



The Effects of Artificial Intelligence on Entrepreneurship Growth.



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Abstract: *This paper reviews emerging but fast-growing literature on impacts of artificial intelligence (AI) on entrepreneurship, providing a resource for researchers in entrepreneurship and neighboring disciplines. It begins with a review of definitions of AI and show that ambiguity and broadness of definitions adopted in empirical studies may result in obscured evidence on impacts of AI on entrepreneurship. Against this background, it present and discuss evidences on how AI technologies affect entrepreneurial opportunities and decision-making under uncertainty, the adoption of AI technologies by startups, and the performance of entrepreneurial businesses. It further discusses how AI may affect entrepreneurship indirectly through impacting local and sectoral labor markets. The reviewed evidence suggests that AI technologies that are designed to automate jobs are likely to result in a higher level of necessity entrepreneurship in a region, whereas AI technologies that transform jobs without necessarily displacing human workers increase the level of opportunity entrepreneurship. The paper was concluded by discussing implications for policy.*

Keywords: Artificial Intelligence, Entrepreneurship, Effects, Growth.
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Introduction

This paper provides a survey of the rapidly growing literature on how artificial intelligence (AI) affects entrepreneurship. Even though there is ambiguity on how AI is defined, in empirical research, which can obscure the true impacts of AI on entrepreneurial activities. Artificial Intelligence (AI) is reshaping industries and redefining the boundaries of what is possible. The entrepreneurial landscape is no exception. Startups and young businesses are increasingly harnessing AI's potential to innovate, scale, and thrive in competitive markets.

AI's impact is evident in the reduction of operational costs and enhancement of efficiencies within data centers. For instance, Google's AI-powered data centers have achieved a 40% reduction in cooling energy usage, demonstrating how AI can optimize resource management and significantly cut operational expenses (Gao, 2014). These examples underscore AI's ability to revolutionize traditional business processes and create new paradigms of efficiency and innovation. AI might complement and support entrepreneurial activity or substitute for entrepreneurial judgment, perhaps even replacing the entrepreneur in the future. While the literature on the AI-entrepreneurship nexus started before 2020. The global Covid-19 pandemic Crisis substantially contributed to the spread of digital technologies and also spurred research on the impacts of AI on startups (Sorgner, 2023). In this review, the paper discusses the extant literature in multiple disciplines including economics and management analyze the effects of AI on entrepreneurship. AI has both direct and indirect impacts on entrepreneurship.

In terms of direct impacts, AI technologies have been identified as external enablers and facilitators of entrepreneurship (Davidsson et al., 2020; Obschonka and Audretsch, 2020; Chalmers et al., 2021; Davidsson and Sufyan, 2023). Innovative entrepreneurs discover and create new business opportunities using AI, and it may reduce costs such as labor costs (through automation) and financing costs (through fintech services). Due to their prediction abilities, AI systems may help to resolve challenges of uncertainty and thereby creating new possibilities of entrepreneurial action.

Recent literature reports that AI deployment has become increasingly important in the development of digital entrepreneurship, in identifying and acquiring knowledge, in customizing products and services as a competitive entrepreneurial strategy, and in managing product innovation (Mariani et al., 2023). Generative AI such as ChatGPT can support creative tasks such as pitching entrepreneurial business ideas to investors or generating business ideas (Short and Short, 2023; Boussioux et al., 2024). An important emerging theme is that AI plays a key role in (digital) entrepreneurial ecosystems (Acs et al., 2022; Wurth et al., 2023) by facilitating information sharing, creating and diffusing new products, and fostering innovation.

AI may also have indirect impacts on entrepreneurship when AI affects the labor market when some individuals are pushed into self-employment due to a lack of alternatives available to them. The number of such necessity entrepreneurs may increase if jobs are automated and workers are displaced by AI. The rapid advances made in AI technologies, raised many concerns about the future of work, which led many countries and regions, most notably the European Union, to develop and implement very strict regulations on AI.

The scope of this review is defined by the various impacts AI may have on entrepreneurship. Obschonka and Fisch (2022) identify two main areas of intersection between AI and entrepreneurship research: AI in entrepreneurship as a research topic and AI as a research method. But this paper concentrates on AI in entrepreneurship as a topic.

Definition and Conceptual Issues

This part reviews existing and the most widely used definitions of AI and provides an overview of various types of AI technologies and their applications in entrepreneurship.

Artificial Intelligence

There is no standard definition of what AI actually involves. Most of the papers referenced in this review provide their own definition of AI, so this paper will mention a broad reputable definition and then highlights AI subsystems that are commonly agreed upon in the definitions as key components in powering the technologies that have brought about the explosion in interest over the past decade.

According to the widely used definition provided by the Organization for Economic Cooperation and Development (OECD 2019), an AI system is defined as a “machine-based system that can for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments.

AI is also viewed as “a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. (OECD,2024).

Tangredi and Galdorisi (2021) perceived AI as human emotional response to new automation but is not a description of how that automation works [...]. What is and is not considered AI is always evolving and should be principally judged by whether a machine is doing something that, until recently, could only be done by human intelligence or couldn't be done at all”. Novelty narrows the definition of AI in a way that updates over time, but also makes the definition vaguer and less stable as it is unclear how to determine how long, a machine that imitated or outperformed humans in a new way should be considered AI Artificial Intelligence is simply a branch of computer science that equips machines with the ability to simulate human intelligence processes, such as reasoning, learning, perception, problem-solving, and linguistic communication (Russell & Norvig, 2016). Within the context of entrepreneurship, AI acts as a transformative force that leverages complex algorithms to enable decision-making processes, optimize business operations, and innovate products and services to meet rapidly changing market demands.

The 21st century has seen an explosion in AI capabilities and applications, driven by vast amounts of data and advancements in computational power. In the context of entrepreneurship, AI is seen as a transformative force that offers a plethora of opportunities for innovation and efficiency, by automating complex processes, providing detailed insights through data analysis, and enhancing customer experience. AI technologies are crucial in driving the growth and scalability of new ventures (Kaplan & Haenlein, 2020).

The scope of AI in entrepreneurship is multi-faceted, touching virtually every aspect of business operation from supply chain management to customer relationship management, marketing, and beyond. Entrepreneurs utilize AI technologies to analyze large datasets quickly and with higher accuracy than humanly possible, enabling them to make informed decisions swiftly and efficiently. For instance, predictive analytics powered by AI can forecast consumer behavior and market trends, allowing startups to adapt their strategies proactively (Agrawal et al., 2016). This definitional ambiguity makes it difficult to compare results across studies and might lead to misleading conclusion about the effects of AI on entrepreneurship.

Entrepreneurship

In academic literature, the definition of an entrepreneur varies among scholars. Schumpeter (1934) described an entrepreneur as an innovator who brings about change in markets by introducing new combinations. These combinations can take various forms, such as introducing a new product or service, creating a new production process, opening a new market, or establishing a new form of organization According to Schumpeter, an entrepreneur is willing and able to transform a new idea or invention into a successful innovation. (Schumpeter, 1934).

Moreover, Drucker (1985) argued that innovation is the tool of entrepreneurship. He suggested that the primary role of the entrepreneur is to innovate and create products, services, or processes that may lead to large-scale transformation in the marketplace. Additionally, entrepreneurs are noted for their ability to see and seize opportunities in the marketplace, opportunities that are often overlooked by established businesses.

Entrepreneurs are essential to any economy, leveraging their skills and initiative to foresee needs and introduce innovative ideas to the market. Successful entrepreneurs, who effectively manage the risks of launching new businesses, are often rewarded with profits, recognition, and further growth opportunities. In contrast, those who do not succeed incur losses and diminish in market presence. Therefore, the entrepreneurial process significantly contributes to economic development.

Entrepreneurial Growth Process

The entrepreneurial process is a theoretical construct utilized to delineate the progression of stages an entrepreneur navigates from the inception of an idea to the establishment of a fully operational enterprise (Bhave, 1994). Within academic discourse, multiple frameworks have been proposed to articulate this progression, each delineating the stages and critical focus areas essential for entrepreneurial success. Among the various models, the framework proposed by Kaplan and McGourty (2020) stands out due to its structured approach to the entrepreneurial process.

According to Kaplan and McGourty (2020), the entrepreneurial journey is segmented into five distinct stages: In order to conduct an in-depth examination of the application of artificial intelligence throughout the entrepreneurial journey, it is imperative for this investigation, to accurately reflect the integration of AI within the various stages of entrepreneurship. The growth and scaling phase of a startup is critical to its long-term success and sustainability, necessitating careful attention to a variety of strategic activities, including financial management, identifying new potential markets, adjusting the product for the new market, develop and implement a marketing strategy and the automation of repetitive tasks.

Each activity within the framework was selected for its empirical association with successful scale and growth, signifying their crucial role in the evolution of a startup. The integration of these activities into a coherent framework reflects a commitment to grounding the entrepreneurial journey in both theoretical rigor and practical applicability.

In the scholarly exploration of entrepreneurship, the entrepreneurial journey is commonly depicted as a progression through several distinct phases, each marked by unique challenges and requisite activities that entrepreneurs must navigate to evolve their ventures from mere concepts to mature businesses. This journey typically unfolds across three pivotal phases: The Idea phase, the market entry phase, and the growth and scale phase, providing a structured framework to analyze the entrepreneurial process (Schwartz, 2010).

i. The initial Idea Phase

The idea phase marks the beginning of the entrepreneurial journey, where business concepts are generated and refined. During this stage, entrepreneurs identify viable opportunities by critically assessing market needs, prevailing industry trends, and potential areas for innovation. The process involves not only recognizing opportunities but also evaluating their feasibility in terms of available resources, potential market size, and the likelihood of achieving a sustainable competitive advantage. Entrepreneurs must develop a robust business model and articulate a clear value proposition. However, entrepreneurs frequently encounter significant challenges, including resource constraints that limit their ability to explore and validate ideas and difficulties in predicting market receptivity (Gruber, 2007).

ii. Market Entry Phase

Transitioning from an idea to a marketable product or service, the market entry phase involves the actualization of the entrepreneurial plan and the introduction of the business to the target market. Entrepreneurs are tasked with executing detailed business plans that encompass strategic marketing, operational logistics, and financial management. Securing adequate resources, including capital, talent, and technology, is essential to support these activities. Furthermore, the product or service must be refined through development and testing processes to ensure it meets market standards and consumer expectations (Gans & Stern, 2003). However, this phase is faced with challenges, such as overcoming barriers to market entry, attracting and retaining initial customers, and navigating the regulatory landscape that governs new business operations.

iii. Growth and Scale Phase

Upon successfully entering the market, the focus shifts to the growth and scale phase, where the primary goals are to expand the business's reach, enhance its market share, and achieve economies of scale. This stage of the entrepreneurial journey is characterized by efforts to scale operations efficiently, penetrate new market segments, and continually innovate product offerings to adapt to changing consumer demands and technological advancements. Key activities during this phase include strategic scaling of operations, exploring new geographic and demographic markets, and fostering an organizational culture that prioritizes continuous improvement and innovation (Galindo-Martín et al., 2021). Entrepreneurs must manage the complexities associated with rapid growth, such as maintaining operational efficiency, ensuring product quality, and strategically navigating the competitive landscape (Brush et al., 2002).

In summary, the entrepreneurial journey from idea creation through market entry to growth and scaling is a multifaceted process that requires a deep understanding of both the macro and micro elements of business development. Each phase presents distinct challenges and demands specific strategic responses, making the journey both perilous and potentially rewarding. Through this academic exploration, it becomes evident that successful entrepreneurship is about navigating this complex landscape as it is about the initial spark of innovation.

In the present review, the paper will concentrate on the scalability and growth phase of entrepreneurial ventures. With the aim of meticulously examining the specific activities associated with this critical stage and explore the extent to which these processes can be facilitated or fully automated through the utilization of artificial intelligence tools. The culmination of the entrepreneurial journey is found in the growth and scaling phase, a testament to the venture's resilience and adaptability. Here, the emphasis shifts to sustaining momentum, scaling operations, and maintaining relevance amidst market flux. Moreover, the integration of artificial intelligence as an enabler for entrepreneurs provides a contemporary lens through which to view the entrepreneur's journey, acknowledging the transformative impact of technology on the growth and scalability of new ventures (Giuggioli & Pellegrini, 2023).

In the entrepreneurship literature, the growth and scale phase is a critical period during which a startup expands its operations and increases its market presence to achieve sustainable economic growth, this phase is characterized by the pursuit of opportunities beyond the initial market, requiring an adaptation of business operations and strategies to handle increased market and operational complexities. Successful navigation of this phase often hinges on the strategic

implementation of key activities that leverage both innovative technologies and market opportunities, which are explained as follows:

Financial Management: Effective financial management is fundamental in the growth and scale phase. Galanakis and Giourka (2017) emphasize that during this phase, businesses must focus on sophisticated financial strategies such as advanced budgeting, financial forecasting, and financial risk management. Success in financial management enables a firm to secure necessary capital for expansion, optimize cash flow for sustained operations, and make informed strategic decisions that avoid financial pitfalls.

Market Research to Identify New Potential Markets: Expanding into new markets is essential for scaling operations. (Galanakis and Giourka, 2017) describe how conducting thorough market research to identify new potential markets is critical during the growth phase. Effective market research informs the business about emerging trends, customer needs, and competitive landscapes, which in turn facilitates strategic entry into new markets with tailored marketing and product offerings.

Product Adjustments for New Markets: As noted by Giuggioli and Pellegrini (2023), adjusting products to meet the specific demands and regulations of new markets is crucial for the successful scale-up of operations. This adaptation not only helps in meeting the diverse needs of different customer segments but also enhances the product's market fit, thereby increasing the likelihood of success in new geographical or demographic markets.

Development and Implementation of Marketing Strategies: The development and effective implementation of comprehensive marketing strategies are vital during this phase. According to Giuggioli and Pellegrini (2023), innovative marketing strategies that leverage digital technologies, such as AI and data analytics, can significantly enhance a company's ability to reach a broader audience, engage customers more effectively, and increase market share.

Automation of Repetitive Tasks: Automation of routine and repetitive tasks is another key activity during the growth and scale phase, as identified by Giuggioli and Pellegrini (2023). Automation not only improves operational efficiency by reducing the time and cost associated with manual processes but also allows the human workforce to focus on more strategic tasks. This shift can lead to higher productivity and innovation, propelling further growth.

Success in these activities collectively contributes to the overall success of the business in the growth and scale phase. By effectively managing finances, exploring new markets through diligent research, adapting products to meet local demands, strategically marketing products, and automating routine tasks, a startup can enhance its scalability and sustainability, thus solidifying its position in the market and paving the way for long-term success.

AI in Entrepreneurs growth scaling phases

In the dynamic landscape of entrepreneurship development, the incorporation of AI in financial management processes is proving to be a game-changer, particularly during the crucial growth and scale phases thereby increasing overall productivity. AI-powered chatbots in the customer service segment provide round-the-clock service, handling inquiries and issues, which enhances customer experience and operational efficiency (Davenport et al., 2020).

AI extends to automating routine tasks which not only increases operational efficiency but also frees up human resources to engage in more complex problem-solving tasks which includes the followings:

Financial management: AI facilitates the processing of vast amounts of data, thereby enhancing financial planning and budget management. This capability is indispensable as it enables entrepreneurs to make informed, strategic decisions critical for navigating the growth phase effectively (Elia et al., 2020). Complementing this perspective, Obschonka et al. (2022) focus on how ML refines financial decision-making processes by providing more accurate financial forecasts and thorough risk assessments. This advancement is particularly crucial in helping startups manage the inherent financial uncertainties associated with scaling, ensuring they are well-prepared to adapt to varying market conditions. These studies underscore the critical impact of AI and ML in enhancing the accuracy and timeliness of financial decision-making, crucial for the sustained growth and scalability of startups.

The automation of routine financial tasks through AI is a crucial element highlighted by Elia et al. (2020). That AI streamlines financial operations ranging from accounting practices to transaction management. This automation not only accelerates processes but also minimizes errors, providing a significant benefit for startups that need to manage their resources efficiently during expansion. AI's significant contribution to budgeting and resource allocation is indispensable during the growth and scaling phases of startups. AI tools empower startups with the ability to model various budget scenarios and forecast financial outcomes. This dynamic capability is crucial as it enables startups to swiftly adjust to fluctuating financial environments, ensuring effective growth management without sacrificing strategic investments. Elia et al. (2020), Obschonka and Audretsch (2020) both emphasize the critical role of AI in financial forecasting for startups. They pointed out that AI's ability to analyze past performance and current market conditions allows startups to predict future financial scenarios accurately. Such predictive insights are crucial for startups as they prepare to meet the demands of scaling, including expanding market reach and ramping up production capabilities.

Development and implementation of marketing strategies

The integration of AI in marketing has revolutionized the field of marketing strategies, enabling more sophisticated data analysis, predictive capabilities, and personalized customer interactions. AI's capacity to process vast amounts of marketing data, enhancing decision-making processes across marketing platforms. This foundational perspective is enriched by Kraus et al. (2020), who examine deep learning's role in refining predictive analytics within marketing frameworks. They delve into how deep learning algorithms can interpret complex consumer data sets, enabling marketers to anticipate consumer needs with unprecedented precision.

Building on the theme of data utilization, Sorgner et al. (2023) highlight how ML techniques, specifically PCA and LDA, are employed to improve customer segmentation. This segmentation is crucial for crafting personalized marketing messages that resonate with diverse consumer groups by focusing on AI's role in personalization, especially in how AI systems enable personalized marketing at scale, ensuring that individual customer preferences are addressed efficiently.

In sum, the literature reveals that AI significantly enhances marketing strategy development through advanced analytics, effective segmentation, and personalization techniques. However, the deployment of AI must also be accompanied by stringent ethical oversight to fully realize its benefits and maintain trust in AI-driven marketing practices.

Indirect Effects of AI on future labour markets

An understanding of the impacts of AI on the labor market is important to derive potential implications for entrepreneurship. If AI leads to increased unemployment and underemployment, this may induce displaced workers who struggle to find employment to become self-employed as a last resort, which is also called necessity entrepreneurship (Boeri et al., 2020; Fairlie and Fossen, 2020; Henley, 2021). These entrepreneurship experts expressed the belief that job loss due to AI automation will force many individuals to become necessity entrepreneurs by 2030. This will lead to potentially large opportunities for entrepreneurs who use new technologies for process and product innovation.

There is widespread concern that AI will accelerate automation and displace workers from their jobs, potentially leading to a large increase in unemployment or underemployment. This concern has manifested in union-led protests and strikes seeking to protect workers from automation through AI;

- i. Automating AI that which replaces human tasks tends to increase necessity entrepreneurship in a region people starts businesses because jobs are lost
- ii. Transformative AI which means AI that changes the nature of Jobs without outright replacing workers is associated with increased opportunity entrepreneurship i.e entrepreneurs seeing new opportunities rather than being pushed into self-employment
- iii. AI reshapes regional entrepreneurship eco system through changing the importance of existing eco system elements such as human capital and infrastructure and it could also reduce the role of geography since AI adoption and development can be more spatially dispersed

At the same time, researchers have emphasized that waves of automation due to technological innovation not only substitute for labor, but also complement labor. These complementarities may increase productivity of labor and output, which may in turn lead to higher demand for labor and raise earnings (Autor, 2015). Like other technologies, AI also leads to the creation of new tasks and new jobs so the net effect on employment is ambiguous.

Conclusion and Implications for Policy

AI has multiple effects on entrepreneurship not just direct effects through business adoption, but also indirect effects through labour markets and entrepreneurship eco systems it can therefore drive opportunity entrepreneurship as well as push some into necessity entrepreneurship, depending on the type of AI. Therefore, the regulatory context matters strongly especially how AI is governed will strongly influence entrepreneurial outcome.

Policy makers should consider how AI regulation affects new business formation and growth. Regional policies should account for how AI changes the structure of entrepreneurship ecosystem. There may be need for support program such as training, and provision of AI infrastructure aimed at entrepreneurs to maximize AI's positive impacts.

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