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THE CONTRIBUTION OF ARTIFICIAL INTELLIGENCE IN ENHANCING THE SUCCESS AND SUSTAINABILITY OF STARTUPS – PRACTICAL MODELS

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ABSTRACT

This study aims to explore the contribution of artificial intelligence (AI) in enhancing the success and sustainability of startups by presenting practical models of companies from different continents that have adopted innovative AI-driven solutions. The research focuses on the role of these technologies in fostering innovation, supporting decision-making, improving performance, and identifying opportunities that strengthen competitiveness.

The descriptive-analytical method was applied to present the conceptual frameworks related to the variables, while the case study method was adopted to analyze the experiences of six startups from various sectors and continents: Cropin from India (Asia) in smart agriculture, Resistant AI from the Czech Republic (Europe) in financial system protection, Mistral AI from France (Europe) in language model development, NotCo from Chile (America) in plant-based food innovation, Amini AI from Kenya (Africa) in environmental data collection, and Harrison AI from Australia (Oceania) in medical diagnostics.

The findings reveal that the adoption of AI enabled these startups to automate processes, efficiently analyze data, enhance customer experience, and adapt to dynamic markets, which provided them with an exceptional ability to achieve early success and strengthen their prospects for sustainability despite their relatively recent establishment.

KEYWORDS

Artificial Intelligence, Startups, Innovation, Sustainability

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1. Introduction

Startups are a key driver of economic and social development, as they play a crucial role in creating new job opportunities, fostering innovation, and offering creative solutions to the challenges facing global markets. Despite their significant contribution to revitalizing the global economy, startups face a range of challenges such as limited financial and human resources, intense competition, and constant changes in the business environment. These challenges make the search for alternative approaches and modern technologies an urgent necessity to ensure their sustainability and competitiveness.

In this context, artificial intelligence (AI) has emerged as one of the most important tools leveraged by startups to enhance their capabilities and achieve their objectives. AI is no longer merely an auxiliary technology; it has evolved into a general-purpose technology capable of driving fundamental transformations across various economic sectors. Many researchers have noted that AI represents a core engine of digital transformation, as it provides precise and efficient mechanisms for decision support, process automation, and big data analytics, enabling startups to respond more swiftly to environmental and market changes.

Moreover, recent studies confirm that AI offers startups unprecedented opportunities to understand markets and anticipate future trends through powerful tools for data analysis and predictive modeling. This, in turn, strengthens their ability to develop innovative products and services aligned with the evolving needs of customers. Thus, AI is not merely an operational technology but a strategic asset that contributes to building a sustainable competitive advantage.

1. 1. Research Problem:

Studying the contribution of artificial intelligence (AI) to the success and sustainability of startups is of great importance—not only to understand the nature of the relationship between this technology and entrepreneurial ventures, but also to explore how these tools can be leveraged to achieve long-term growth. By analyzing practical case studies of startups across different continents, this research aims to highlight the pivotal role of AI as a driving force for innovation, sustainability, and competitive advantage in the era of the digital economy.

Accordingly, the study's central research question can be formulated as follows:

"How has the adoption of artificial intelligence contributed to enhancing the success and sustainability of startups?"

1. 2. Importance and Objectives of the Study

The significance of this study lies in its integration of artificial intelligence (AI)—one of the most influential technologies driving digital transformation—with startups, which serve as key engines of economic growth and value creation. The research seeks to demonstrate how AI technologies can enhance the success and sustainability of startups by improving performance, supporting innovation, and strengthening their competitive capabilities.

The practical importance of this study also emerges through its presentation of real-world cases of startups from various continents that have successfully leveraged AI to achieve tangible results. These examples offer valuable insights that can be adapted and replicated in other business environments.

Accordingly, the main objectives of this study can be summarized as follows:

- To present an integrated conceptual framework for understanding artificial intelligence and startups;
- To clarify the importance of AI for startups;
- To analyze practical case studies of startups from different continents that have implemented AI-based solutions in their operations.

1. 3. Methodology and Scope of the Study:

This study adopted a descriptive-analytical approach through a comprehensive review of the literature and theoretical sources related to artificial intelligence and its role in startups, with the aim of constructing a conceptual framework that clarifies the nature of the relationship between the two variables under investigation. Additionally, the case study method was employed to present and analyze practical models of several startups from different continents that have adopted AI-based solutions in their operational and strategic activities.

The study relied on a collection of international reports, academic articles, and applied research focusing on these startups, with the objective of deriving practical indicators on how artificial intelligence contributes to enhancing performance, strengthening competitiveness, and supporting the sustainability of startups. Accordingly, the adopted methodology integrates theoretical analysis of concepts with applied analysis of real-world cases, providing the study with a comprehensive dimension that bridges scientific inquiry and practical application.

2. Conceptual Framework of the Study:

Before presenting and analyzing the practical experiences of startups that have adopted artificial intelligence technologies, it is essential to first introduce the conceptual and theoretical framework of the study variables — namely, artificial intelligence on one hand, and startups on the other. This introduction serves as a fundamental step toward understanding the theoretical dimensions related to the subject, as it helps clarify relevant concepts and scientific approaches, providing a solid knowledge base that enables the systematic and coherent interpretation of results and analysis of subsequent data in line with the research objectives.

2.1. Basic Concepts of Artificial Intelligence:

The origins of artificial intelligence trace back to the 1940s, coinciding with the emergence of the first electronic computers and the rise of mathematical ideas related to logic and computation—most notably the work of Alan Turing, who in 1950 proposed the famous Turing Test to assess a machine’s ability to simulate human intelligence .(Awad & Fawzi, 2021, p. 03):

In the mid-1950s, the term “artificial intelligence” was used for the first time during the Dartmouth Conference in 1956, which is regarded as the official starting point of AI as an independent scientific discipline. Since then, the field has witnessed remarkable expansion, with approximately 1.6 million scientific publications related to artificial intelligence and more than 340,000 patents registered to date .(Awad & Fawzi, 2021, p. 03):

Research in the 1950s focused on early artificial neural networks and initial learning models, while in the 1960s, efforts shifted toward symbolic systems based on knowledge representation and logic. During the 1970s, the field faced significant challenges known as the “AI Winter,” resulting from limited computational capabilities and high costs; however, some scientific experimentation continued despite these obstacles.

At the beginning of the 1980s, a qualitative leap occurred with the emergence of expert systems, which were widely used in medical and industrial fields. This development revived interest in artificial intelligence and opened up new horizons for its applications. (Awad & Fawzi, 2021, p. 03).

Accordingly, it can be said that the history of artificial intelligence throughout the 20th century went through several successive stages. The following table illustrates this historical development:

Table 1. Historical Development of Artificial Intelligence

Year	Milestone / Innovation
1943	Founding of the field of neural networks
1945	The term “robotics” coined by Isaac Asimov.
1950	Alan Turing proposed the Turing Test to evaluate machine intelligence; Claude Shannon published a detailed analysis of chess as a research study.
1956	John McCarthy coined the term Artificial Intelligence, and the first AI program was presented at Carnegie Mellon University.
1958	John McCarthy invented the LISP programming language for AI.
1964	Discovery that computers could understand natural language well enough to correctly solve algebraic word problems.
1965	Joseph Weizenbaum at MIT built ELIZA, a natural language processing program demonstrating the possibility of human-machine communication.
1969	Researchers at the Stanford Research Institute developed Shakey, a robot capable of movement, perception, and problem-solving.
1973	The University of Edinburgh Robotics Society developed Freddy, a robot capable of using vision to identify and assemble models.
1979	Stanford Cart introduced as the first computer-controlled autonomous vehicle.
1985	Introduction of a computer program capable of creating original artistic images.
1990	Major progress in AI fields such as machine learning, case-based reasoning, algorithms, automated scheduling, data mining, web crawlers, natural language understanding and translation, virtual reality, and realistic video games
1997	Deep Blue defeated world chess champion Garry Kasparov.
2000	Commercial availability of interactive robots; MIT introduced Kismet, a robot with an expressive emotional face.
2004	DARPA launched a major challenge requiring competitors to produce driverless autonomous vehicles.
2005	Honda’s ASIMO robot achieved human-like walking speed for customer service; the Blue Brain Project launched in Switzerland to simulate the human brain in detail.
2009	Google began developing a self-driving car.
2011	Launch of Apple’s Siri and Google Now, smartphone applications using natural language to answer questions, make recommendations, and perform tasks.
2013	NEIL program released by Carnegie Mellon University to extract visual knowledge from web data.
2017	Future of Life Institute in California organized the Asilomar Conference on Beneficial AI, resulting in a set of guiding principles for AI research.

2018	Alibaba's AI model outperformed humans in reading comprehension at Stanford University; Google Duplex announced—an AI service capable of natural-sounding voice conversations and scheduling appointments.
2019	Microsoft released Turing NLG (17 billion parameters).
2020	Launch of GPT-3 (OpenAI) and AlphaFold's success in predicting protein structures.
2022	Global launch and widespread adoption of ChatGPT.
2023	Launch of Google Bard, emergence of AutoGPT, signing of the AI Risk Statement, and hosting of the AI Safety Summit (Bletchley Park).
2024	Release of AlphaFold 3, and enforcement of the EU AI Act.

Prepared by the researchers, based on : (Moussa & Bilal, 2019, p. 40)

Based on **Table (01)**, which highlights the historical trajectory of artificial intelligence from its theoretical beginnings in the 1940s to its most recent achievements in 2025, it is evident that AI has undergone a clear transformation — from the **foundational stage**, characterized by theoretical ideas and early innovations such as **neural networks** and the **LISP programming language**, to the **experimental maturity stage**, marked by the emergence of **expert systems** and practical applications such as **robots** and **autonomous vehicles**, and finally to the **contemporary stage**, defined by breakthroughs in **deep learning** and **large language models** such as **ChatGPT**, **Claude**, and **Gemini**. This modern phase also reflects the growing global concern for the **ethical and legal regulation** of AI, demonstrating that the field has evolved beyond a purely academic domain to become a **transformative force reshaping the global economy and society**.

The concept of **artificial intelligence** has been defined in multiple ways. **John McCarthy**, who first coined the term, defined it as *a means of creating computer systems and robots that think intelligently in a manner similar to humans, by studying how humans think, learn, and solve problems* (**Dahshan, 2020, p. 109**).

Meanwhile, Avron Barr and Edward Feigenbaum viewed it as a branch of computer science that aims to design intelligent systems exhibiting characteristics of human behavior associated with intelligence (Youssef & Seddiki, 2021, p. 03).

Arnous Bashir offered a broader definition, describing AI as a science concerned with developing systems that possess human-like intelligence, capable of decision-making and performing tasks requiring human thought and perception (Ibrahim, 2021, p. 2814).

Many scholars also consider AI as the collective effort to develop computer-based systems capable of learning, understanding, and acting in ways that resemble human behavior (Hashmi & Meliani, 2024, p. 50).

In general, the researchers view Artificial Intelligence (AI) as *a branch of computer science that seeks to design computational systems or robots capable of simulating human intelligence in reasoning, learning, and decision-making*, drawing inspiration from how the human brain functions, learns, and solves problems. AI systems encompass programs and technologies that demonstrate human-like behavioral characteristics, such as natural language understanding, learning from experience, perceiving and interpreting visual patterns, and storing and utilizing knowledge to make decisions in a manner similar to human capabilities.

AI can be classified into three levels, as illustrated in the following figure:

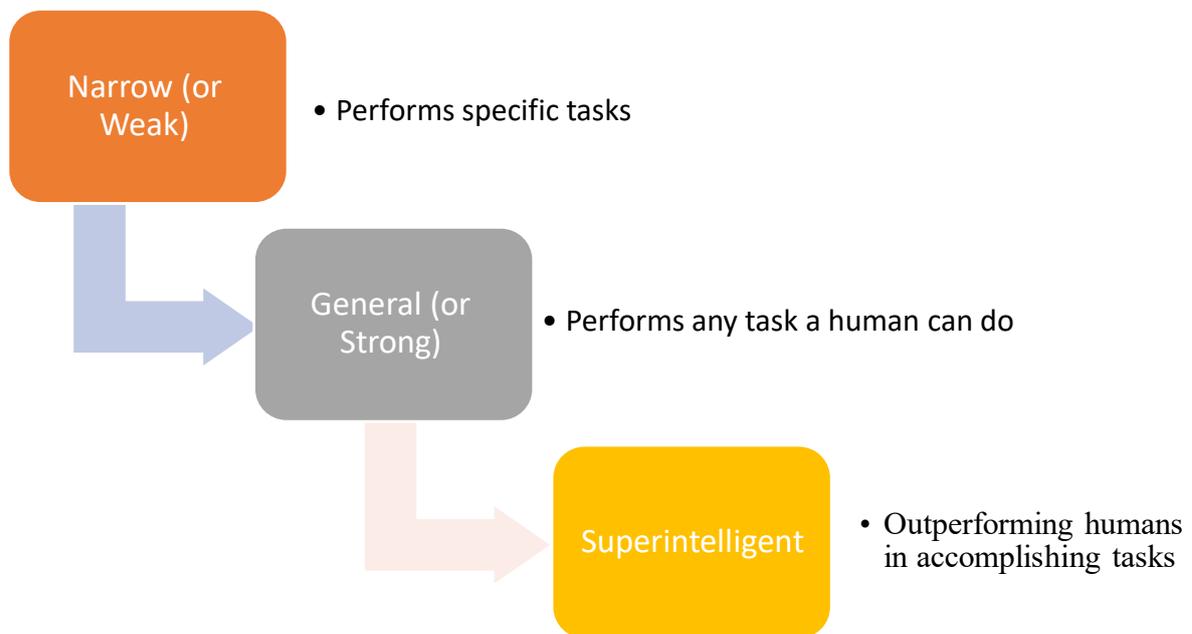


Fig. 1. Levels of Artificial Intelligence
(Boubaha, 2022, p. 95) Source :

Based on Figure (01), which illustrates the levels of artificial intelligence development, narrow or weak AI represents the most common level today, as it is limited to performing specific tasks with high precision—such as translation or image recognition. In contrast, general or strong AI refers to systems that are theoretically capable of performing any intellectual task that a human can do with comparable efficiency. Meanwhile, superintelligent AI surpasses human capabilities in reasoning, creativity, and problem-solving; however, it remains within the realm of future aspirations and theoretical concepts, reflecting the gap between current reality and future ambitions in this field (Al-Omari, 2021, p. 311)

AI applications are characterized by a set of features that have granted them growing significance and made them an effective investment tool across various sectors. They enable machines and devices to analyze problems, recognize speech and sound, and control physical objects, in addition to their ability to understand and process inputs to produce accurate outputs aligned with user needs. Furthermore, AI systems are distinguished by their capacity for continuous, autonomous learning without direct supervision, and their ability to process massive amounts of data efficiently. They can also detect and analyze recurring patterns within data with accuracy exceeding human capabilities and generate innovative solutions to unfamiliar problems, thanks to their advanced cognitive potential (El-Sayed Mohammed & Mahmoud Mohammed, 2020, p. 23).

2.2. The Concept of Start-up Enterprises:

Most studies on startups indicate that there is no universally agreed-upon definition of the term. However, most researchers, academics, and practitioners concur that a startup represents a new, innovation-driven venture seeking to establish a profitable, scalable business model.

The Cambridge Dictionary defines a startup as a newly established small business aiming to generate quick revenues (Youssef & Seddiki, 2021, p. 71). Eric Ries describes it as a human institution designed to create a new product or service under conditions of extreme uncertainty (Bouakka, 2022, p. 44). According to the Business Dictionary, a startup represents the first stage of a business life cycle, in which the entrepreneur moves from idea conception to financing, organization, and then operation. Thomas Drouve and Andrew Blank define it as a temporary organization searching for a scalable and profitable business model, while Peter Thiel views it as a group of people working according to a plan to build a better future. Meanwhile, Bob Walsh defines it as a small, independent company typically led by developers seeking to deliver innovative solutions (Ben Lakhder & Al, 2020, p. 29)

Accordingly, the researchers define a startup as a newly established project based on an innovative idea, aiming to integrate into the business environment by developing that idea and transforming it into a sustainable and scalable economic activity.

Startups possess a set of characteristics that distinguish them from traditional enterprises. They are temporary by nature and not an end in themselves, as entrepreneurs use them as a transition phase toward maturity and long-term sustainability. Innovation is a central pillar, as startups develop new products or services that create added value for society and enhance economic efficiency. Their small size and simple organizational structures give them high flexibility in facing challenges, though this often comes with limited resources and expertise.

If successful in targeting large markets with innovative products, startups have significant growth potential; however, they operate under high uncertainty, which requires testing hypotheses and Minimum Viable Products (MVPs) to reduce risks. Fundamentally, a startup is in continuous search for a scalable and profitable business model, summarized by Alexander Osterwalder in nine essential elements: customers, value proposition, channels, customer relationships, revenue streams, key resources and activities, partnerships, and cost structure (Ben Lakhder & Al, 2020, p. 30)

As a key pillar in economic and social development programs, startups pursue strategic objectives that differentiate them from other sectors. They work to enhance market competitiveness, create sustainable jobs, and are particularly effective in developing countries since they often require modest capital investment. Startups also promote individual and collective entrepreneurship, either by launching new economic activities or revitalizing traditional ones. Moreover, they serve as a vital link in the economic ecosystem through their interactions with other firms.

Startups contribute to direct and indirect job creation, economic diversification, and faster, more flexible responses to customer needs. They increasingly rely on modern technologies and digital tools to launch innovative ideas and employ smart solutions that address market needs, fostering their growth, expansion, and ability to attract funding via digital platforms (Bouakka, 2022, pp. 43-44).

In developing countries, startups act as a driver of economic and social development, helping address structural challenges such as industrial weakness, unemployment, poverty, limited human capital, and rising living costs. They provide productive employment opportunities, absorb large segments of youth and university graduates, and contribute to reducing unemployment rates. Startups also serve as innovation hubs in research and technological development, enabling them to produce cost-effective solutions and products compared to large corporations.

In addition to improving productivity and competitiveness through advanced production tools and technologies, startups foster positive social values, such as initiative, creativity, innovation, and a modern consumer culture. They also contribute to economic diversification by introducing new products and services while modernizing traditional sectors such as agriculture. Furthermore, they act as a channel for investing local savings and attracting foreign capital, thereby boosting capital accumulation, promoting income redistribution, and supporting sustainable economic growth (Youssef & Seddiki, 2021, pp. 72-73).

Startups can be categorized into several types based on their nature, size, and objectives. These include (Magherbi & Sadouki, 2022, p. 85):

- Small and medium startups, employing fewer than 200 people and focusing on limited activities without large-scale expansion ambitions;
- Large startups, which seek to innovate, create significant impact in their industries, and achieve unlimited growth;
- Social startups, which focus on generating positive societal impact by addressing social issues or contributing to charitable initiatives;
- Scalable startups, designed for continuous expansion to become industry leaders;
- Sellable startups, founded with the intent to grow and be acquired through major deals after establishing a market presence;
- Lifestyle startups, built around personal passions and interests tied to specific lifestyles.

2.3. The Importance of Artificial Intelligence for Start-ups:

Artificial intelligence (AI) contributes significantly to supporting startups by enabling them to identify new opportunities and develop innovative business models aligned with technological transformations. It allows them to leverage market data and consumer behavior analysis to accurately predict customer needs. However, the greatest challenge for entrepreneurs lies in adapting traditional methods to these technologies in order to achieve tangible improvements in performance and innovation.

AI serves as an effective tool for enhancing performance within startups, as it simplifies operations through automation and machine learning, leading to faster execution and cost reduction. It also enables the use of large-scale data to detect market trends and design precise marketing strategies, in addition to improving inventory management and demand forecasting, thereby boosting operational efficiency and productivity.

Furthermore, AI acts as a powerful decision-support tool, transforming data into accurate forecasts that help entrepreneurs allocate resources and manage risks more effectively. It provides a competitive advantage through predictive analysis of customer preferences and market trends, while also reducing uncertainty by analyzing variables and clarifying key factors influencing outcomes.

In the marketing domain, AI helps predict customer purchasing behavior, implement dynamic pricing, and optimize digital marketing strategies, in addition to managing customer relationships in a more personalized manner. These applications enhance customer loyalty and increase the competitiveness of startups in both local and global markets.

AI also plays an important role in education and research, narrowing the gap between learners and instructors by providing targeted training programs that help develop entrepreneurial skills. It accelerates digital transformation in education, fosters entrepreneurial thinking among university students, and connects theoretical research with practical applications to generate solutions to real-world challenges faced by entrepreneurs.

Additionally, AI supports sustainability by offering innovative solutions to environmental challenges, such as analyzing climate data and developing strategies to combat climate change, as well as optimizing resource utilization and promoting renewable energy adoption. It also fosters sustainable economic growth by enhancing efficiency and driving innovation, improves working conditions through the integration of robots in hazardous or repetitive tasks, and contributes to better healthcare outcomes through early diagnosis and treatment planning.

In conclusion, artificial intelligence represents a true revolution in the world of entrepreneurship, providing startups with extensive opportunities for innovation and expansion by integrating big data with traditional models—thus strengthening their ability to compete in global markets.

3. Applied Framework of the Study:

To highlight the applied dimensions of artificial intelligence in startups, a set of practical case studies of companies that have adopted this technology across various sectors will be presented. The objective is to illustrate how AI contributes to enhancing success opportunities and ensuring sustainability, as follows:

3.1. Cropin Company (India – Asia):

Cropin was founded in 2010 in Bangalore, India, and is considered one of the world's leading platforms specializing in AI-powered food and agriculture technologies. The company has revolutionized the sector by launching the world's first industry cloud platform dedicated to agriculture, known as Cropin Cloud. This platform is built on an integrated architecture comprising three main components (CROPIN, 2024):

- Cropin Apps: A suite of intelligent applications such as Cropin Grow, for farm management and digital recordkeeping; Cropin Connect, which facilitates communication between farmers and agricultural officers; and Cropin Trace, enabling product traceability from the farm to the consumer.
- Cropin Data Hub: A unified framework for collecting and analyzing data from sensors, drones, weather stations, and satellites.
- Cropin Intelligence: A collection of more than 22 deep learning models providing precise predictions related to crops, productivity, irrigation, and disease diagnosis.

Recently, the company developed Cropin Sage, the world's first generative agricultural AI (Gen-AI) system. This tool enables users to obtain comprehensive, real-time insights into crop and land conditions by analyzing past and present data to forecast future outcomes.

Cropin has successfully built the world's largest agricultural data repository, containing information on over 488 crops and 10,000 crop varieties across 56 countries, with more than 30 million acres digitized and over 7 million farmers' livelihoods improved. Its global impact extends to more than 100 countries (CROPIN, 2024).

In addition, the company launched several high-impact applied projects, including the FIRST Potato Project, funded by the European Union with a budget of €700,000, which uses field data and satellite imagery to deliver daily recommendations on irrigation optimization, pesticide reduction, and crop quality improvement. Field trials in India have demonstrated how Cropin's solutions helped farmers double their

profits from ₹5,000–10,000 to over ₹20,000 per acre, thanks to the use of remote sensing and predictive analytics.

Cropin has also attracted over \$54 million in investments across 15 funding rounds, involving 41 investors, including major firms such as Google and ImpactAssets. Through this trajectory, Cropin has established itself as a global leader in agricultural intelligence, successfully combining digitization and artificial intelligence to deliver practical solutions that enhance efficiency, productivity, and sustainability in agriculture (CROPIN, 2024).

3.2. Resistant AI Company (Czech Republic – Europe):

Resistant AI was founded in 2009, when a team of academics in the Czech Republic established Cognitive Security, a company focused on applying machine learning technologies to enhance network security and combat cyber threats. In 2013, Cisco acquired its technology and subsequently launched the Cognitive Threat Analytics (CTA) platform, which today protects over 25 million users worldwide.

In 2019, after more than fifteen years of experience in artificial intelligence and cybersecurity, the same team re-established their venture under the name Resistant AI, headquartered in Prague, with the primary mission of protecting financial systems from fraud, document forgery, money laundering, and unknown real-time threats (Resistant AI, 2024).

The company employs a Layered AI approach that covers the entire customer lifecycle without disrupting existing technical infrastructures. It offers a set of core solutions, including (Resistant AI, 2024):

- Document Forensics: An advanced tool for analyzing official documents—such as invoices, ID cards, and certificates—based on more than 500 indicators to detect forgery and generate actionable, human-readable results.

- Transaction Forensics and Identity Forensics: AI-powered systems designed to monitor and analyze financial transactions and user behaviors to detect fraudulent activities such as money laundering and account impersonation.

In terms of financing, Resistant AI secured \$2.8 million in seed funding in 2020, followed by a Series A round of \$16.6 million in 2021, led by GV (Google Ventures) and supported by prominent investors such as Index Ventures, Credo Ventures, and Seedcamp. In July 2025, the company further strengthened its position through a strategic investment from Experian, aimed at advancing innovations in financial fraud prevention, particularly within the “authorized push payment” fraud domain in the United Kingdom.

Today, Resistant AI stands among the leading global companies in applied AI for financial security. It has earned the trust of major international clients such as Payoneer, and has been recognized in prestigious listings such as CB Insights AI 100 (2024) and Sifted 250 Europe, reflecting its global prominence and rapid growth in the financial technology sector (Resistant AI, 2024).

3.3. Mistral AI Company (France – Europe):

Mistral AI was founded in April 2023 in Paris, France, by three former researchers from DeepMind and Meta — Arthur Mensch (Chief Executive Officer), Guillaume Lample (Chief Scientist), and Timothée Lacroix (Chief Technology Officer). The company specializes in developing open-source large language models (LLMs) characterized by high performance and exceptional quality, such as Mistral 7B, Mixtral 8×7B, and Mistral Large (123B), in addition to specialized models like Codestral, Mathstral, and others (Mistral AI, 2024).

Mistral AI has achieved extraordinary financial success since its establishment. In June 2023, the company raised a substantial seed funding round of €105 million, even before launching its first product — making it one of the largest early-stage investments in Europe. This was followed by a Series A round in December 2023, which secured €385 million, raising the company’s valuation to around \$2 billion. In June 2024, Mistral completed a Series B funding round worth €600 million (approximately \$6.2 billion), bringing its combined valuation to about €5.8 billion. In total, the company’s cumulative funding exceeded €1 billion in less than two years.

Mistral AI has attracted a distinguished group of investors, including Lightspeed Venture Partners, Andreessen Horowitz, General Catalyst, Bpifrance, IBM, Nvidia, Samsung, Salesforce, and Microsoft, which partnered with the company to make Mistral’s models available on its Azure Cloud platform. Furthermore, in April 2025, Mistral signed a strategic partnership worth €100 million with the French shipping company CMA CGM to leverage AI technologies in transportation, logistics, and corporate communications (Mistral AI, 2024).

Mistral distinguishes itself by its focus on European technological sovereignty and transparency in AI development. According to the company’s CEO, the goal is to deliver powerful, high-performance AI

technologies that are cost-efficient and transparent, while preserving the company's independence and leadership within Europe.

From a technological standpoint, Mistral has released a range of notable AI models (Mistral AI, 2024):

- Mistral 7B: A 7-billion-parameter model that outperforms Llama 2 (13B) and Llama 1 (34B) in reasoning, mathematics, and code generation tasks.
- Mixtral 8×7B: A Mixture-of-Experts (MoE) model that has outperformed GPT-3.5 and Llama 70B across most benchmark tests.
- In 2025, the company launched Magistral Small and Magistral Medium, the first AI models specialized in logical reasoning with advanced chain-of-thought reasoning capabilities.
- Mistral also introduced Pixtral 12B, its first multimodal model capable of understanding both text and images, released under an open-source license (Apache 2.0).

Through its rapid growth, commitment to transparency, and open innovation, Mistral AI has emerged as a leading force in the European AI landscape, symbolizing the continent's ambition to achieve technological independence and global competitiveness in artificial intelligence.

3.4. NotCo Company (Chile – America):

NotCo was founded in 2015 in Santiago, Chile, by three young entrepreneurs — Matías Muchnick, Karim Pichara, and Pablo Zamora — with the vision of revolutionizing the food industry through artificial intelligence. The company focuses on developing plant-based alternatives to animal-derived products using an innovative AI algorithm called Giuseppe.

This algorithm leverages artificial intelligence and machine learning to analyze millions of plant-based ingredients and map them to the physical, chemical, and sensory properties of animal-based foods. Through this process, Giuseppe generates plant-based recipes that mimic traditional flavors and textures while maintaining high nutritional value.

NotCo has successfully launched a diverse range of products (NotCo, 2024):

- NotMilk – a plant-based milk alternative replicating the traditional taste and texture;
- NotBurger – a plant-based burger made from natural, locally sourced ingredients;
- NotMayo – an egg-free vegan mayonnaise;
- NotIceCream – a plant-based ice cream with natural flavors.

This product diversification demonstrates the company's ability to adapt its proprietary technology to develop a wide variety of healthy and sustainable food alternatives, enabling NotCo to enter multiple global markets.

Starting from the Chilean market, NotCo quickly expanded across Latin America — including Brazil, Argentina, Mexico, Colombia, and Peru — and later entered the United States and Canada. The company formed strategic partnerships with major brands such as Burger King, integrating its products into restaurant menus, and with Kraft Heinz to co-develop a new line of plant-based food products.

NotCo has also attracted significant global investment, securing multi-million-dollar funding rounds that have enabled it to expand its research and production facilities, enhance its AI-driven technologies, and continuously develop new food innovations. These investments have boosted the company's market valuation, positioning it among the leading FoodTech companies in Latin America.

Moreover, NotCo plays a vital role in promoting environmental sustainability by reducing dependence on animal-based products — which are associated with high carbon emissions and intensive resource consumption. The company also provides healthier alternatives for consumers seeking balanced, plant-based diets.

Thanks to its unique integration of technology, innovation, and sustainability, NotCo has become a regional icon in merging artificial intelligence with food innovation — advancing both human health and environmental preservation simultaneously (NotCo, 2024).

3.5. Amini AI Company (Kenya – Africa):

Amini AI, a Nairobi-based startup in Kenya, is one of Africa's most prominent entrepreneurial initiatives in the field of environmental artificial intelligence (AI). The company was founded in response to Africa's critical need for accurate climate and environmental data, as the continent faces a major challenge stemming from the lack of infrastructure for collecting and analyzing weather, agricultural, and vegetation data—an issue that hinders strategic planning and impacts food security.

Amini AI leverages a sophisticated combination of artificial intelligence, satellite imagery, and field data to build a high-precision environmental data infrastructure capable of covering even the most remote areas. This enables monitoring of environmental and climatic changes with remarkable spatial accuracy—down to the one-square-meter level.

Through these technologies, the company delivers practical, data-driven solutions that serve multiple sectors, particularly agriculture. Its tools help farmers and agribusinesses forecast crop yields and plan production more efficiently. They also support agricultural insurance companies by providing reliable risk assessment data. Additionally, Amini AI contributes to tracking agricultural supply chains and enhancing transparency, thereby strengthening the sustainability of food systems across Africa. Beyond agriculture, the company's datasets are used in environmental protection efforts, such as monitoring deforestation and changes in vegetation cover, helping governments and international organizations design effective climate action policies (Amini AI, 2024).

From a financial standpoint, Amini AI successfully secured over USD 2 million in seed funding, reflecting investors' confidence in its potential to transform Africa's environmental and agricultural economies. The company has received backing from venture capital funds specializing in emerging technologies and green innovation, enabling it to scale operations and continually enhance its technological platform.

Thanks to its rapid growth, Amini AI has become a leading example of African innovation, combining technological advancement with socioeconomic impact. The company exemplifies how artificial intelligence can be harnessed to address development challenges, going beyond commercial profit to improve the livelihoods of millions of farmers and rural communities by empowering them with digital tools that boost productivity and sustainability.

Ultimately, Amini AI stands out as one of Africa's most transformative startups — not merely providing technical solutions, but driving broad social and environmental change across the continent (Amini AI, 2024).

3.6. Harrison AI Company (Australia – Oceania):

Harrison.ai is one of Australia's most prominent startups that has transformed the healthcare sector through the power of artificial intelligence (AI). Founded in Sydney by the physician brothers Aiden and Dimitry Nguyen, the company combines medical expertise with a vision to leverage AI in bridging the gap between the rising demand for healthcare services and the shortage of specialized doctors. Harrison.ai develops deep learning models capable of analyzing medical images such as X-rays, CT scans, and other diagnostic images, providing highly accurate and rapid results that support physicians in making better decisions and accelerating diagnosis and treatment.

One of the company's most notable achievements is Annalise.ai, developed in partnership with I-MED Radiology. This AI-powered tool can detect over 120 different thoracic conditions in chest X-rays alone, making it one of the most comprehensive medical AI systems in the world. Additionally, Harrison.ai is pioneering AI solutions for IVF (in vitro fertilization) by creating algorithms that help identify the most viable embryos, thereby improving success rates and reducing the emotional and physical burden on couples (Harrison AI, 2024).

From an investment perspective, Harrison.ai has secured over USD 120 million in funding from leading venture capital firms such as Blackbird Ventures and Horizons Ventures, providing significant resources to expand its research teams and enter new global markets. These investments have enabled the company to develop new products and extend its solutions to multiple medical specialties, including oncology, cardiology, and gynecology.

Today, Harrison.ai's technologies are deployed in hundreds of hospitals and medical centers across Asia, Europe, and Australia, with growing adoption in the Middle East and Latin America. This widespread reach has earned the company a strong reputation as a global leader in medical AI innovation, committed not only to technological advancement but also to creating tangible social impact—by improving healthcare quality, reducing costs, and alleviating the burden on global health systems.

The Harrison.ai experience stands as a remarkable example of balancing commercial innovation with social responsibility. By empowering doctors and nurses to focus on direct patient care while AI systems handle complex, time-consuming tasks, the company enhances the healthcare system's overall efficiency and resilience. This fusion of technology and medicine strengthens society's ability to confront growing health challenges and positions Harrison.ai as a world-class pioneer in medical artificial intelligence (Harrison AI, 2024).

4. Future Prospects for Start-ups in the Age of Artificial Intelligence:

Artificial intelligence (AI) represents a genuine opportunity for startups to achieve success through its multifaceted contributions to enhanced decision-making, improved operational efficiency, and task automation. Despite existing challenges, these enterprises are well-positioned to overcome them in the future and achieve sustainable growth and prosperity, leveraging the diverse advantages that AI provides. The most significant of these benefits include (El-Sayed Mohammed & Mahmoud Mohammed, 2020, p. 67):

- **A broader scope for innovation:** AI technologies offer startups vast potential for creativity by enabling the development of new products and services that align with customer needs. This fosters greater flexibility and adaptability to market changes.
- **New business models:** Recent research has shown that AI can generate innovative business model designs by integrating knowledge from various scientific domains, thereby enhancing opportunities for scalability and growth.
- **Expansion of application domains:** AI tools reveal that we are moving toward a more mature and transparent world, where barriers are reduced, and applications are expanding across diverse sectors. This evolution contributes to providing solutions for long-standing challenges and unanswered questions.
- **Creating a competitive advantage:** Scholars agree that AI serves as a key source of sustainable competitive advantage for startups, whether by improving product quality or enhancing customer experience. Through precise analysis of consumer behavior and preferences, AI enables startups to achieve success and longevity in markets characterized by rapid change and increasing complexity.

5. Conclusion

This study has emphasized the pivotal role that artificial intelligence (AI) now plays in the modern business environment—particularly within startups, which are typically characterized by limited resources and an urgent need for innovative and efficient solutions to confront growing market challenges.

AI is no longer merely a supportive technological tool; it has evolved into a strategic force capable of reshaping business practices, transforming entrepreneurial mindsets, and enhancing growth opportunities.

The analysis revealed that AI constitutes a fundamental pillar for achieving competitive advantage and ensuring sustainability, given its vast capabilities in data collection and precise analysis, strategic decision support, operational optimization, and opening new horizons for innovation across various sectors.

5.2. Study Findings:

This study aimed to highlight the experiences of several startups in leveraging artificial intelligence (AI) technologies, with a particular focus on exploring its role in supporting their success and sustainability by clarifying the nature of the relationship between the two.

The analysis of these case studies led to several significant findings, which can be summarized as follows:

- AI is not confined to a single field; rather, it spans across diverse sectors such as smart agriculture, food technology, medical diagnostics, language modeling, and financial systems, demonstrating its remarkable flexibility and adaptability to various domains.
- AI has enabled startups to overcome their resource limitations by automating numerous complex processes, thereby achieving higher operational efficiency, reduced costs, and enhanced performance speed.
- AI has provided a strong competitive advantage, helping startups navigate global market dynamics and rapid technological change through the use of accurate analytics and predictive modeling.
- AI has fostered sustainable innovation by empowering startups to develop products and services aligned with evolving customer needs, enhancing their adaptability and ensuring continued growth.

5.3. Study Recommendations:

Based on the findings of this study, a set of recommendations and proposals can be formulated as lessons learned from the experiences of the examined startups, with the aim of adapting them to the Algerian context. These recommendations include:

- Encouraging entrepreneurs and startups to invest early in artificial intelligence technologies, given their impact on cost reduction and competitive advantage creation, as AI facilitates faster innovation, process optimization, and adaptation to rapid global market changes.

- Strengthening partnerships among governments, the private sector, and research centers to foster an innovation ecosystem through incubators and accelerators, while promoting knowledge exchange and developing specialized training programs that support AI adoption.

- Developing support policies and funding programs for AI-driven startups by providing soft loans, venture capital funds, and tax incentives, thereby enabling these enterprises to launch and scale their operations despite limited resources.

- Directing future research toward quantitatively assessing the impact of AI adoption on startup sustainability, as empirical studies can reveal the economic and operational benefits, offering key indicators to guide future investment decisions.

Examining the ethical and legal dimensions of AI use by establishing regulatory and legislative frameworks that ensure responsible deployment, data security, and user rights protection, thus building public trust and enhancing the long-term sustainability of startups.

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