Driving entrepreneurial success: navigating AI-driven transformation through workforce agility and sustainability

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Abstract

This research investigates the role of AI-driven transformation and workforce agility in building dynamic capabilities that support entrepreneurial sustainability. Insights were derived from semi-structured interviews with entrepreneurs across different sectors using qualitative methodology. Dynamic Capabilities Theory is used to ground the research and to theorize how AI improves entrepreneurial agility, innovation, and sustainability. It also presents an integrated model of the relationships between integration of AI, workforce agility, and entrepreneurial sustainability. Findings disclose that AI-driven practices improve decision-making and innovation and require constant learning and reorganization. This research helps understand how technology can be used responsibly by linking AI adoption to sustainable entrepreneurial outcomes. Finally, it provides original insights in the context of dynamic capability building to help entrepreneurs navigate the complex technological landscape to preserve long-term value and growth.

Keywords: Artificial intelligence, Entrepreneurship, Automation, Workforce agility, Sustainability

Introduction

In order to remain competitive in the entrepreneurial ecosystem, it is important to stay competitive and integrate artificial intelligence (AI) into the activities of the organization. Entrepreneurs must cultivate a proactive and adaptable perspective to navigate the fast-paced advancements in AI, which offer both opportunities and challenges. AI-driven automation enhances productivity, improves operations efficiency, and creates innovative ways of implementing machine learning, data analytics, and others (Acemoglu & Restrepo, 2019). However, some problems include job displacement, lack of resources, and always a demand to update the skills (Vrontis et al., 2022). In particular, the transformative potential of AI has been attributed to its use in a complete transformation of traditional business models. AI has decreased operational costs and automated working processes, changed the entire industry, and replaced manual roles with effective advanced AI-based systems (Harborth & Kümpers, 2022).

Entrepreneurs must consequently rethink their workforce strategies, organizational structures, and value propositions in order to adapt to this changing market. Moreover, the adoption of AI influences entrepreneurial teams and their broader ecosystem. The demand has to be put on the workforce to make them change, essentially, a way of the development of digital skills, adaptability, creativity, and problem-solving ability. These developments in AI have altered relational and cognitive expectations toward these entrepreneurial teams, wherein work practices and performance are prepared innovatively (Colbert et al., 2016). Therefore, AI technology opportunities and risks should be handled by entrepreneurs by cultivating a culture of continuous learning and upskilling (Bhargava et al., 2021). Entrepreneurs are advantaged by having a unique view of the augmentation perspective, the simultaneous presence of human capabilities with those of AI (Mohapatra, 2021). The discussion implies that the future of productivity decision-making and synergistic workflows is being driven by AI, and human expertise can be used for AI-driven processes (Tschang & Almirall, 2021).

Additionally, it is important to comprehend how the integration of AI molds not only business evolution and productivity but also long-term entrepreneurial sustainability at the holistic level. However, when AI adoption is strategically aligned toward a venture's core business values and capabilities, AI can lead to a strengthening of venture resilience, adaptability, and sustainability (Senadjki et al., 2023). The new view of strategic augmentation will prompt entrepreneurs to a higher level of innovation and value creation (Hisnanick, 1989; Yu et al., 2023). Therefore, this research seeks to critically assess the duality of AI in entrepreneurship, the strategic value it can generate, and the corresponding ethical, operational, and workforce problems faced (Wynsberghe, 2021). This study investigates how AI impacts decision-making, operational agility, workforce dynamics, and, more generally, the overall objective of sustainable development at entrepreneurial ventures through a focus on entrepreneurs in different industries.

This study endeavors to investigate the effect of artificial intelligence-driven innovation on entrepreneurial decision-making, operational processes, and psychological perceptions in entrepreneurial ventures. This study uses 27 entrepreneurs across different industries to identify potential gaps in the adoption of AI and actionable recommendations for the optimization of AI adoption. In particular, this study focuses on how AI adoption influences dynamic capabilities of sensing opportunities, seizing advantages, and transforming business operations in an entrepreneurial environment. It further examines how dynamic capabilities fosters the long-term sustainability of ventures when they use workforce agility as a moderator to facilitate the integration of AI in the business. This study explores the learning generated from these participants through thematic analysis of insights related to the role played by AI in shaping strategies and innovation. Additionally, it also highlights how entrepreneurs can work with challenges, including skill displacement, ethical concerns, and technological adaptation. This research provides practical solutions to adverse impacts, a sustainable entrepreneurial environment, and organizational performance and competitiveness.

This study aligns with the theoretical lens of Dynamic Capabilities Theory and addresses three core research questions:

RQ1. How does AI-driven entrepreneurial transformation influence the development of dynamic capabilities in entrepreneurial ventures?

RQ2. What role does workforce agility play in influencing the relationship between AI-driven transformation and dynamic capabilities?

RQ3. How do enhanced dynamic capabilities, influenced by AI adoption, contribute to the entrepreneurial sustainability of ventures?

This study seeks to offer valuable insights to entrepreneurs, policymakers, academicians, and researchers by supporting the ethical and efficient utilization of AI in entrepreneurial ventures and sowing the seeds for the evolution of AI-powered ecosystems.

AI advancement perspectives

Integration of artificial intelligence through business processes and the strategic decision-making of entrepreneurs has restructured entrepreneurial ventures. In addition to changing operational workflows, AI-driven changes in business activities have also affected entrepreneurs' psychological perceptions and self-efficacy (Yu et al., 2023). As AI changes the nature of work, roles across industries are changing, and entrepreneurs are increasingly realizing they need to adapt their business models (Einola & Khoreva, 2023). For instance, awareness of "STARA" (smart technologies, artificial intelligence, robotics, and algorithms) is known to enhance perceptions of professional goals and negatively influences job satisfaction if not handled well (Brougham & Haar, 2018). While digitization has substantially boosted innovation and entrepreneurship, it has also resulted in the rise of obscure technologies that cater to niche markets or are displaced by more recent alternatives (Kreiterling, 2023). The integration of machine learning, social media, and artificial intelligence into an organization's business system is expected to significantly enhance learning and innovation (Awad & Martín-Rojas, 2024). Encouraging positive AI intention among entrepreneurs is essential for the successful integration of technology into entrepreneurship (Upadhyay et al., 2022). This reflects a long-standing economic view that innovation and knowledge are foundational drivers of developmental progress (Meramveliotakis & Manioudis, 2021).

The regulatory landscape is another thing that entrepreneurs need to think of when doing their work. Sustainable growth and the avoidance of technological risk require an effective governance of AI (Khogali & Mekid, 2023). Businesses without understanding of these dynamics are unlikely to be able to fully exploit AI (Booyse & Scheepers, 2023). AI and big data can enrich entrepreneurship education, preparing future entrepreneurs by integrating algorithms into tasks (Giuggioli & Pellegrini, 2023). AI helps entrepreneurs handle large amounts of data quickly, allowing for informed decision-making and decentralized project management, supporting autonomy and collaborative creativity at the entrepreneurial level (Kiani, 2024). Therefore, for example, AI has helped the human decision-making process to be augmented rather than replace human workers completely (Konuk et al., 2023). The research on digital transformation is to see enterprises using disruptive technologies such as artificial intelligence, generative AI, and quantum computing to transform (Hoessler & Carbon, 2024). At a broader level, sustainable economic development depends not only on micro-level innovation but also on macro-level institutional, policy, and structural transformations, an area where digital technologies like AI play a pivotal role (Meramveliotakis & Manioudis, 2024).

Nevertheless, there are some challenges that entrepreneurs have to overcome with regard to the nature of disruption caused by AI. It may disrupt interpersonal relationships, create insecurity in freelance markets, and affect workplace dynamics (Sison et al., 2023).

It may be necessary for entrepreneurs to handle repetitive tasks that can be automated and also to employ human-like automation models (Coupe, 2019; Fleming, 2019).

AI integration in entrepreneurial practices

The integration of AI brings possibilities for entrepreneurs to speed up the decision-making process, simplify operations, and thereby make themselves competitive. Business analysis with AI-driven tools, predictive insights, and customer engagement can be enabled through AI-driven tools, especially for start-ups and small-to-medium enterprises (Mariani et al., 2023). Entrepreneurs can benefit from integrating AI with human expertise in strategic outcomes, even if that means a risk of losing influence over decision-making processes (Booyse & Scheepers, 2023). Digital entrepreneurship is driven by the growing interest in AI for innovative technology-based solutions, driven by its revolutionary effects on the entrepreneurial landscape (Siddiqui et al., 2024). Technological and AI-driven skills are key to the creation of a resilient entrepreneurial ecosystem (Yu et al., 2023). AI and Big data integration in sustainable entrepreneurship enhances efficiency, optimizes business practices, and minimizes waste, promoting a shift toward sustainable entrepreneurship, a shift that also benefits from grounding in classical political economy perspectives to contextualize long-term sustainability (Bickley et al., 2024; Manioudis & Meramveliotakis, 2022). However, without regulatory foresight and ethical safeguards, AI could risk undermining some aspects of sustainable development, including transparency and safety (Vinuesa et al., 2020).

AI significantly influences entrepreneurial organizations' strategies by transforming data collection into smart data, enabling the development of new entrepreneurship ideas (Blanco-González-Tejero et al., 2023). Compared to traditional entrepreneurship approaches, technologically savvy entrepreneurs may get greater financial returns with less work through AI-enabled business growth (Chalmers et al., 2021). Digital entrepreneurship leverages digital technology to seek and exploit entrepreneurial possibilities, transforming business and communication using emerging and disruptive technologies in the digital environment (Upadhyay et al., 2023). Moreover, AI has been successfully applied in customer service, supply chain management, and recruitment so that output becomes more efficient without compromising its human-centric approach (Ore & Sposato, 2022). In addition, integrating AI must address societal and organizational issues for entrepreneurs. Socio-technical strategies, including the design of human-centric AI systems as well as the interplay between humans and machines, will help address employee apprehension and aid organizations in being more agile (Makarius et al., 2020). Businesses can achieve competitive advantage and sustainable growth by keeping a balance between AI-powered systems and human labor (Bayón et al., 2019).

Despite the rising number of studies, the psychological impact of AI adoption on entrepreneurs and their teams is still not well understood. However, studies have not yet examined to what extent AI advancements affect the decision-making of entrepreneurs, their innovation strategies, and underlying long-run sustainability (Dwivedi et al., 2021). To address these gaps, this study explores the opportunities and challenges introduced by AI advancements for entrepreneurs, offering real-world takeaways for navigating the ever-changing business landscape. This research contributes to the existing literature by explicitly examining how AI-driven transformation influences the development of dynamic capabilities, specifically in sensing, seizing, and transforming processes within entrepreneurial ventures. It also fills a critical gap by evaluating the role of workforce agility as a moderator in this transformation

process, which has received limited empirical attention. Furthermore, this study extends the discussion beyond operational and strategic benefits by exploring the socio-psychological and ethical implications of AI adoption on entrepreneurial teams, an area that remains under-explored in current literature. In doing so, it addresses a multidimensional gap by linking AI adoption to strategic adaptability, and sustainable entrepreneurial performance, thus enriching the theoretical discourse through the lens of Dynamic Capabilities Theory.

Theoretical framework

This study uses the Dynamic Capabilities Theory (DCT), which states that the dynamic capability of an organization is made by the organizational integration, building, and reconfiguration of internal and external resources in order to adjust the internal environmental change (Teece et al., 1997). However, in entrepreneurial ventures, the dynamic capabilities to sense opportunities and threats, seize opportunities, and transform and reconfigure resources are essential to ensure long-term competitive advantage in uncertain markets (Zahra et al., 2006). It is also realized that AI-driven entrepreneurial transformation can help firms' capabilities of finding and exploring opportunities, decision-making, and adaptation. Advanced data analytics, pattern recognition, and market experts on real-time monitoring are used to gather information through AI to sense opportunities. Automating operations and optimizing resource allocation helps improve strategic decisions arising from which seizing capabilities are enhanced. On the other hand, AI facilitates process transformation, reconfiguration, digitalization, automating workflow, and innovation of business models that lead to the improvement of an organization's agility (Aldoseri et al., 2024).

One of the important factors in determining AI-driven transformation as an enabler of dynamic capabilities is workforce agility. It is the ability for employees to flexibly react to new uses of technology, workflows, or market demands to allow the best integration of AI into entrepreneurial processes. In addition, this study attempts to shed light on the relationship between entrepreneurial sustainability and dynamic capabilities in strategic resilience, innovation capacity, and long-run adaptability (Eikelenboom & Jong, 2019). AI applications or capabilities help firms react in a proactive manner toward market disruptions, improve operational efficiencies, and ensure survival in the long run with any kind of business volatility. However, the only way for entrepreneurial ventures to maintain their competitive advantage in the digital era is through the dynamism of sensing, seizing, and transforming resources.

Besides, the dynamic capabilities framework can be used to evaluate the success of entrepreneurial ventures in the two aspects of competitive advantage and sustainable development. In terms of the dynamics of AI adoption, sensing, seizing, and transforming are emergent capabilities that allow entrepreneurs to proactively search for sustainability-oriented opportunities and seize strategically with innovation to transform their operations to achieve long-term environmental and social goals. Integrating these capabilities into AI-enabled transformation puts entrepreneurial ventures in a much better position to become more resilient in facing rapid changes in the digital space and provide sustained economic and social outcomes.

From the theoretical perspective, this study offers the integration of AI-driven transformation, workforce agility, and dynamic capability to explain how entrepreneurial ventures construct adaptability and resiliency. The contribution of this framework is to serve as a basis for

studying the relationships between the adoption of AI, responsiveness of the workforce, and capability building in advancing entrepreneurial success due to the adoption of AI.

Methods

Qualitative research methodology is used in this study to understand how entrepreneur's experience of AI advancements has impacted their businesses. The research adopts a cross-sectional and exploratory approach to investigate the opportunities and risks of AI progress and its effect on the entrepreneurial approach. Participants were selected by purposive sampling to limit the study to entrepreneurs with direct experience of AI adoption and its implementation in operationalizing the business (Setia, 2016). Primary data were collected using in-depth, semi-structured interviews, so researchers could get detailed and quite nuanced information about the background of participants. Participants had to be entrepreneurs who had actively implemented AI technologies in their business systems for a minimum of 2 years in order to provide useful insights. In addition, this study was done with the aim of ensuring industry diversity, as the entrepreneurs included those from the technology, retail, healthcare, and finance sectors.

The sample for this study consists of 27 entrepreneurs operating from two major entrepreneurial hubs, i.e., Mumbai and Pune. As a matter of fact, these locations have a well-known start-up ecosystem or ties in the technology and entrepreneurial space. Both Mumbai and Pune were deemed to have played a huge role in India's start-up landscape, with Mumbai being the economy and innovation hub and Pune being a tech hub. The cities offer a representative sample of AI-powered entrepreneurial ventures that are working in highly competitive and fast-changing market environments. Information saturation was used to ensure saturation had been achieved after 27 interviews to increase the reliability and validity of the findings. To determine this claim, information saturation was found to depend on the assumption that follow-up interviews provided no new themes or data (Guest et al., 2006). A review of all the important patterns through a systematic, iterative data analysis process was the correct way to determine the occurrence of theoretical saturation (Boddy, 2016).

The data were subjected to thematic analysis that brought out recurring patterns and themes on the influence of artificial intelligence on entrepreneurial decision-making. The researchers were thus able to uncover the opportunities and challenges of AI adoption, as well as certain ways of embedding AI solutions in entrepreneurial ventures. The thematic analysis process involves (1) familiarization with the data, (2) initial coding, (3) identification of themes, (4) assessment of themes, (5) refining and naming themes, and (6) final report writing. In a bid to make the analysis strong and eliminate prospective biases, multiple independent coders reviewed the data, with consensus discussion used to reconcile differences in theme identification (Braun & Clarke, 2006).

In this study, 27 in-depth, semi-structured interviews were conducted with entrepreneurs who run their businesses using artificial intelligence. The interview guide was designed with the aim of uncovering the changes that AI has brought to business operations, strategic decision-making, and entrepreneurial agility. Questions were open-ended to allow for detailed responses, and there was space for further follow-up probes to explore the developing themes further. Table 1 shows the categorization of the respondents based on their affiliation with the target group and experience with entrepreneurial ventures. The ethical standards were maintained, and the confidentiality and anonymity of the data were ensured.

Table 1 Information about entrepreneurial respondents

Respondent group	Experience	Respondents
Group 1: Beginners	Tenure: 0–2 years	E5, E11, E13, E16, E22, E23, E27
Group 2: Early-stage entrepreneurs	Tenure: 3–5 years	E1, E3, E4, E6, E9, E12, E15, E17, E25
Group 3: Mid-career entrepreneurs	Tenure: 6–8 years	E2, E7, E14, E18, E19, E24, E26
Group 4: Established entrepreneurs	Tenure: 9 + years	E8, E10, E20, E21

All the interviews were then transcribed, and data were cleansed to make it accurate and consistent. NVivo qualitative data analysis software assisted in the systematic management and analysis of the transcribed interviews. Thematic analysis, as exercised by Braun and Clarke (2006), was applied to analyze the data to identify patterns and themes that arose from the data. From this analysis, we identified four broad themes and a number of sub-themes, which are presented in Table 2. The main themes include (1) AI-driven opportunity and risk perception, (2) harnessing opportunities for entrepreneurial sustainability, (3) AI-enabled strategic restructuring, and (4) workforce agility driving sustainable entrepreneurship. The research findings aim to provide entrepreneurs, policymakers, and researchers with actionable strategies to integrate AI into entrepreneurial ventures effectively.

Results

Four primary themes and corresponding sub-themes emerged from this study following the analysis of the entrepreneurs' responses. Table 2 outlines the main themes and sub-themes. Below, each theme is discussed in detail with relevant quotes from participants, providing evidence for the qualitative coding process.

Theme 1: AI-driven opportunity and risk perception

This theme reflects how entrepreneurs perceive both the potential for change and the underlying threats pertaining to integration with AI. The subsequent sub-themes expand on their interactions with AI technologies, the perceived dangers to established business models, digital trust problems, and how AI is being employed to predict market changes.

Sub-theme 1: Adoption of diverse AI tools by entrepreneurs

Entrepreneurs mentioned a deliberate shift toward the use of alternative AI-based tools to improve their business operations. Other than simply embracing technology for effectiveness, respondents indicated a growing heavy reliance on AI to offer strategic insights, monitor customer behavior, and enhance operational responsiveness.

E1: "As a business owner, I use Tableau and ChatGPT to analyze data and better know the trends that consumers follow."

E2: "AI advances led me to acquire data science knowledge so that I can manage my start-up better."

Table 2 Thematic analysis

Sr. No	Sub-theme	Response of interviewee
Theme 1. AI-driven opportunity and risk perception		
1	Adoption of Diverse AI Tools by Entre-preneurs	E1, E2, E5, E18,
2	Risk to Traditional Entrepreneurial Roles and Business Models	E24, E25, E15, E4, E8
3	Data Accuracy, Privacy, and Digital Trust	E3, E6, E7, E17, E12, E13
4	Sensing Market Shifts and Business Risks	E23, E27, E25, E16, E19, E22
Theme 2. Harnessing opportunities for entrepreneurial sustainability		
1	Efficient Data Management and Decision-Making	E10, E11, E14, E17
2	Time Efficiency Driving Business Growth	E12, E13, E16, E14, E15, E18
3	Increased Productivity and New Business Opportunities	E19, E4, E20, E22, E26
4	Lifelong Learning for Business Flexibility	E15, E22, E17, E15, E26
Theme 3. AI-enabled strategic restructuring		
1	AI-Driven Process Optimization	E7, E26, E15, E12, E11, E10
2	Restructuring Workforce Roles	E9, E23, E2, E5, E7, E11
3	Redefining Competitive Advantage	E5, E20, E9, E10, E6
4	AI as a Business Enabler for Entrepre-neurs	E11, E18, E12, E23, E24
Theme 4. Workforce agility driving sustainable entrepreneurship		
1	Skills Gap and Entrepreneurial Adapt-ability	E22, E3, E5, E6
2	Enhancing Agility Through AI Integration	E8, E20, E1, E21, E23, E25
3	Optimizing AI–Human Collaboration	E12, E15, E17, E19, E25
4	Ensuring the Accuracy and Reliability of AI Tools	E7, E4, E10, E15, E19, E21
5	Continuous Upskilling for Agile Teams	E19, E4, E20, E22, E26

E5: "We use Watson and AI chatbots in order to reduce our time going through customer support."

These quotes emphasize the way entrepreneurs are transforming from passive data gathering to proactive information processing, employing artificial intelligence as a direct cognitive facilitator. This is an individualized transformation as they reskill to manage AI-driven operations, consciously automating the front-end tasks to re-direct human effort into strategic priorities.

Participants said that the addition of different artificial intelligence instruments provided better resource management. Successfully scaling businesses and evolving to new market requirements are essential components in enabling competitive advantage and entrepreneurial growth.

Sub-theme 2: Risk to traditional entrepreneurial roles and business models

The respondents acknowledged that intelligent systems and automation were profoundly changing fundamental aspects of their business practices. Artificial intelligence is not just an ancillary tool; instead, it is reshaping role expectations, task

assignments, and the very basis of business models, especially in sectors like manufacturing and retail.

E26: "Artificial intelligence is transforming the entrepreneurial ecosystem. This is best exemplified by the retail industry, which is witnessing automation replace roles that were previously the preserve of traditional inventory management roles, thereby leading to job displacement."

E7: "Computerized business models are profoundly affecting firms that are heavily dependent on huge production and labor-intensive operations. Although gains in efficiency are evidently observed, there remains an extensive necessity for human judgment in numerous fields."

Both quotes point out that although artificial intelligence enhances operational efficiencies, it does so by displacing traditional workforce jobs, thereby creating a trade-off between social responsibility and innovation. Entrepreneurs stressed the importance of reframing existing business models to counter these risks.

Sub-theme 3: Data accuracy, privacy, and digital trust

Validity issues of the data, ethical application of AI, and customer trust came to the forefront. Entrepreneurs were concerned about over-reliance on data from AI, especially when the origin or algorithmic bias was not known. Trust in data accuracy was linked directly to brand reputation and long-term viability.

E23: "AI-generated data is not always to be trusted, and as business people, we cannot risk decisions based on false or immoral outputs."

E9: "Business reputation is based on online trust. If our customers do not trust the AI software we use in decision-making or analytics, it reflects on our brand and future existence."

These results underscore the moral responsibility of entrepreneurs to have artificial intelligence output tested not just for operational correctness but to uphold public confidence and create business integrity.

Respondents pointed toward the need for strict data validation processes and adherence to good ethical principles to improve the reliability and integrity of artificial intelligence systems.

Sub-theme 4: Sensing market shifts and business risks

Most of the participants said that the use of digital tools helped them respond better to changing market conditions. They claimed that data-driven insights help them comprehend changing consumer behavior, monitor emerging trends, and detect possible threats to their businesses.

E23: "I can now track what customers are leaning toward. These tools sort of alert me when there is a change in preferences, and that has been a huge help in adjusting our strategies."

E27: "I use AI tools to monitor competitors' activity and sense a change in the market environment. They are a kind of radar system that can detect threats."

These words imply that artificial intelligence is not only simplifying processes but also improving forecasting abilities, thus allowing business executives to stay ahead of the curve in identifying future trends and risks.

These findings emphasize that entrepreneurs utilize technology not merely for automation but also for staying well-informed and responsive. Through an early recognition of changes, they can improve their preparation and reduce possible disruptions.

Theme 2: Harnessing opportunities for entrepreneurial sustainability

This theme outlines how entrepreneurs utilize AI strategically to enhance efficiency as well as build long-term resilience and agility in a dynamic business environment. The following sub-topics illustrate how AI generates informed decision-making, improvement in productivity, and continuous learning toward entrepreneurial sustainability.

Sub-theme 1: Efficient data management and decision-making

Members pointed out the use of artificial intelligence in the management and understanding of business information. Most emphasized that AI technologies are most useful in detecting patterns, maximizing time, and making faster, wiser decisions.

E10: "Artificial intelligence makes data storage and analysis on a large scale possible, necessary to stay in business. Clear and timely information is necessary in order to move forward, and AI delivers it in an efficient manner, without the need for a lot of manual review."

This underscores that entrepreneurs can handle massive volumes of data more effectively, using artificial intelligence to transform complexity into clarity where decision-making is more timely and informed.

Respondents expressed a strong appreciation for the capacity of artificial intelligence to identify subtle changes in customer sentiment or product performance, thereby enabling them to easily modify marketing strategies or modify products.

Sub-theme 2: Time efficiency driving business growth

All the interviewees strongly emphasized the contribution of artificial intelligence to automating the time management of repetitive and routine operational tasks. This AI feature of time saving was considered a determinant that helped entrepreneurs devote time to more essential functions, such as entrepreneurial innovation and sustainable strategic planning.

E12: "AI helped me get things done in half the time, so I could free up bandwidth to grow my business even further."

E13: "AI has provided me with new opportunities to innovate and scale my start-up faster than ever. I no longer waste the whole day getting bogged down in repetitive operations."

These indicate how time gained due to AI goes beyond organizational benefits and straightaway converts to business expansion and innovative discoveries.

The productivity generated by artificial intelligence was emphasized by the participants as being that which not only boosts productivity on a daily basis but also serves as a catalyst to overall business and entrepreneurial growth.

Sub-theme 3: Increased productivity and new business opportunities

Automation driven by AI not only improved efficiency in production but also created new entrepreneurial frontiers. Members talked about how cognitive space created by automation led them to explore new areas, experiment with new business models, and identify underserved customer needs.

E4: "Using AI tools gave me the confidence to go into areas like ed-tech, which I would never have thought of going into before. It made it more possible for me."

E19: "Automation of repetitive work enables me to spend time innovating and developing new services."

The quotes reveal a change in the mindset of entrepreneurs from running their businesses to consciously transforming and diversifying them.

Such comments from participants have revealed how AI technologies influence not just business operational efficiency but also entrepreneurial growth, enabling business operators to innovate and diversify in competitive markets.

Sub-theme 4: Lifelong learning for business flexibility

It involves continuous self-development and the development of team members' skills to function in an AI-based world. Entrepreneurs highlighted the importance of creating their own skills, taking courses on AI, or learning by doing in order to stay in the game and adapt to new technologies.

E22: "I keep on updating my skills to accommodate the changes in the market and to ensure that it is relevant to my business."

E15: "Adopting artificial intelligence innovations and knowing how to utilize the skills required to co-exist with these technologies has avoided stagnation in my business."

These quotes from business executives suggest a forward-thinking approach to change and signal that openness in thought and learning is considered essential to success in the long term.

The findings outlined reveal that the sustainability of entrepreneurship in the context of artificial intelligence is inherently linked to continuous improvement in skills, hence reinforcing the significance of adaptability and responsiveness in business operations.

Theme 3: AI-enabled strategic restructuring

This theme is an indication of how entrepreneurs are not only incorporating AI into their business processes but also revolutionizing fundamental structures, functions, and value propositions. AI is emerging as an organizational change agent, forcing entrepreneurs to rethink efficiency, competitiveness, and human–machine interaction.

Sub-theme 1: AI-driven process optimization

Members indicated how AI revolutionized the efficiency of operations by removing labor-intensive steps and redundancy. Entrepreneurs mentioned the speed, precision,

and affordability of AI-driven solutions that automate repetitive processes, allowing businesses to grow without increasing proportional operational burden.

E18: "Before, we would spend hours working with data by hand. Now, we let AI handle it for us, and it has made everything so much simpler and quicker."

E11: "The way AI simplifies our backend operations is a huge relief. It deals with customer inquiries and reports, requiring only our supervision; this feature saves a great deal of time."

These factors underscore that the worth of artificial intelligence is more than the simple replacement of labor; instead, it includes its potential to increase operating intelligence, reduce turnaround times, and free human resources for more strategic pursuits.

Participants underscored that optimization through AI has allowed them to respond faster to market needs, reduce errors, and maintain uniformity in offering services. The shift is very significant for start-ups and small businesses that aim to expand without necessarily increasing their resources significantly.

Sub-theme 2: Restructuring workforce roles

Entrepreneurs reported that the incorporation of artificial intelligence necessitated rearranging the composition of teams. With mechanical or redundant tasks being automated, humans were reassigned to more strategic and creative roles. This sub-theme attests to the growing need for adaptive, flexible workers who could co-exist alongside AI systems.

E27: "Previously, employees used to spend a lot of time on follow-ups and data entry. Now that all this work is done automatically, we are re-deploying those team members to focus on product development and customer analysis."

E4: "The arrival of artificial intelligence has altered our expectations of worker performance. Now we're looking for people not only able to perform tasks, but instead able to apply critical thinking, problem-solving, and innovation in combination with technology."

This change reflects a more profound cultural shift as the entrepreneurial workplace moves from execution-oriented to insight-oriented, necessitating ongoing team upskilling and reskilling.

Some business owners reported that resistance to role changes, especially from senior staff, required adopting proactive change management measures. Some of these measures involved mentorship programs, experiential learning on AI applications, and free communication on role changes.

Sub-theme 3: Redefining competitive advantage

Most of the participants conceded that the competitive advantage had moved beyond the mere accumulation of resources; today, it encompasses the creative and strategic leveraging of artificial intelligence. The pioneers of AI noticed a clear advantage in providing tailored services, accelerating innovation cycles, and enhancing the overall customer experience.

E3: "The current competitive advantage we possess is not solely attributed to the size firm, but rather to our rapid adaptability and our ability to provide distinctive offerings through the utilization of these tools."

E6: "We have seen growth because we use AI to give a better customer experience. Others in our sector still work manually, and that is where we gain."

This shift in competitive narrative from asset dependence to flexibility repositions AI from being an afterthought to being a central force for differentiation and growth.

Entrepreneurs have noted that the capacity to use technology to drive customer interactions, minimize delays in operations, and create tailored products is becoming increasingly significant as a competitive differentiator.

Sub-theme 4: AI as a business enabler for entrepreneurs

Entrepreneurs envisioned AI as something beyond a productivity tool. It became a strategic facilitator, allowing them to maintain focus on vision-setting, opportunity mapping, and business model development. Participants reported that by taking on complicated analysis and mundane processes, AI increased their decision-making ability.

E24: "I use artificial intelligence programs such as ChatGPT and natural language processing algorithms to carry out tasks, data analysis, and growth strategies."

E25: "AI should be there to support entrepreneurs, not to replace them. We need to balance humans with technology."

The focus on "balance" is a sophisticated appreciation of artificial intelligence, presenting it not as a negation of human agency but as an enabler of entrepreneurial freedom and preparedness for the future.

The responses highlight that AI is not just an automation device but strategically allows entrepreneurs to grow businesses, enhance decision-making, and foster customer satisfaction with an essential human element.

Theme 4: Workforce agility driving sustainable entrepreneurship

This theme deals with how entrepreneurs are proactively fostering agility among their teams to gain a competitive edge in an AI-driven business environment. The participants voiced that although AI technologies are so promising, human adaptability, ethical accountability, and ongoing learning are the keystones to maintaining entrepreneurial resilience in the long term.

Sub-theme 1: Skills gap and entrepreneurial adaptability

Entrepreneurs have noted the widening skills gap that has emerged as a result of the rapid development of artificial intelligence, citing the challenges of reskilling aged employees or upskilling themselves to remain competitive. The pace of changes fueled by AI has been characterized as overwhelming, especially for those without a technology background.

E5: "The fast pace of AI advancement is leaving huge numbers of small business owners and older employees struggling to keep up."

E20: "Future automated jobs may phase out some work entirely, and as an entrepreneur, I have to think about reimagining my team structure and skillsets."

These results highlight the imperative need for adaptive capacity, both in the technology adoption process and in redesigning business and planning the workforce in order to escape exclusion and obsolescence.

The participants highlighted lifelong career development, flexibility, and forward-looking upskilling as essential drivers of reducing employment insecurity and long-term entrepreneurial success.

Sub-theme 2: Enhancing agility through AI integration

Entrepreneurs consistently asserted that agility was not only an operational concern but also had reputational and ethical consequences. Some participants pointed to the ethical aspects of using AI in customer analytics, hiring, and financial considerations.

E22: "AI must be used responsibly and prudently, especially in customer sentiment analysis and even in finances, so that there are no ethical concerns and digital trust is maintained."

This assertion highlights that sustainable entrepreneurship requires not only technical proficiency but also ethical management of AI use.

Respondents also linked ethical accomplishment with customer loyalty, expressing that transparent use of AI promotes trust between firms and consumers and separates ethical firms from exploitative or secretive data practices.

Sub-theme 3: Optimizing AI–human collaboration

Participants stressed the need for a synergetic relationship between artificial intelligence and human capabilities, noting that there is a necessity for harmonious collaboration as opposed to substitution in order to achieve entrepreneurial success. The majority of participants noted that although AI can enhance precision and operational efficiency, it should be ensured that it operates alongside human intuition, creativity, and judgment in order to achieve maximum outcomes.

E1: "Applications of AI are able to boost productivity, but AI never takes the place of human entrepreneurship and instinct."

E20: "The real value of artificial intelligence is that we are able to marry human thinking and AI to help us tackle hard problems in the world of business."

This co-evolution model is a paradigm change from tool purchasing to strategic co-evolution where humans and AI learn from and supplement each other in constant loops of action and learning.

Participants presented a type of collaborative model where AI aids human judgment but does not replace it. Machine intelligence combined with human judgment was seen as a facilitator of adaptability and long-term business growth.

Sub-theme 4: Continuous upskilling for agile teams

Participants highlighted the highest priority, which lies in continually upgrading skills as a result of rapid development in artificial intelligence technologies. Entrepreneurs observed that staying competitive in the virtual entrepreneurial world requires not only personal development but also active resource diversion toward training their staff.

E12: "Entrepreneurs must invest in the training of themselves and their staff to become better equipped with AI tools."

E7: "Sustaining a competitive edge in the marketplace requires continuous training on new technologies and promoting a culture of such pursuit within our teams."

These align with wider organizational plans where upskilling is a strategic investment rather than a cost-cutting measure to deliver future innovations.

Entrepreneurs saw the significance of lifelong learning and continuous upgrades in skills as being crucial in building workforce flexibility, innovation, and sustainable development in an ever-evolving technological environment.

Sub-theme 5: Ensuring the accuracy and reliability of AI tools

Participants expressed a consistent concern regarding the trustworthiness and safety of AI-produced outcomes. As AI software becomes more central to decision-making, entrepreneurs stress the importance of data authenticity, preventing bias, and mitigating risks generated by flawed algorithmic logic.

E8: "Accuracy and reliability of AI tools drive trust in them. They need to be able to provide value without the quality or efficiency of it being compromised."

E4: "A company should ensure the authenticity of AI application for operations prior to using it to prevent risks."

This suggests an entrepreneurial risk awareness that sees validation processes and ethical audits as prerequisites for responsible AI use, not an afterthought.

The respondents reflect a strong preference for a strategic and cautious evaluation of artificial intelligence systems, suggesting that entrepreneurs are not just embracing technology but are also focusing on its reliability to avoid operational risks and safeguard business performance.

The themes described in this study create a consistent narrative of the entrepreneurial transformation in the context of the AI era. Theme 1 lays the ground by emphasizing digital trust, data accuracy, and the ethical application of AI, thereby establishing the ground for ethical innovation. This is then seamlessly followed by Theme 2, where lifelong learning and flexibility allow entrepreneurs to cope with technological disruption and ensure sustainability. Theme 3 further develops this idea by depicting how the application of AI provokes strategic reorganization, shifting human functions to creativity and decision-making. These changes are well depicted in Theme 4, where workforce agility allows entrepreneurs to implement the above-mentioned themes, reacting to change with ethical sensitivity, ongoing learning, and convergent collaboration of human and AI work. All these themes together depict that sustainable entrepreneurship in the era of AI needs an integrated evolution of ethics, capabilities, strategies, and adaptability.

Discussion

The results analysis indicated that entrepreneurs should use AI ethically and wisely. Artificial intelligence should help entrepreneurs in their activities and help businesses operate, not as a substitute for human labor. AI enhances performance, productivity, and time management, but entrepreneurs consider the risks involved in adopting it. Given this, employees engaged in analytical or repetitive roles are quite vulnerable to job displacement, and digital transitions can increase employment uncertainty and resistance. However, given that some AI technologies are used by numerous entrepreneurs, they also need to be aware of over-reliance on AI technologies and how to handle concerns about data security, privacy, and algorithmic opacity.

The research points to the increasing significance of ethical challenges and long-term consequences associated with AI adoption in entrepreneurial businesses. As AI facilitates data-driven decision-making and automation, it can also bring algorithmic bias, minimize human oversight, and undermine traditional values of transparency and trust. Thus, entrepreneurs should take into account the ethical implications of AI beyond compliance so that the deployment of AI is in line with organizational values, stakeholder expectations, and broader social impacts. Using the Dynamic Capabilities Theory as a base, this study highlights the fact that AI-driven entrepreneurial transformation can improve the capacity to sense, seize, and transform opportunities when correlated with workforce agility. Dynamic capabilities are observed to represent a prerequisite for entrepreneurial sustainability in emerging markets. The proposed model (Fig. 1) highlights how AI is engaged with an agile workforce to produce capabilities that also enable strategic resilience, innovation, and adaptability to comprise the strategies of long-term sustainability.

To mitigate AI-related risks, entrepreneurs can adopt transparent and explainable AI systems and ethical audits to eliminate bias and misuse. Also, entrepreneurs should help employees with continuous learning and set internal governance structures, so this AI system becomes accurate, reliable, and ethical. It involves the compatibility of AI use with ethical paradigms, digital trust, and ensuring the confidentiality of sensitive information. The more AI is being adopted, the more it increases the possibilities of misuse and unexpected outcomes, and forward-looking governance becomes a core of long-term entrepreneurial practice. On top of that, entrepreneurs need to create a culture of learning that encourages employees to keep updated with the skills necessary for surviving in the long term in an AI-enriched work environment.

Based on the research outcomes and participant opinions, this research provides a number of practical suggestions. Entrepreneurs must value ethical principles and long-term value creation when they use AI instead of aiming only for gains in efficiency. Workforce agility is key to mediating the relationship between AI transformation and capability development. Cross-functional training, flexible structures, and digital literacy will help companies absorb AI-related insight more effectively and drive innovation. It can help entrepreneurs promote adaptability and ethical responsibility that will make AI a viable business growth force.
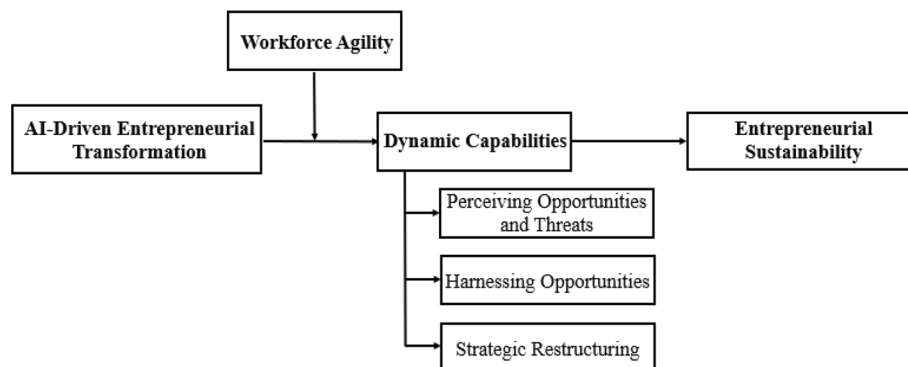
Fig. 1 Proposed model based on findings of the current study

Furthermore, this research argues that the ethical and strategic implementation of AI will have a great impact on the overall goals of entrepreneurial sustainability and sustainable development. Entrepreneurs increase the resilience and adaptability of the business model through the use of AI to improve resource efficiency, eliminate redundant operations, and develop environmentally friendly innovations. Moreover, the reflective embedding of AI provides an easier transition for the workforce by supporting reskilling, upskilling, and inclusive talent development, which aids the social aspect of sustainability. These are a foundation of the dynamic capabilities of entrepreneurial firms that support sensing and responding to changing markets, which keep their human capital and promote ethical development.

Finally, the research shows how entrepreneurs can leverage AI to gain business advantages and serve as a catalyst to foster long-term human-centered firms. In order to make growth inclusive and sustainable, entrepreneurs, investors, and policymakers should treat AI as a force that can transform societies and can do so only with strategic guidance, moral thinking, and collective accountability.

Implications, limitations, and future studies

The theorizing contribution of this study lies at the intersection of theoretical discourses on AI in entrepreneurship as it pertains to organizational dynamics and human–AI collaboration. It contributes to digital transformation literature, making the points of critical interventions, such as employee training and change management. This study is consistent with the theory of dynamic capability and allows us to strengthen the importance of adaptive strategies in successful AI integration. The contemporary discussions of sustainable AI-driven business models are aligned with reasonable use of Ethical AI and responsible deployment. In light of the findings, this study also reinforces that entrepreneurial sustainability depends on continuous upskilling, workforce agility, and ethical AI governance factors that align with the principles of dynamic capabilities theory and support long-term adaptability in volatile environments.

This study presents entrepreneur's actionable insights on the adoption of AI as it affects business practices. Nevertheless, this study brings attention to the need for employee engagement and training in order to seamlessly adopt AI. Entrepreneurs have to deal with challenges like resistance to change, ethical concerns, and over-reliance on AI-driven decision-making proactively. This follows a structured AI integration model, including systematic deployment, continuous monitoring, and creating an iterative improvement based on feedback with the alignment of business goals and long-term sustainability. Drawing from the discussion, entrepreneurs must establish internal governance mechanisms to ensure responsible AI usage, including bias audits, privacy protections, and transparency measures to maintain stakeholder trust. Basing on human–AI collaboration, skill development, and responsible use of AI will keep a business competitive and adaptive. These capabilities, when supported by an agile workforce, enable firms to continuously transform operations, respond to market changes, and remain competitive under AI-driven disruptions.

This study focused only on the effects of AI within a certain industry, thus limiting its generality in other entrepreneurial sectors. Future research should include a wider look at the industry where AI is being adopted, as it is being used in fields including retail,

manufacturing, and services. Furthermore, the small sample size limits the applicability of results to a larger entrepreneurial landscape; the use of the qualitative methodology also limits the applicability of findings to other settings. Future studies should increase the sample size and quantitative studies in order to increase the robustness and generalizability of insights. This study followed a cross-sectional approach, which allowed the capture of current AI trends but did not provide insights into future implications. Future longitudinal studies are encouraged to track the evolving relationship between AI adoption and dynamic capabilities over time, providing deeper insights into the sustained impacts on entrepreneurial growth and transformation.

In addition, AI's reach goes beyond operational efficiency and applies to enhancing customer experience, generating and adding to innovation, and driving strategic decision-making. Future research can further explore AI's role in redefining entrepreneurial value propositions, customer personalization, and innovation acceleration, especially in diverse organizational contexts such as start-ups, family businesses, and digitally mature enterprises. Therefore, the sensitivity of the proposed model to an organization will be tested by embedding it across various organizational contexts, such as start-ups, family businesses, and large enterprises. A combination of the evaluation of AI strategies in different business structures, with the aim of tailoring AI adoption frameworks to respective needs, will result in improved competitive advantage and better implementation effectiveness.

Conclusion

This qualitative study examined how AI-driven entrepreneurial transformation influences the development of dynamic capabilities, specifically, the ability to perceive opportunities and threats, harness opportunities, and undertake strategic restructuring. It also highlighted the moderating role of workforce agility in strengthening the relationship between AI adoption and capability building, ultimately contributing to entrepreneurial sustainability. The findings underscore that AI should not be viewed as a replacement for human labor but rather as a strategic enabler that enhances productivity, decision-making, and adaptability when implemented ethically and thoughtfully. This study contributes to the advancement of Dynamic Capabilities Theory by illustrating how AI technologies, coupled with agile workforces, help entrepreneurial ventures sense, seize, and transform opportunities in rapidly evolving markets. The proposed model offers a practical framework for entrepreneurs to incorporate AI in a way that significantly improves performance and develops the workforce and long-term strategic resilience. For entrepreneurs, investors, and policymakers, it provides them with insights on how to work ethically with AI integration, minimize workforce disruption, and build inclusive innovation ecosystems.

This study ultimately emphasizes that the adoption of AI in entrepreneurial ventures should not merely improve productivity and performance but also promote sustainable development. AI can be integrated ethically and strategically driven to force long-term entrepreneurial sustainability through responsible innovation, inclusive growth, and environmentally and socially conscious business practices. This study offers significant insight, but it lags behind due to its small sample size and specific sector. These limitations suggest that future research could expand by employing quantitative methods

to validate and generalize the findings across broader populations. Comparative studies across different geographic regions or industries could offer deeper perspectives into how contextual factors shape the AI–dynamic capabilities–sustainability relationship. Additionally, longitudinal research may help capture the evolving nature of AI's impact on entrepreneurial strategies over time. By aligning AI deployment with workforce agility, ethical standards, and dynamic capability development, entrepreneurs can foster competitive advantage while ensuring adaptability and human-centric innovation in an increasingly digital business environment.

Declarations

Ethics approval and consent to participate
As our study involved interviews with voluntary participants without including sensitive or vulnerable populations, ethical approval was not required. Informed consent was obtained to conduct the interview.

Consent for publication
This study does not include any identifying images, personal details, or personal information of participants. Therefore, consent for publication is not applicable.

Competing interests
The authors declare that they have no competing interests.

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