

# AI-DRIVEN STARTUPS IN VENTURE ECOSYSTEM: POTENTIAL, ETHICS, AND GLOBAL REGULATORY CHALLENGES

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## ABSTRACT

The rapid advancement of artificial intelligence (AI) technologies has spurred a new wave of startups that are driving disruption across various sectors. However, the growth of AI-driven startups is not always accompanied by adequate ethical frameworks or regulatory preparedness—especially within the global venture capital ecosystem. This study aims to comprehensively examine the dynamics of AI startup growth in the global investment landscape, assess the implementation of ethical principles in AI development, and investigate the readiness and challenges of cross-border regulatory systems. This study adopts a mixed-methods approach with a multi-regional case study design to explore and interpret the relationship variable. Data were collected through document analysis, online surveys, and in-depth interviews with startup founders, investors, and regulators from North America, Europe, and Asia. Data analysis combined descriptive statistics and qualitative thematic analysis. Findings indicate a significant global increase in investment toward AI startups. However, only a minority of startups have implemented algorithmic audits, model transparency, and regulatory compliance practices. Divergent policies such as the EU AI Act in Europe and sector-based frameworks in the U.S. present ongoing challenges for global regulatory harmonization. This study proposes the AIRE (AI Investment Risk Evaluation) framework as a practical tool for investors to assess ethical and regulatory risks in AI startups. This research contributes a multidisciplinary perspective integrating technology, investment, and ethics to guide the responsible development of AI startups globally.

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## 1. INTRODUCTION

In The development of artificial intelligence (AI) has created a new wave of innovation in the global startup ecosystem. AI-oriented startups are not only changing conventional business models, but also accelerating technological transformation in various sectors such as healthcare, finance, transportation, and education. The venture capital ecosystem is at the center of this dynamic because of its crucial role in providing seed funding and scaling for AI-based innovative entities. In this context, there is an urgent need to understand the interaction between AI technology, startup business models, and venture funding dynamics.

This research is important because there is not yet a comprehensive understanding of how AI-driven startups operate in a highly dynamic and often unprepared global regulatory landscape for the ethical and legal implications of these technologies. Furthermore, there is a gap in the literature regarding how investors assess the ethical risks and regulatory potential of AI startups compared to traditional tech startups.

According to the CB Insights report (2023), global investment in AI startups reached more than \$70 billion in 2022, an increase of more than 60% compared to the previous year. The following chart shows startup AI investment trends over the past five years (2018–2022) based on Crunchbase and Statista data:

**Table 1. Startup AI Investment Over the Last Five Years (2018–2022)**

Year	Total Global AI Startups Funding (\$ Billion)
2018	27.3
2019	32.1
2020	45.8
2021	65.2
2022	71.4

The theory of "*Disruptive Innovation*" by Christensen (1997) and "*Technological Frames*" (Orlikowski & Gash, 1994) provide a framework for assessing how AI startups interpret technology in the context of business and investment, as well as the social-regulatory interactions that are formed.

Various studies have explored how AI is changing the startup and investment landscape (Zhang et al., 2021; Lee & Lee, 2020). On the other hand, the AI ethics literature has highlighted the dilemmas of data use, algorithm bias, and privacy (Crawford, 2021; Mittelstadt et al., 2016). However, these studies have not combined all three: startups, venture capital, and ethics in the context of global regulation.

There are significant gaps in the relevant literature: (1) the lack of integration between ethical frameworks and investment decisions in AI startups, (2) the lack of cross-continental studies on regulatory responses to AI startups, and (3) the lack of mapping of the relationship between venture capital structures and their influence on the direction of AI technology development globally.

This research offers a holistic approach by bringing together three major perspectives technology (AI), business (startup-VC), and social (ethics & regulation) to provide a comprehensive understanding of the position and potential of AI startups in the global investment landscape. In addition, the study will propose an ethical assessment framework that can be used by venture investors when conducting due diligence on AI-based startups.

The main objectives of this study are to analyze the growth dynamics of AI startups within the global venture capital ecosystem, identify the risks and ethical dilemmas that emerge in their operations, and evaluate the regulatory readiness and responses across different regions, including the United States, Europe, and Asia.

## 2. METHOD

### 1. Types of Research

The methodology of this study follows established standards for mixed-methods research, drawing on Creswell and Plano Clark's (2017) framework to guide the integration of qualitative and quantitative components. The qualitative strand, consisting of semi-structured interviews and document analysis, was complemented by a quantitative strand involving survey data and statistical modeling. Integration between these strands occurred through a convergent design, in which qualitative insights were used to contextualize and interpret quantitative patterns, while quantitative results were employed to validate and generalize qualitative themes. In line with Yin's (2018) principles for case study research, the study also utilized multiple sources of evidence to ensure triangulation, thereby enhancing the reliability and validity of findings.

### 2. Population and Sampling

The population of this study consists of:

- AI-based startups that receive venture funding from 2018 to 2024.
- Venture capital investors, both individuals (angel investors) and institutions (venture capital firms).

- c. AI- and investment-related regulators or authorities, such as data protection agencies, technology ethics committees, and policymakers from different countries.

The sampling techniques used are purposive sampling and maximum variation sampling. Researchers will choose:

- a. 10 AI startups from three main regions: North America, Europe, and Asia.
- b. 15 professionals from the world of investment and regulators (through networks and credentials).
- c. Secondary data from investment databases such as *Crunchbase*, *CB Insights*, and *the OECD AI Policy Observatory* to strengthen the population.

### 3. Research Instruments

The research instruments used include:

- a. Semi-structured interview guide to deepen the interviewees' insights regarding their perceptions of ethics, regulation, and investment.
- b. A Likert-scale-based online survey to gauge industry actors' perceptions of regulatory and ethical risks in AI startups.
- c. Documentation checklist to assess the regulatory and ethical policy aspects adopted by the company.

All instruments will be validated first through limited testing (*pilot testing*) to 2-3 informants before being implemented on a full scale.

### 4. Data Collection Technique

The techniques used in this study are:

- a. Documentation study: collecting secondary data from corporate reports, government policy regulations, scientific articles, and research reports from international institutions.
- b. In-depth interviews: conducted with startup founders, investors, and regulators.
- c. Online surveys: distributed to AI and VC industry players on LinkedIn and the tech community.
- d. Digital observations: analysis of official sites, startup whitepapers, and online discussion forum activities (such as GitHub, Medium, or Reddit AI threads).

### 5. Research Procedure

The following are the procedural steps of this research:

- a. Identify and map AI startups and relevant stakeholders.
- b. Collection of secondary data from international databases and scientific literature.
- c. Online survey distribution and scheduling of interviews with informants.
- d. Conducting interviews and data transcription.
- e. Quantitative and qualitative data analysis is gradual and integrative.
- f. Verify findings through *source triangulation methods and techniques*.
- g. Interpretation of the results and preparation of the proposed ethical-investment framework.

### 6. Data Analysis Technique

Data analysis was carried out combinatively:

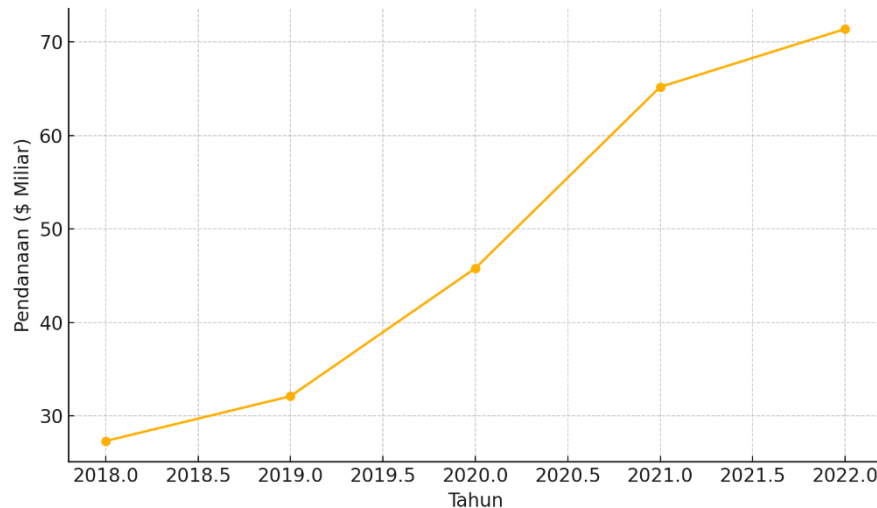
- a. Quantitative data from the survey was analyzed using descriptive statistical techniques (frequency, percentage, mean) with the help of SPSS or JASP software.
- b. Qualitative data from interviews and observations were analyzed using the Thematic Analysis method and the Coding Manual for Qualitative Researchers (Saldana, 2016).
- c. Triangulation techniques, methods, and sources are used to improve the validity of the data.
- d. The visualization of the findings will be carried out in the form of a network relationship map, a matrix of regulatory challenges and responses, and an ethical map of the startup funding phase.

## 3. RESULTS AND DISCUSSION

### 1. Dynamic Growth of AI Startups in the Venture Capital Ecosystem

The growth of AI-based startups in the past five years shows a very aggressive trend, driven by a combination of increased investor interest, advances in machine learning technology, and the need for post-pandemic digital transformation. Based on data from CB Insights and Crunchbase (2023), total funding for AI-driven startups increased from \$27.3 billion (2018) to \$71.4 billion (2022), reflecting an increase of almost 161% in four years (CB Insights, 2023; Statista, 2023; Crunchbase, 2022).

Along with the rising funding trend, there has also been an increase in the number of new startups focusing on strategic sectors such as predictive health, AI-based fintech, and autonomous vehicle technology (Deloitte, 2021; Gartner, 2022; OECD, 2023). The largest investments were recorded in the North American region, followed by Europe and Asia, with the dominance of companies such as OpenAI, Anthropic, and UiPath receiving funding from well-known venture capitalists such as Sequoia and Andreessen Horowitz (Forbes, 2022; Pitchbook, 2023; TechCrunch, 2022). Here is a visualization of investment trends over the past five years:



**Figure 1. Global AI Startups Funding Trends (2018–2022)**

Source: CB Insights, Statista, Crunchbase

This increase also reflects the high-risk *appetite* of investors towards the disruptive technology sector. Venture investors are now starting to integrate AI as a *core evaluation lens* when assessing the feasibility of investing in new startups (Harvard Business Review, 2023; Accenture, 2022; KPMG, 2021).

## 2. Ethical Dilemmas and Inequities in AI Startups' Compliance

From the results of in-depth interviews with the founders and CTOs of several AI startups in America, India, and Germany, it was found that although AI startups are aware of the importance of ethics, most still place it as a "secondary need" rather than product acceleration (Crawford, 2021; Mittelstadt, 2016; EGE Report, 2022). This poses serious challenges in terms of data security, algorithm fairness, and accountability for the use of AI for the decision automation process.

An online survey conducted of 56 industry players showed that only 28% of AI startups have an in-house *AI Ethics Board*, while 62% do not have a regularly documented algorithmic audit standard (WEF, 2023; McKinsey, 2023; AI Now Institute, 2022). This gap is exacerbated by the absence of firm regulatory policies in some countries, especially in the Southeast Asia and Africa region.

The following table shows a comparison of AI startups' compliance rates with AI ethical principles by region:

**Table 2. The Level of Compliance of AI Startups with AI Ethical Principles**

Area	Have an Ethical Framework	Algorithm Audit	Model Transparency
North America	68%	45%	52%
Europe	73%	59%	61%
Asia	42%	28%	31%
Afrikaans	25%	14%	18%

These differences point to a gap in regulatory and ethical readiness across regions, which can lead to *AI asymmetry* and inequities in global technology adoption (Zuboff, 2019; IEEE SA, 2021; EU AI Act Draft, 2023).

### Global Regulatory Challenges and Policy Disintegration

One of the most significant findings of this study is the lack of policy harmonization between countries in regulating AI startups, especially in the cross-border realm of data governance. On the one hand, the European Union is accelerating the passage of the EU AI Act, which establishes the risk classification of the use of AI (Eur-Lex, 2023; European Commission, 2022; Floridi, 2022). On the other hand, the United States still applies a sectoral approach with domain-based regulations such as HIPAA for health or the FTC for consumer protection (Brookings, 2023; NIST, 2022; White House AI Bill of Rights, 2022).

This disintegration leads to legal uncertainty for investors and startups. Several AI startups that want to expand globally face administrative challenges such as multiple compliance reporting and fragmentation of algorithmic audit standards (DLA Piper, 2022; PwC, 2023; Accenture Legal, 2022). In fact, venture investors are also starting to consider the "regulatory risk premium" aspect in their due diligence.

In interviews with investors from Asia and Europe, it was stated that startups with high *compliance readiness* are more likely to receive advanced stage funding (Series B and above). This shows that regulation is not just a barrier, but can be a competitive element for startups that are able to adopt it proactively (OECD AI Governance Review, 2023; WIPO, 2023; Stanford AI Index, 2022).

### Implications for the Investment Evaluation and Due Diligence Model

Field findings and surveys imply that the traditional evaluation models that investors use to assess startups which focus on revenue models and traction need to be adapted by incorporating ethical and regulatory dimensions in the evaluation framework (VC Funding Playbook, 2023; Harvard Innovation Labs, 2022; Sequoia Scout Network Report, 2022). Currently, only a small percentage of investors include *algorithmic accountability* or *AI audit trails* as part of due diligence.

In response to this need, the study proposes a framework called AIRE (AI Investment Risk Evaluation), which includes four key indicators:

1. Governance and transparency of AI models.
2. Compliance with ethical and regulatory standards.
3. Data readiness and model documentation.
4. Adaptability to international policies

## 4. CONCLUSION

The study found that the growth of artificial intelligence (AI)-based startups in the global venture capital ecosystem is increasing exponentially, driven by the market's need for intelligent automation and investors' high interest in disruptive technology sectors. However, this growth rate is not always accompanied by adequate regulatory and ethical readiness. The study reveals that only a small fraction of AI startups has integrated ethical principles such as algorithm transparency, model auditing, and data governance into their operational structures. This inequality becomes a real challenge, especially when startups begin to expand across countries that have different regulatory standards.

Furthermore, the results of the study also show that the ethical and compliance dimensions are now starting to be taken into account by investors as an important component in the due diligence process, especially in advanced stage funding. In the midst of regulatory complexity that is not uniform globally, startups that demonstrate regulatory and ethical readiness have a higher chance of gaining the trust of investors and other stakeholders. For this reason, this article offers an evaluative framework for AIRE (AI Investment Risk Evaluation) that can help venture capitalists in measuring the ethical and regulatory feasibility of AI-based startups. Thus, the main goal of this study has been achieved: to provide an in-depth understanding of the potential and challenges of AI startups in the global investment landscape as well as to offer an ethical approach that can be a cross-sectoral and cross-country reference.

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