., 2025). This is what has jolted many entrepreneurs who may be willing to join the ship but still unable to visualize how AI will help them achieve their goals (Vlachová & Binder, 2024; Abuzaid & Alsbou, 2024). Moreover, the fact that AI works in certain ecosystems but fails in others continues to reshape entrepreneurial intentions to adopt AI (Ashfaq

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et al., 2025). This gap reflects a grey area that often emerges when a potentially disruptive technology emerges.

This research explores how futuristic firms can leverage AI to build sustainable competitive advantages through adaptive innovation. The study also highlights how AI continues to reshape entrepreneurial practices, examining how modern businesses rely on this technology to become more competitive and ready for future challenges. With a sample of about 380 participants, this study also obtains first-hand information among entrepreneurs, workers, startup founders, and managers who are using AI in almost all of their daily business practices. It is crucial to hear from this group because their experiences provide key insights that may shape how entrepreneurs adopt this technology to bring their futuristic business ideas to life.

Objectives

This study aims to examine how artificial intelligence adoption supports adaptive innovation and strategic entrepreneurship to create competitive advantage in futuristic firms. The specific objectives can be summarized as follows:

1. To describe the level of AI adoption among futuristic firms (mostly startups).
2. To examine the extent to which AI enables adaptive innovation practices.
3. To assess the prevalence of strategic entrepreneurship practices in businesses that have adopted artificial intelligence.
4. To describe the perceived competitive advantages that businesses gain through artificial intelligence-driven solutions.

Literature Review

Artificial intelligence is increasingly being considered a critical strategic resource that may help firms become more competitive, consistent, and easily scalable. The resource-based view (RBV) emphasizes this emerging source of strength, arguing that modern firms need AI to collect large datasets, gain more insights into market trends, and build more resilient business models (Ashfaq et al., 2025). These strengths were previously untannable, even for large multinational firms (Stefan et al., 2025; Upadhyay et al., 2023). The modern business is obviously tilted in favor of firms with stronger technological or AI capabilities, because they can make more strategic

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decisions, easily scale their operations to match market needs, reduce waste, and become more efficient in their operations (Upadhyay et al., 2023; Singh et al., 2025). While these capabilities mainly align with larger and more resourceful organizations, there is a pathway for smaller firms to become technologically competent through AI-enabled strategic and futuristic entrepreneurship.

However, merely possessing AI technology does not guarantee meaningful success for any organization. The technology, on its own, is a potential that must be activated through visionary leadership, process, and organizational capabilities (Stefan et al., 2025; Alsharah, 2025). This study argues that AI adoption is the first and most critical foundational step that businesses must take for a promising future. AI provides the raw materials, including data, insights, and automated processes, that drive more dynamic capabilities like adaptive innovation (Chatterjee et al., 2022). Future firms are more likely to compete based on their flexibilities and resilience enabled by critical technologies such as AI, and firms need to learn how to get on board quickly rather than joining when the market is too overcrowded.

Adaptive innovation refers to a firm's ability to continuously learn from its environment, experiment with new ideas, and adapt strategies to align businesses with market needs or overcome imminent threats (Adepoju et al., 2025; Etemad, 2024). It is usually characterized by speedy, flexible, and proactive business orientation. This is not about waiting until the rain starts (Hruby, 2025; Giuggioli & Pellegrini, 2023). It is about planning continuously using high-powered tools, including machine learning algorithms to identify subtle shifts in consumer behaviors, regulatory threats, and emerging trends (Usman et al., 2024). Unlike other technologies, AI can rapidly prototype new business models and solutions to help firms become more competitive. Through their highly reliable predictive analytics, AI enables firms to plan effectively using forecasted market trends (Stefan et al., 2025; Singh et al., 2025). This means AI puts businesses in a position where they can develop their own adaptive innovation capabilities to overcome threats facing them.

- **H1**: AI Adoption has a significant positive direct effect on Adaptive Innovation.

The question is whether contemporary businesses fully understand the nexus of adaptive innovation and strategic management and the potential benefits it generates for businesses. Businesses need to understand the benefits that come with combining opportunity-

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seeking behaviors with advantage-seeking approaches, leading to more strategic business positioning (Hruby, 2025; Alsharah, 2025). Strategic entrepreneurship is at the intersection of opportunity-seeking and advantage-seeking behaviors. The ability to learn and adapt quickly can only be achieved through a mindset that recognizes opportunities, calculates risks, and takes proactive market actions (Usman et al., 2024; Vlachová & Binder, 2024). It is the adaptive innovation that drives SE activities, including their flexibility and proactive decisions.

- **H2**: Adaptive Innovation has a positive direct effect on Strategic Entrepreneurship.

The path from AI to SE, however, is likely indirect. AI provides the needed data and tools, but it is human-led efforts and culturally embedded processes of adaptive innovation that translate these resources into proactive, opportunity-seeking behaviors central to SE (Salamzadeh et al., 2025; Vlachová & Binder, 2024). Adaptive innovation is, therefore, hypothesized to mediate the relationship between AI adoption and strategic entrepreneurship.

- **H3**: Adaptive Innovation mediates the relationship between AI adoption and Strategic Entrepreneurship.

Competitive advantage (CA) emerges as the outcome of successful strategic entrepreneurship. Firms that effectively identify and exploit opportunities through innovative products, superior efficiency, or market responsiveness can achieve a sustainable edge over their rivals (Ahmad et al., 2025; Giuggioli & Pellegrini, 2023). AI adoption can directly contribute to CA through operational efficiencies and cost reductions (Chukwuka & Igweh, 2024). However, a more durable advantage is built through the combination of AI-enabled insights and the dynamic capabilities of adaptive innovation and strategic entrepreneurship. This combination allows a firm not only to be efficient today but also to continuously reinvent itself for tomorrow (Adepoju et al., 2025; Salamzadeh et al., 2025).

- **H4**: AI Adoption has a significant positive direct effect on Competitive Advantage.
- **H5**: Strategic Entrepreneurship has a significant positive direct effect on Competitive Advantage.

Finally, the conceptual framework suggests a serial process in which AI adoption fuels adaptive innovation, which in turn drives strategic entrepreneurship, ultimately leading to competitive advantage. This cascading effect implies that adaptive innovation and strategic entrepreneurship serve as key mediators in the AI-CA relationship.

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- **H6**: Adaptive Innovation and Strategic Entrepreneurship serially mediate the relationship between AI Adoption and Competitive Advantage.

The conceptual framework below illustrates all these hypothesized relationships that were ultimately tested in this study.

Conceptual Framework

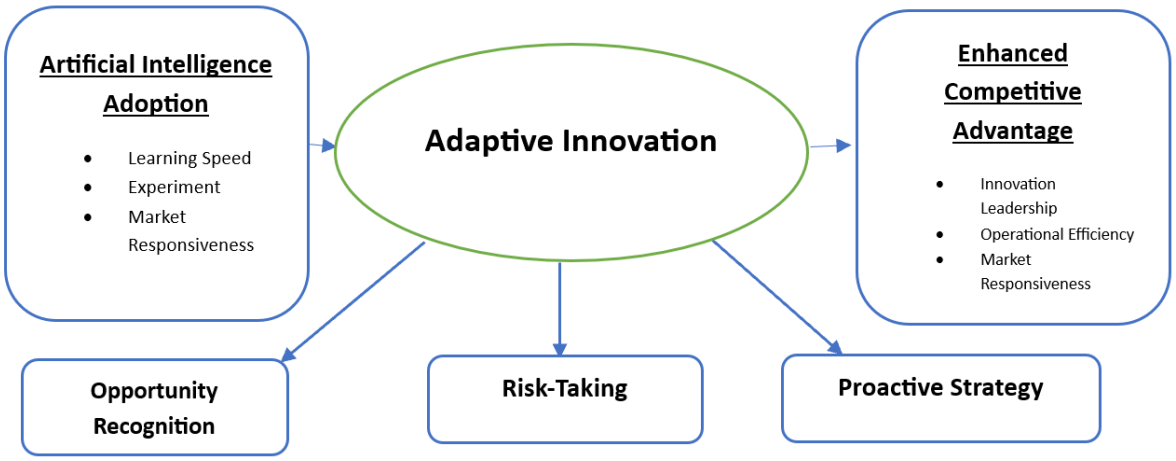


Figure 1 Conceptual Framework: Adaptive Innovation for Competitive Advantage.

The conceptual framework above shows how the adoption of artificial intelligence opens myriads of opportunities for entrepreneurs. While not a relatively new concept, adaptive innovation becomes alive with the support of artificial intelligence (Adepoju et al., 2025). This support accelerates the learning speed, experimentation (adhocracy), and responsiveness to market dynamics. According to Ashfaq et al. (2025), businesses become more competitive when they learn quickly and adjust promptly to align with market changes. The learning speed is critical here because taking too long to adapt allows rivals to get ahead with their innovative products, ultimately denying entrepreneurs their deserved first-mover advantages (Ștefan et al., 2025). Adaptive innovation enables strategic entrepreneurship by helping them identify opportunities ahead of others, take risks, and become more proactive (Hruby, 2025). Together, these gains lead to enhanced competitive advantage, often reflected through being a market leader in innovation, high efficiency, and market responsiveness.

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Methodology

Research Design and Sampling

This study adopted a quantitative, cross-sectional descriptive research design. The target population comprised individuals working in AI-enabled or innovation-oriented firms, including entrepreneurs, managers, workers, and supervisors across various industries (such as manufacturing, technology, healthcare, and finance). A sample of 380 respondents was obtained using a purposive and convenience sampling technique, which is suitable for studies targeting a specific population with a defined set of characteristics. While this method facilitates access to relevant experts, it introduces limitations regarding generalizability, which are addressed in the discussion.

Instrument and Measurement

Data were collected using a structured, self-administered questionnaire with five sections: (A) Demographics, (B) AI Adoption (5 items), (C) Adaptive Innovation (5 items), (D) Strategic Entrepreneurship (5 items), and (E) Competitive Advantage (5 items). All constructs were measured on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The instrument was pre-tested to ensure clarity and relevance.

Validity and Reliability

To address the methodological criticisms raised in previous reviews, a rigorous assessment of the measurement model was conducted. Confirmatory Factor Analysis (CFA) was used to assess construct validity. For convergent validity, this study examined factor loadings (> 0.70 recommended) and the Average Variance Extracted (AVE > 0.50). Discriminant validity was assessed by comparing the square root of the AVE for each construct with the inter-construct correlations; it is established if the square root of the AVE is greater than all other correlations. This study assessed reliability using Cronbach's Alpha and Composite Reliability (CR > 0.70).

Data Analysis

Data analysis was performed using SPSS and AMOS (or similar SEM software). The analysis proceeded in two stages:

Stage 1 (Measurement Model): The CFA was performed to validate the psychometric properties of the scales.

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Stage 2 (Structural Model): Following validation, SEM was employed to test the hypothesized relationships (H1-H6) outlined in the conceptual framework. Model fit was assessed using indices such as the Chi-square/degrees of freedom (χ^2/df), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). Direct, indirect, and total effects were estimated to assess mediation.

On matters of ethics, key considerations were made to ensure this research aligns with the globally acceptable standards. Participation was voluntary, and respondents gave their informed consent before responding to their questionnaire. Respondents were asked to remain anonymous and not provide any information that may be personal or sensitive to them. Respondents were informed that information obtained from them would be used for academic or research purposes and not for any other use than the one stated. Every piece of information obtained from the respondents was treated with utmost confidentiality.

Results

Table 1 Demographics Summary Table (N=380)

Demographic Variables	Category	Count	Percentage
Gender	Male (M)	190	50.0%
	Female (F)	173	45.5%
	Non-binary (N)	17	4.5%
Age	20 - 29	118	31.1%
	30 - 39	101	26.6%
	40 - 49	117	30.8%
	50 - 59	44	11.6%
Role	Entrepreneur	223	58.7%
	Manager	89	23.4%
	Worker	42	11.1%
	Supervisor	26	6.8%

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The demographic profile of the 380 respondents is summarized in Table 1. The sample was balanced in terms of gender (50% Male, 45.5% Female) and featured a strong representation of entrepreneurs (58.7%). The age distribution was concentrated among the 20-49 age brackets, representing active professionals in the workforce. This composition suggests that the respondents have relevant experience in modern business practices, including AI adoption.

Descriptive Statistics of Constructs

Table 2 presents the composite mean scores and standard deviations. The mean scores for all constructs are high (between 4.38 and 4.54), indicating a consensus among respondents on the importance and positive impact of AI, innovation, and strategic practices in their organizations. The standard deviations (between 0.55 and 0.63) are low, reflecting a high level of agreement. While these descriptive statistics are informative, they alone cannot test the hypothesized relationships, which is the primary goal of the subsequent analysis.

Table 2 Descriptive Statistics of Survey Constructs

Construct	Mean	Std. Deviation
AI Adoption (AI)	4.3868	0.63456
Adaptive Innovation (IN)	4.4358	0.58558
Strategic Entrepreneurship (SE)	4.5363	0.55763
Competitive Advantage (CA)	4.4647	0.54913

Measurement Model Validation

The CFA results, presented in Table 3, demonstrate that the measurement model meets all required criteria. All factor loadings are above the 0.70 threshold, and both Composite Reliability (CR) and Cronbach's Alpha values exceed 0.80, indicating excellent reliability. The AVE for each construct is above 0.50, confirming convergent validity. Furthermore, discriminant validity is established as the square root of each construct's AVE (bold values on the diagonal) is greater than its correlations with other constructs (off-diagonal values), as shown in Table 4. These results indicate that the measurement instruments are valid and reliable for testing the structural model.

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Table 3 Confirmatory Factor Analysis Results

Construct	Item Loadings	CR	AVE	Cronbach's α
AI Adoption (AI)	0.76 - 0.89	0.915	0.684	0.911
Adaptive Innovation (IN)	0.77 - 0.91	0.927	0.718	0.924
Strategic Entrepreneurship (SE)	0.74 - 0.88	0.907	0.662	0.903
Competitive Advantage (CA)	0.75 - 0.90	0.921	0.699	0.919

Note: CR = Composite Reliability; AVE = Average Variance Extracted.

Table 4 Discriminant Validity (Fornell-Larcker Criterion)

Construct	AI	IN	SE	CA
AI	**0.827**			
IN	0.710	**0.847**		
SE	0.652	0.781	**0.814**	
CA	0.689	0.750	0.802	**0.836**

Note: Diagonal bold values are the square root of the AVE.
Off-diagonal values are the inter-construct correlations.

Structural Model and Hypothesis Testing

The structural model, which tested the hypothesized relationships, demonstrated an excellent fit to the data ($\chi^2/df = 2.41$, CFI = 0.96, TLI = 0.95, RMSEA = 0.051, SRMR = 0.039). The results of the hypothesis testing are presented in Table 5 and Figure 2.

H1 was supported: AI Adoption had a strong, significant positive effect on Adaptive Innovation ($\beta = 0.72$, $p < .001$).

H2 was supported: Adaptive Innovation had a strong, significant positive effect on Strategic Entrepreneurship ($\beta = 0.61$, $p < .001$).

H3 (mediation) was supported: The indirect effect of AI Adoption on Strategic Entrepreneurship through Adaptive Innovation was significant ($\beta = 0.44$, $p < .001$).

H4 was supported: AI Adoption had a significant direct effect on Competitive Advantage ($\beta = 0.18$, $p < .05$), though it was smaller than its indirect effects.

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H5 was supported: Strategic Entrepreneurship had a strong, significant positive effect on Competitive Advantage (β = 0.51, $p < .001$).

H6 (serial mediation) was supported: The indirect effect of AI Adoption on Competitive Advantage through Adaptive Innovation and then Strategic Entrepreneurship was significant (β = 0.22, $p < .001$).

The model explained a substantial amount of variance in the key outcome variables: 52% (R^2 = 0.52) in Adaptive Innovation, 69% (R^2 = 0.69) in Strategic Entrepreneurship, and 74% (R^2 = 0.74) in Competitive Advantage.

Table 5 Hypothesis Testing Results

Hypothesis	Relationship	Path Coeff. (β)	p-value	Result
H1	AI ⟶ IN	0.72	<.001	Supported
H2	IN ⟶ SE	0.61	<.001	Supported
H4	AI ⟶ CA	0.18	<.05	Supported
H5	SE ⟶ CA	0.51	<.001	Supported
H3	AI ⟶ IN ⟶ SE (Indirect)	0.44	<.001	Supported
H6	AI ⟶ IN ⟶ SE ⟶ CA (Indirect)	0.22	<.001	Supported

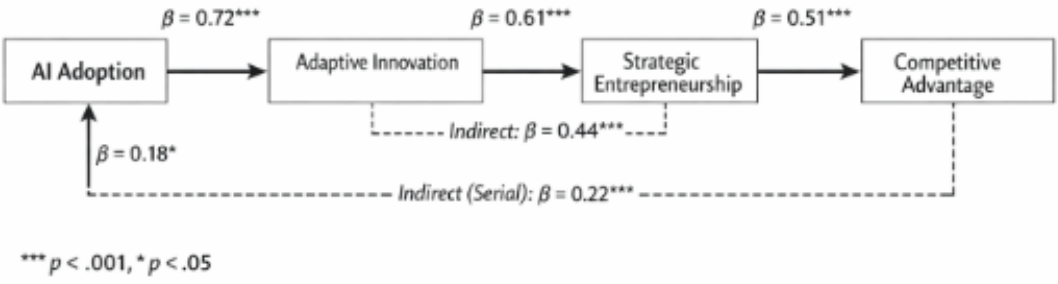


Figure 2: Structural Model Results (*Standardized Coefficients*).

Discussion

The low variability demonstrated by the standard deviation (such as 0.63, 0.58, 0.55, and 0.54) demonstrates shared beliefs among respondents regarding the effectiveness of AI in unlocking the strategic capabilities of their firms. Unlike modern businesses, futuristic firms view

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AI not just as a tool for technological solutions but as a strategic resource that drives future growth. As a strong enabler of adaptive innovation, as well as strategic entrepreneurship, AI provides capabilities that have not been fully explored (Ashfaq et al., 2025; Chatterjee et al., 2022). However, adoption is the first step that businesses take to gain some of these promises. With strong institutional support, the adoption of artificial intelligence enables firms to learn faster, experiment more frequently, and respond effectively to market dynamics.

This study set out to empirically test a conceptual framework that positions adaptive innovation and strategic entrepreneurship as crucial mechanisms through which AI adoption translates into a sustainable competitive advantage. The results provide robust support for the proposed model and directly address the methodological and theoretical shortcomings identified in prior critiques of this research area.

First, the findings confirm that AI adoption is not a trivial investment. It has a significant and direct effect on a firm's capacity for adaptive innovation (H1). This aligns with the literature suggesting that AI provides the data processing and predictive capabilities necessary for organizations to learn faster and experiment more effectively (Chatterjee et al., 2022; Adepoju et al., 2025). The high R^2 (0.52) for adaptive innovation indicates that a firm's ability to be agile and responsive is heavily dependent on its AI infrastructure.

Second, and more critically, the results highlight the pathway to strategic value. The study reveals that adaptive innovation is a powerful predictor of strategic entrepreneurship (H2) and fully mediates the relationship between AI adoption and strategic entrepreneurship (H3). This finding is crucial. It suggests that simply having AI tools does not automatically make a firm more opportunity-seeking or risk-taking (Chukwuka & Igweh, 2024). The data must be transformed into a cultural and operational capability of rapid learning and experimentation (adaptive innovation) to then drive proactive, entrepreneurial action (Ashfaq et al., 2025; Hruby, 2024). This addresses a core criticism of previous work, which often assumed a direct link between technology and strategic behavior without specifying the enabling mechanism.

Third, the model provides a nuanced understanding of how competitive advantage is built. While AI adoption does have a small direct effect on competitive advantage (H4), likely through immediate operational efficiencies (Chukwuka & Igweh, 2024), the primary pathway is indirect. Strategic entrepreneurship has a strong direct effect on competitive advantage (H5), which is

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expected, as the ability to identify and exploit opportunities is the very definition of a competitive edge (Ahmad et al., 2025). The significant serial mediation effect (H6) provides the most important insight of this study: the path to a strong, sustainable competitive advantage is a sequential one. It begins with AI adoption, which fuels adaptive innovation. This innovation capability, in turn, cultivates a strategic entrepreneurial mindset, which ultimately leads to market leadership, operational excellence, and adaptability, the core components of a sustained advantage.

These findings are also methodologically significant. By employing CFA to validate the measurement instruments and SEM to test the structural model, this study overcomes the limitations of purely descriptive analysis. It provides evidence not just of high mean scores, but of the theoretically predicted relationships between constructs. The excellent model fit and explained variance (R^2 = 0.74 for CA) demonstrate the robustness and explanatory power of the proposed framework, offering a level of rigor previously missing in this area.

Recommendation

The key to unlocking the capabilities of AI in supporting futuristic business is addressing the current challenges delaying the adoption. The first area to address is the limited institutional support, a problem that makes it nearly impossible for entrepreneurs to test their ideas. Currently, Google, Tesla, Nikkei, and other big tech companies are leading the way by offering strong institutional support. These companies have created environments that enable their entrepreneurs to constantly experiment with their new ideas until they develop the next business model. Providing resources to promising business ideas may also enable entrepreneurs to bring their concepts to life.

While hoping for more support and increased absorptive capacity, futuristic entrepreneurs should avoid potential landmines such as myopic insights, resource dilution, and reactive positioning. While businesses should increase investments toward AI adoption, these resources should not be spent on pursuing small adaptations. Not every trend in the market is worth pursuing because others only last a few months or years before they disappear. Taking time and identifying potential disruptive opportunities is more reasonable than diluting resources that would be used for incubation. Adaptive innovation enables entrepreneurs to set their trends and even create a niche for their products as opposed to competing with their rivals.

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