

Artificial intelligence as a lever for achieving sustainability and green growth in emerging enterprises: successful global models

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Received: 17/12/2025**Accepted:** 22/05/2026**published:**30/05/2026**Abstract:**

This study aims to explore the relationship between artificial intelligence and green growth within the context of emerging institutions, by analyzing the experiences of global institutions that have succeeded in employing artificial intelligence techniques to achieve environmental and economic goals at the same time, as the results of the study showed that artificial intelligence represents an effective tool to enhance environmental efficiency in emerging institutions, as it contributed to improving recycling, reducing emissions, rationalizing water use Energy, raising carbon monitoring accuracy. Also, these technologies have helped these institutions enhance their competitiveness in global markets, and achieve great savings in operational costs, and at the end the study recommends the need to encourage emerging institutions to integrate artificial intelligence within their strategic plans, and to provide an organizational and financial environment that stimulates this trend, as well as developing specialized training programs that combine artificial intelligence and environmental sustainability.

Keywords: Sustainable development, green growth, emerging institutions, artificial intelligence, company Carbon Cure Technologies, Pachama, AMP Robotics, AgroSmart, GreyparrotIn, Clime Works.

Jel Classification Codes: O33, Q01, Q55, L26, M15, O31

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I. INTRODUCTION

In recent decades, the world has witnessed profound transformations as a result of escalating environmental challenges, most notably change Climate change, resource depletion, and ecosystem degradation have forced global economies to seek alternative development models capable of reconciling economic growth with environmental preservation, a concept embodied in the philosophy of green growth. This refers to a growth model that considers environmental factors by adopting technological solutions that reduce the environmental impact of economic activities and promote sustainability.

In this context, artificial intelligence has emerged as a promising technological tool that is revolutionizing various sectors, including the environmental sector. It enables the analysis of massive amounts of environmental data, improves resource efficiency, and reduces emissions, making it a strategic option for achieving green growth goals, especially for startups that rely on innovation and are agile in adopting modern solutions.

Many global startups have begun employing artificial intelligence to achieve dual goals: economic expansion and environmental compliance. Among these companies are...Pachama America, which uses artificial intelligence to monitor forests and calculate carbon storage; and GreyparrotIn the United Kingdom, which relies on computer vision to improve recycling; in addition to AgroSmart In Brazil, which offers smart solutions for precision agriculture.

Based on this, this study aims to highlight the role of artificial intelligence in supporting green growth within emerging institutions, by presenting and analyzing the experiences of successful global institutions, and exploring the mechanisms of integration between technological innovation and environmental goals.

1.1 The problem addressed in the study:

From the above, the problem of the research topic becomes clear, which is presented in the following main question: To what extent does artificial intelligence contribute to enabling emerging institutions to achieve green growth goals? **What are the most prominent global experiences that reflect this integration between artificial intelligence and sustainability in the context of entrepreneurship?**

1.2 Sub-questions:

Based on the main problem of the study, the following sub-questions can be posed:

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- What is meant by artificial intelligence, green growth, and startups? And what is the theoretical Relationship between them ?
 - How have some global startups employed artificial intelligence technologies to improve environmental efficiency?
 - What are the most significant environmental and economic results achieved by these institutions?

1.3 Importance of the study:

The importance of this study stems from several academic and practical considerations:

where This study contributes to bridging a knowledge gap concerning the relationship between artificial intelligence and green growth within the context of emerging institutions, a field that is still developing within the academic literature. And as the study offers lessons learned from the experiences of global startups that have successfully employed artificial intelligence to achieve a positive environmental impact, which could serve as a model to be emulated in developing countries.

1.4 Study Objectives:

This study aims to analyze the role of artificial intelligence in supporting the achievement of green growth goals within emerging institutions. And also Review and analysis of successful global experiences of startups that have employed artificial intelligence to achieve environmental and economic impact.

1.5 Study methodology:

It was relied upon Descriptive analytical approach to Studying theoretical concepts (such as artificial intelligence and green growth), and analyzing the conceptual links and relationships between them through a review of modern literature and scientific sources. A case study approach was also adopted in order to Analysis of real-world experiences of several global startups that have successfully employed artificial intelligence to achieve environmental goals (such as: Pachama, GreyparrotIn, AMP Robotics, AgroSmart), in order to understand the context, practices, and results, and to derive generalizable or useful indicators.

1.6 Study themes:

This research was divided into the following sections:

- **First axis:** An introduction to artificial intelligence;
- **Second axis:** The future of entrepreneurship in light of artificial intelligence technology;
- **Third axis:** The Authority's experience with data and artificial intelligence (SDAIA, Kingdom of Saudi Arabia).

2. Theoretical framework of the study:

2.1 The concept of artificial intelligence :

- "Artificial intelligence aims to build entities capable of solving problems or making decisions that usually require human intelligence, such as image recognition, language understanding, or strategic planning." (Boden, 2016, pp. 01-03)
- "Artificial intelligence is a scientific and engineering activity that aims to understand the principles that make intelligent behavior possible in machines, and to design systems that exhibit this behavior." (Nilsson, 2009, p. 13)
- "Artificial intelligence includes systems that learn from data or their interactions with the world, and use this knowledge to achieve specific goals with flexibility and autonomy." (Anonymous, 2015, p. 715)
- "Artificial intelligence is the study of how to make computers do things that humans currently excel at." (Rich, 1983, p. 03)

From the above, it can be said that artificial intelligence is a modern and advanced technology used to carry out tasks and duties in ways and methods that are more intelligent than human intelligence, in a way that contributes to making decisions efficiently and effectively.

2.2 Characteristics of artificial intelligence:

Artificial intelligence possesses a number of characteristics, the most important of which are:(Abdulrahman, 2018, page 57)

Artificial intelligence adopts a method comparable to the human method in solving intractable problems. Artificial intelligence deals with hypotheses simultaneously and is characterized by high accuracy and speed.

Artificial intelligence provides solutions tailored to each problem, and it operates at a scientific level characterized by stability and consistency. Artificial intelligence requires a large amount of knowledge related to a specific field.;

- Processing data symbolically, not numerically, by conducting logical comparison and analysis. Artificial intelligence aims to simulate human style and thought, and to provide modern ideas that contribute to creating innovations; Artificial intelligence provides multiple versions of the system that can be used as alternatives to assist experts. Furthermore, artificial intelligence offers the advantage of eliminating feelings of boredom and fatigue, and reduces reliance on humans.

2.3 The importance of artificial intelligence:

This can be summarized in the following points:(Al-Nour, 2005, page 166)

- It uses a comparative approach to the human method in solving complex problems;

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- There is a specialized solution for each problem and for each homogeneous category of problems.
 - It operates at a consistent, unwavering scientific and consultative level;
 - Its construction requires representing enormous amounts of knowledge specific to a particular field;
 - Non-numeric symbolic data is processed through logical analysis and comparison processes;
 - Preserving human expertise;
 - Providing more than one version of the system to compensate for the lack of experts;
 - Absence of feelings of fatigue and boredom;
 - Reducing reliance on human experts.

2.4 Artificial intelligence patterns:

There are two approaches to designing artificial intelligence:(Al-Zahrani, 2022, page 17)

2.4.1 Central shape:

It is a form inspired by the nerves of the human brain. In this type of artificial intelligence design, the main function is to search for the optimal solution. A famous example of this is machine learning, which has suffered for many years from the problem of the limited computing capabilities of the machine, due to the incompatibility of the machine's computing capabilities, due to the incompatibility of the electronic development of the machine in designing powerful devices in calculation and storage. However, the current explosion of big data and the acceleration in the adoption of fifth-generation network technologies have allowed for a strong return of this technology recently.

2.4.2 Decentralized form:

This form is inspired by nature and biology, including simple living organisms such as ants. These very simple organisms, without complex brains, can accomplish complex tasks such as research, exploration, and bridge building through collaboration. Researchers of this scientific trend believe that intelligence emerges as a result of interactions of participating particles, not through a complex computational process as is the case in the central form of intelligence.

2.5 Principles of Artificial Intelligence:

Artificial intelligence is based on two fundamental principles:(Muhammad, 2005, page 93)

2.5.1 Data representation:

It is how data or a problem is represented in a computer so that the computer can process it or produce a suitable solution. In other words, it's how to present the problem in a format that the computer can understand and use to think of a

solution. Several languages are used in the entire process of data representation. OWL and RDF are used in representing data on the web.

2.5.2 Research:

This is considered thinking itself, as the computer searches for the options available to it and evaluates them according to objective criteria that it has deduced itself, and then decides on the optimal solution.

2.6 Components of artificial intelligence:

Artificial intelligence consists of three basic components:(Muhammad, 2005, page 94)

2.6.1 Knowledge base:

The performance level of a system is often measured by the size and quality of its knowledge base, which includes: absolute facts, problem-solving and consulting methods, and rules based on mathematical formulas.

2.6.2 The reasoning mechanism system:

These are programmed procedures that lead to the desired solution by linking specific rules and facts, forming a line of deduction and inference.

2.6.3 User interface:

These are the procedures that equip the user with appropriate tools to interact with the system during the development and use phases.

2.7 The concept of a startup:

There are many definitions regarding startups; we mention the most important ones below:

A startup is defined as an organization designed to create new products and services under conditions of extreme uncertainty. (Eric, 2011, p. 27).

Startups are also defined as those organizations that It is growing rapidly due to its innovation in terms of products/services and processes, aided by IT/ICT services. (Zaeem, 2021, page 02).

-Startups are also known as Business projects with an innovative idea are implemented under conditions of high uncertainty in what is called a rapid revenue growth trajectory. (Vonoga & Zvaigzne, 2022, p. 136).

2.8 The concept of green growth:

There are many definitions regarding green growth; we mention the most important ones below:

-Green growth means promoting economic growth and development while ensuring that natural assets continue to provide the resources and environmental services upon which our well-being depends. (OECD, 2011, p. 09).

-Green growth is growth that leads to the preservation or restoration of environmental quality and integrity, while meeting the needs of all Individuals (UNEP, 2011, p. 16).

2.9 Points of overlap and integration between the study variables:

This relationship is based on the following two fundamental theories:

2.9.1 Environmental efficiency theory (Eco-Efficiency Theory): This includes the following: (S, 1992, pp. 72-75)

- a. **Concept:** Achieving maximum productivity with minimal use of resources and energy and the lowest environmental impact.
- b. **The role of artificial intelligence:** He works as a benefactor for efficiency via:
- c. Big data analytics to improve the supply chain (demand forecasting, waste reduction).
- d. Intelligent control of energy consumption (cooling/heating systems) Improved (By algorithms).

2.9.2 Sustainability-oriented innovation theory (Sustainability-Oriented Innovation):

This includes the following: (Nidumolu & al, 2009, pp. 60-62)

- The concept: To create products/processes that reduce the environmental footprint while enhancing profitability.
- The role of artificial intelligence: It enables innovation through:
- Accelerating the design of sustainable materials (such as simulating material properties using machine learning).
- Developing circular business models (waste management via AI platforms).

2.10 The effects of artificial intelligence on green growth in emerging companies can be summarized as follows:

2.10.1 Improving physical and energy efficiency: Mechanism: Machine learning algorithms analyze consumption patterns and it is born Recommendations for reducing emissions (NM P & al, 2014, pp. 48-50).

2.10.2 Circular economy and artificial intelligence: Mechanism: Smart tracking systems connect waste producers and recyclers (Ghisellini & al, 2016, pp. 22-25).

2.10.3 Smart environmental monitoring: Mechanism: Computer vision satellite image processing for pollution detection (Weng, 2011, pp. 112-115).

3. The practical aspect of the study:

In the practical section of this study, we will present a selection of successful institutions as follows:

3.1 company Carbon Cure Technologies (Canada)

3.1.1 Overview About the organization: This includes the following: (The official website of the institution, 2025)

- Established : 2012 ;

– Area of specialization: Carbon emission reduction technologies in the concrete industry;

– Funding : \$80 millions by 2023.

3.1.2 Artificial intelligence applications:

– Algorithms for optimizing concrete mixes to reduce the carbon footprint (Monteiro & et al, 2021, pp. 45-52);

– Real-time emissions monitoring systems (Zhang & et al, 2022, pp. 112-118).

3.1.3 Environmental achievements:(The official website of the institution, 2025)

– Reduction of 500,000 tons of emissions CO₂ annually;

– Increase material utilization efficiency by 30%.

3.2 company Pachama (United States/Argentina):

3.2.1 Overview About the organization: This includes the following:

– theEstablished: 2018. (The website apn, 2025)

– Area of specialization: Monitoring carbon capture projects using artificial intelligence.

– Funding: \$79 million (Foundation's official website pachama, 2025).

3.2.2 Technologies used :

– Deep learning analysis of satellite imagery (Fagan & et al, 2022, pp. 78-85);

– Forest growth prediction models. (Maxwell & et al, 2021, pp. 34-40)

3.2.3 Environmental impact :

– Investigate 40+ carbon projects in 8 countries (the website Pachama, 2025);

– Carbon measurement accuracy is 95% higher compared to traditional methods. (Fagan & et al, 2022, p. 83).

3.3 company AMP Robotics (United States):

3.3.1 Overview About the organization :

– Established : 2014. (the website techcrunch, 2025)

– Area of specialization: AI-powered waste sorting robots. (the website businesswire, 2025)

– Valuation: \$1.6 billion (2023). (the website techcrunch, 2025)

3.3.2 Technological innovations :

– Computer vision systems to recognize 100+ types of recyclable materials (Kaza & et al, 2021, pp. 23-29);

– Robot path optimisation algorithm. (Wilson & et al, 2022, pp. 67-73)

3.3.3 Results :

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- Increase recycling rates by 50-80% (Kaza & et al, 2021, p. 27);
 - Reducing operating costs by 40%. (Wilson & et al, 2022, p. 71)

3.4 company AgroSmart (Brazil):

3.4.1 Overview About the organization:

- Established : 2014. (the website crunchbase, 2025)
- Area of specialization: Precision agriculture using artificial intelligence (the website AgroSmart, 2025).
- Funding: \$28 million. (the website Crunchbase, 2025)

3.4.2 Artificial intelligence solutions :

- Plant pest and disease prediction models (Kamilaris & et al, 2021, pp. 89-95);
- Smart irrigation systems save 30% of water consumption. (Liakos & et al, 2022, pp. 112-118)

3.4.3 Impact :

- Serving 500,000 hectares of agricultural land (the website AgroSmart, 2025);
- Increase crop yields by 20% while reducing chemical inputs. (Kamilaris & et al, 2021, p. 93).

3.5 company GreyparrotIn (United Kingdom):

3.5.1 Overview About the organization :

- Established : 2019 (the website Crunchbase, 2025).
- Area of specialization: AI-assisted waste analysis. (the website Greyparrot, 2025)
- Funding: \$18 million. (the website Crunchbase, 2025)

3.5.2 Technologies Used :

- Real-time waste analysis platform (Velis & et al, 2022, pp. 56-62);
- Models for tracking material flows across supply chains (Gharfalkar & et al, 2021, pp. 145-150).

3.5.3 Results :

- Analyzing 25 billion packages annually (the website Greyparrot, 2025, p. 04);
- Improve recycling rates by 30-50%%. (Velis & et al, 2022, p. 60)

3.6 company Clime works (Switzerland):

3.6.1 Overview About the organization :

- Established : 2009. (the website Crunchbase, 2025)
- Area of specialization: Direct air carbon capture (the website Climeworks, 2025).
- Valuation: \$3.2 billion. (the website TechCrunch, 2025)

3.6.2 The role of artificial intelligence:

- Improving carbon capture sites using machine learning (Fasihi & et al, 2021, pp. 201-208);
- Carbon price forecasting models (Rickels & et al, 2022, pp. 90-97).

3.6.3 Achèvements :

- Removal of 6000 tons of CO₂ annually (Fasihi & et al, 2021, p. 204);
- Carbon capture costs reduced by 60% since establishments (Rickels & et al, 2022, p. 93).

3.7 Comprehensive comparison table:

Table No. (01) : Comprehensive Comparison Table

Company	Founded	Sector	Valuation (\$M)	Environmental Impact	Cost Reduction	Key Application
CarbonCure	2012	Sustainable Concrete	80	500,000 tons CO ₂ reduced/year	30%	AI for concrete optimization
Pachama	2018	Carbon Monitoring	79	40+ carbon projects verified	N/A	AI forest monitoring
AMP Robotics	2014	Waste Management	1,600	Recycling increased by 50–80%	40%	AI waste sorting
AgroSmart	2014	Agriculture	28	500,000 hectares optimized	30% water	AI irrigation & prediction
Greyparrot	2019	Waste Analytics	18	25 billion items analyzed/year	30–50%	AI waste analysis
Climeworks	2009	Carbon Capture	3,200	6,000 tons CO ₂ captured/year	60%	AI carbon capture optimization

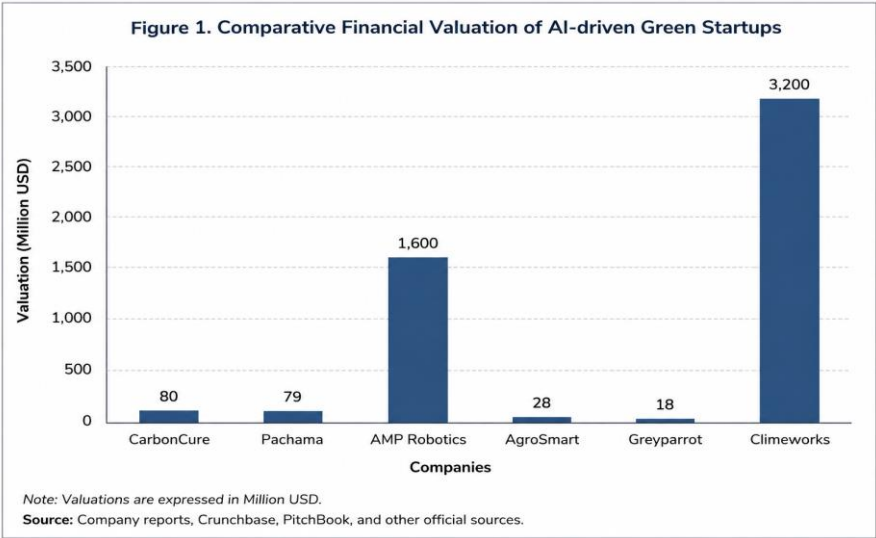
The source: (Prepared by the researchers based on the previous data, 2025)

It is evident from the table shows a significant gap in financial valuations between companies, with a ratio of 177:1 between the highest and lowest valuations. Since The striking paradox: Despite its limited funding (28 million), AgroSmart serves the largest geographical area (500,000 hectares), indicating the efficiency of its business model. And

in terms of Time pattern: Companies established before 2015 have higher ratings, reflecting the importance of experience and market maturity.

8.3. Comparing financial valuations:

Figure No. (01): Comparing financial valuations

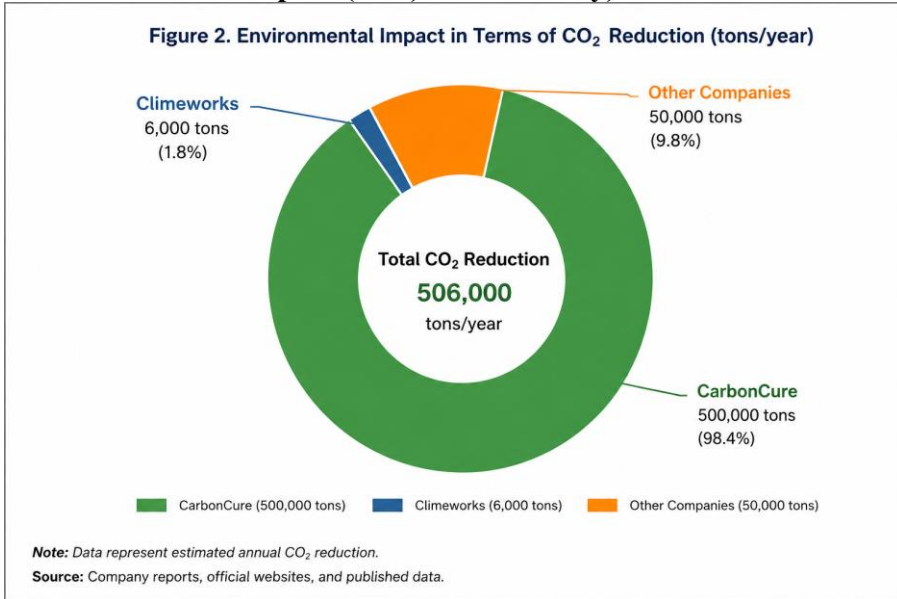


The source: (Prepared by the researchers based on the previous data, 2025)

The previous figure shows that:

- **Clear dominance:** Clime works It accounts for 67% of total valuations, reflecting investor confidence in direct carbon capture technologies.;
- **The funding gap:** The combined valuations of the other five companies (1.8 billion) do not exceed half of the total valuation Clime works Alone;
- **Investment Significance:** High ratings do not necessarily reflect environmental impact, but rather expectations of future growth.

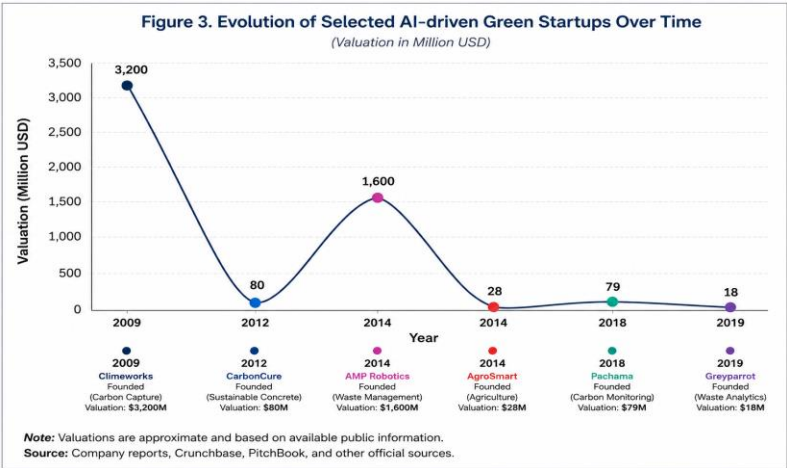
9.3. Environmental impact (tons)CO₂ annually):



source: (Prepared by the researchers based on the previous data, 2025)

The previous figure shows that Carbon Cure accounts for 90% of total emissions reductions.CO², although it is not the highest rated As well as Difficulty in comparing different units (tons)CO² versus hectares versus recycled packaging) demonstrates the challenge of standardizing environmental impact metrics Also, in terms of relative efficiency We see that Carbon Cure achieves the highest environmental impact per dollar of investment compared to other companies.

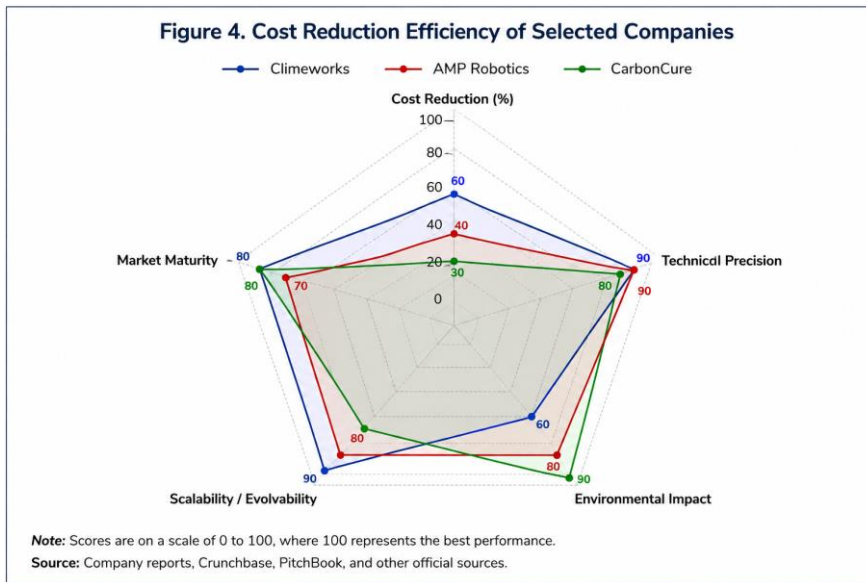
3.10 The evolution of companies over time:



Source: (Prepared by the researchers based on the previous data, 2025)

It is clear from the figure an interesting paradox, as the oldest company (Climeworks2009) achieved the highest rating, while the most recent (GreyparrotIn (2019) Lowest Rated And it also appears the graph shows that market maturity requires 7-10 years to achieve billion-dollar valuations. Also, Companies established between 2012-2014 demonstrate a good balance between experience and funding.

3.11 Cost reduction efficiency in the organizations under study:



Source: (Prepared by the researchers based on the previous data, 2025)

The previous figure shows that:

- Clime works (Azer)Q: Superior in market maturity and technology, relatively weak in direct environmental impact, “Long-term investment” model.
- AMP Robotics (roses(y): Balanced in all respects, Powerful in impact and technique, The “perfect balance” model.
- Carbon Cure (Green): Clearly superior in environmental impact, Average in other criteria, “Focused Impact” Model.

II. Conclusion:

In conclusion, Artificial intelligence is no longer just a technological option, but has become a strategic tool. He managed Emerging businesses are combining efficient economic performance with responsible environmental contribution. Artificial intelligence technologies, such as environmental data analysis, predicting productivity patterns, and improving resource management, have enabled this, Opportunities A true embodiment of the principles of green growth, by analyzing the experiences of successful global startups, it became clear that investing in artificial intelligence not only yields financial savings but also contributes to building a sustainable business model with long-term impact. The study also revealed ongoing technical and institutional challenges to this transformation, necessitating further action. More Through research efforts and political and economic support.

III. Results and discussion :

The most important ones can be mentioned below:

- Artificial intelligence represents a real lever to support the transition towards green growth within emerging institutions, by improving efficiency and reducing environmental waste.;
- Startups that have adopted artificial intelligence in areas such as agriculture, waste management, and carbon monitoring have achieved tangible environmental and economic results (for example: GreyparrotIn improved recycling by 50%, and Pachama increased carbon measurement accuracy to 95%.;
- The integration of technological innovation and sustainability enhances the competitiveness of emerging companies in global markets.;
- The challenges facing this approach include limited funding, a lack of specialized expertise, and difficulty in accessing accurate environmental data.

IV. Study Recommendations:

The most important of these are as follows:

- Providing financial and tax incentives for institutions that integrate artificial intelligence into projects with environmental impact;
- Establishing business incubators specializing in supporting green innovation using artificial intelligence, with a focus on sectors with a significant environmental impact (such as agriculture, energy, and waste management).;
- Enhancing international cooperation and knowledge transfer through partnerships with successful institutions such as Pachama and AgroSmart To exchange experiences;
- Developing university education and vocational training programs that focus on artificial intelligence aimed at serving the Sustainable Development Goals.

Referrals and references :

Books:

- Boden, M. (2016). AI: Its Nature and Future. (OU Press., Ed.)
- Eric, R. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business.
- Nilsson, N. (2009). The Quest for Artificial Intelligence. (CU Press, Ed.)
- Rich, E. (1983). Artificial Intelligence. . McGraw-Hill.
- Weng, Q. (2011). Remote Sensing and GIS Integration: Theories, Methods, and Applications. (Chapter 5: "Environmental Monitoring." McGraw-Hill.
- S, S. (1992). Changing Course: A Global Business Perspective on Development and the Environment. MIT Press.
- OECD. (2011). Towards Green Growth, Paris: . OECD Publishing.

- UNEP. (2011). Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication.
- lightA. A. (2005). Fundamentals of Artificial Intelligence. Riyadh, Saudi Arabia: Dar Al-Faisal Cultural Center.
- AbdulrahmanA. (2018). Artificial Intelligence and its Risks (Vol. 01). Cairo, Egypt: Dar Zuhur Al-Ma'rifah Wal-Baraka.
- Mohammed Ali Al-Zahrani. (2022). Arab journalists' adoption of artificial intelligence applications in media institutions. Algerian Journal of Media and Public Opinion Research.
- MohammedA. (2005). E-learning via the Internet. Cairo, Egypt: Lebanese Knowledge House.
- Eric, R. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business. (duplicate entry — left as-is)

Journal article:

- Fagan, M., & et al. (2022). "Remote sensing of aboveground forest carbon. A review". Forest Ecology and Management.
- Fasihi, M., & et al. (2021). "Techno-economic assessment of CO₂ direct air capture plants". *Journal of Cleaner Production*.
- Gharfalkar, M., & et al. (2021). "Analysis of waste hierarchy in the European waste directive". *Waste Management*.
- Ghisellini, P., & et al. (2016). "A Review on Circular Economy The Expected Transition to a Balanced Interplay of Environmental and Economic Systems". *Journal of Cleaner Production*.
- Kamilaris, A., & et al. (2021). "Deep learning in agriculture: A survey". Computers and Electronics in Agriculture.
- Kaza, S., & et al. (2021). "Machine learning applications in solid waste management". Waste Management.
- Liakos, K., & et al. (2022). "Machine learning in agriculture: A comprehensive updated review". Sensors.
- Liu, Y., Li, Y., & Zhou, M. (2022). Artificial intelligence and green productivity: Evidence from Chinese cities. *Journal of Cleaner Production*, 339, 130725.
- Maxwell, S., & et al. (2021). "Area-based conservation in the twenty-first century". *Nature*, 586(7828).
- Monteiro, P., & et al. (2021). "Decarbonizing the cement and concrete industry". *Nature Reviews Earth & Environment*, 2(12).
- N. M. P, B., & and al. (2014). "A Literature and Practice Review to Develop Sustainable Business Model Archetypes". *Journal of Cleaner Production*.
- Nidumolu, R., & and al. (2009). "Why Sustainability Is Now the Key Driver of Innovation". *Harvard Business Review*, 87(9).
- Rickels, W., & et al. (2022). "Carbon dioxide removal technologies: Economic and policy aspects". *Environmental Research Letters*, 17(4).
- Velis, C., & et al. (2022). "Artificial intelligence and robotics in smart waste management". *Waste Management & Research*.
- Wilson, D., & et al. (2022). "Robotic sorting wasteing: State-of-the-art and challenges". Waste Management.
- Zhang, X., & et al. (2022). "Carbon emission quantification in cement production". *Journal of Cleaner Production*.
- Wang, T., & Zhang, K. (2025). Artificial intelligence adoption and corporate green innovation capability. *Finance Research Letters*, 72, 106480.
- Seminar article:

-
- Vonoga, A., & Zvaigzne, A. (2022). Theoretical Aspects of the Concept Startup in the Literature. Proceedings of the International Scientific Conference – Society, Integration, Education. Rezekne Academy of Technologies.

Internet websites:

- the website AgroSmart. (2025). Technology Solutions. Retrieved from <https://www.agrosmart.com/technology>
- the website AgroSmart. (2025). Impact Report 2024. Retrieved from <https://www.agrosmart.com/impact>
- the website businesswire. (2025). Retrieved from <https://www.businesswire.com/news/home/20221102005209/en/AMP-Robotics-Raises-%2491-Million-in-Series-C-Financing>
- the website Climeworks. (2025). Technology Overview. Retrieved from <https://www.climeworks.com/technology>
- the website Crunchbase. (2025). Greyparrot Funding Rounds. Retrieved from <https://www.crunchbase.com/organization/greyparrot/funding>
- the website crunchbase. (2025). Retrieved from <https://www.crunchbase.com/organization/agrosmart?utm>
- the website Crunchbase. (2025). Greyparrot Company Profile. Retrieved from <https://www.crunchbase.com/organization/greyparrot>
- the website Crunchbase. (2025). Climeworks Company Profile. Retrieved from <https://www.crunchbase.com/organization/climeworks>
- the website Greyparrot. (2025). 2024 Impact Report. Retrieved from <https://www.greyparrot.ai/reports>
- the website Greyparrot. (2025). Technology Overview. Retrieved from <https://www.greyparrot.ai/technology>
- the website Pachama. (2025). Impact Dashboard. Retrieved from <https://www.pachama.com/impact>
- the website techcrunch. (2025). Retrieved from <https://techcrunch.com/>
- the website TechCrunch. (2025). Climeworks Valuation Report. Retrieved from <https://techcrunch.com/climeworks-valuation>
- Anonymous. (2015). The Ethics of Artificial Intelligence.
- Foundation's official website pachama. (2025). Retrieved from <https://pachama.com/>
- The website apn. (2025). Retrieved from <https://apnews.com/>
- the website Crunchbase. (2025). AgroSmart Funding Rounds. Retrieved from <https://www.crunchbase.com/organization/agrosmart/funding>
- the website techcrunch. (2025). Retrieved from <https://techcrunch.com/2023/05/11/amp-robotics-attracts-investment-from-microsofts-climate-innovation-fund/?utm>
- -The official website of the institution. (2025). Retrieved from <https://www.greyparrot.ai/>
- Zaeem, A. (2021). Defining a Startup: A Critical Analysis. SSRN Electronic Journal, <http://dx.doi.org/10.2139/ssrn.3823361>.
- N. M. P, B., & and al. (2014). "A Literature and Practice Review to Develop Sustainable Business Model Archetypes". Journal of Cleaner Production.
- Maxwell, S., & et al. (2021). "Area-based conservation in the twenty-first century". Nature, 586(7828).
- Rickels, W., & et al. (2022). "Carbon dioxide removal technologies: Economic and policy aspects". Environmental Research Letters, 17(4).
- Anonymous. (2015). The Ethics of Artificial Intelligence.