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Decoding funding dynamics for AI start-ups: Investor influence, innovation strategies, and ecosystem synergies

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Abstract
In this research, we analyze the multiple relationships of funding for AI start-ups and specify investor influence, technological changes, and funding types within a start-up ecosystem. The research has identified over 500 relevant AI start-ups and splits the analysis based on regions and time into several years from 2019 to 2024. The research focuses on issues such as the involvement of venture capitalists, corporate investors, governmental support, and funding models of AI businesses. This study makes use of both descriptive statistics of financial and operational data and subjective data collection from the identified start-up founders, investors, and policymakers. Machine learning algorithms, statistical tools like R and Python, and business intelligence tools like Tableau are used to analyze patterns of funding to determine patterns in the data sets. To enhance the findings, the study also relies on secondary data from local and international venture capital databases and financial statements. Some of the findings have to do with ways in which funding ecosystems shape the technological development path of AI start-ups through, inter alia, emphasizing ethical approaches to AI, regulatory frameworks, and sustaining innovations. The study highlights the standout of investor preferences, systematic positioning of innovation centers, and socio-cultural imperative of multi-stakeholder collaboration as the drivers of sustainable growth. In addition, it recognizes challenges such as selection algorithm bias and data privacy issues and it presents policy suggestions regarding funding approaches. The present work advances the knowledge in the field by presenting an overall model of funding processes in AI start-ups, explaining the actions of investors, and providing tools for entrepreneurs. It also educates policymakers about specific areas that should be prioritized to enable a positive culture of unleashing and supporting AI, thereby filling knowledge gaps, and reinforcement AI stability and growth.
Keywords: artificial intelligence, start-up ecosystems, venture capital, innovation dynamics, funding mechanisms

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Анализ динамики финансирования стартапов в сфере ИИ: влияние инвесторов, инновационные стратегии и синергия экосистемы

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Аннотация
В статье рассматриваются множественные взаимосвязи между финансированием стартапов в сфере ИИ и определяется влияние инвесторов, технологических изменений и типов финансирования внутри экосистемы стартапов. Исследование, охватывающее период с 2019 по 2024 год, позволило выявить более 500 многообещающих стартапов, работающих в сфере искусственного интеллекта. Анализ проводился с учетом региональной специфики и динамики развития во времени. Исследование посвящено финансированию ИИ-компаний, включая роль венчурных и корпоративных инвесторов, государственную поддержку и различные модели финансирования. Для изучения моделей финансирования стартапов в этом исследовании применяется комплексный подход, сочетающий описательную статистику, машинное обучение и качественные данные. Анализ включает в себя использование R, Python и Tableau для обработки финансовых и операционных данных, а также субъективных оценок, полученных от основателей, инвесторов и политиков. Вторичные данные из баз данных венчурного капитала и финансовых отчетов используются для подтверждения и расширения результатов. Финансирование экосистем играет ключевую роль в определении траектории развития стартапов, занимающихся искусственным интеллектом. Исследование демонстрирует, что именно финансирование влияет на то, насколько компании уделяют внимание этике ИИ, соблюдению нормативных требований и внедрению инноваций. Для обеспечения устойчивого роста необходимо учитывать интересы инвесторов, создавать благоприятные ус-

ловия для инновационных центров и развивать международное сотрудничество. В работе также анализируются риски, связанные с предвзятостью алгоритмов и защитой конфиденциальных данных, и предлагаются рекомендации по формированию более эффективной политики финансирования. Исследование предлагает практическое руководство для стартапов в сфере ИИ, инвесторов и политиков. Оно представляет собой комплексную модель финансирования, объясняет мотивы инвесторов и предоставляет инструменты для предпринимателей, стремящихся привлечь капитал. Кроме того, исследование указывает политикам на приоритетные направления для создания благоприятной среды, способствующей развитию и поддержке ИИ, тем самым заполняя пробелы в знаниях и обеспечивая устойчивый рост отрасли.
Ключевые слова: искусственный интеллект, экосистемы стартапов, венчурный капитал, динамика инноваций, механизмы финансирования

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分析人工智能初创企业的融资动态：投资者影响、创新战略和生态系统协同效应

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简介
本文研究了人工智能初创企业资金之间的多重相互联系，并确定了初创企业生态系统中投资者、技术变革和资金类型的影响。研究涵盖 2019 年至 2024 年，确定了 500 多家有前途的人工智能初创企业。在进行分析时，考虑到了地区的具体情况和随着时间推移的发展动态。本研究重点关注人工智能公司的融资问题，包括风险资本和企业投资者的作用、政府支持以及各种融资模式。本研究采用描述性统计、机器学习和定性数据相结合的综合方法来研究初创企业的融资模式。分析包括使用 R、Python 和 Tableau 处理财务和运营数据，以及创始人、投资者和决策者的主观评价。来自风险投资数据库和财务报告的二手数据被用来验证和扩展研究结果。资金生态系统在决定人工智能初创企业的发展轨迹方面发挥着关键作用。研究表明，正是资金影响着公司对人工智能道德、合规和创新的关注程度。为确保可持续增长，有必要考虑投资者的利益，为创新中心创造有利环境，并促进国际合作。本文还分析了与算法偏差和保护敏感数据相关的风险，并就更有效的资助政策提出了建议。本研究为人工智能初创企业、投资者和政策制定者提供了实用指南。它提出了一个全面的融资模型，解释了投资者的动机，并为寻求融资的创业者提供了工具。此外，该研究还为政策制定者指出了创造有利环境的优先领域，以促进和支持人工智能，从而填补知识空白并确保该行业的可持续增长。
关键词： 人工智能、初创企业生态系统、风险投资、创新动力、融资机制

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1. Introduction and background

Artificial Intelligence (AI) has a future as an insightful technology that provides opportunities for sectors such as health, finance, education, and logistics. A significant role in the advancement of AI technology and its commercialisation is played by start-ups that focus on ongoing innovation and fast-moving strategies due to their very nature [Schulte-Althoff et al., 2021; Kulkov, 2023]. However, on the one hand, AI start-ups have great potential, but, on the other, they often face multiple problems when attempting to obtain sufficient funding to scale-up operations and achieve sustainable growth. The investment in AI start-ups is also influenced by institutions such as venture capitalists, corporate investors, local, and national governments, and innovation hubs, each with different expectations and contributions [Bertoni, Bertoni, 2022].

2019–2024 saw an increase in funding for AI start-ups due to the growing interest of investors in the efficient and practical solutions for AI deployment. This period also saw increased focus on ethics in AI, establishing regulatory frameworks, and alliances cutting across different fields to address issues such as data protection and fairness in machine learning [Sloane, Zakrzewski, 2022]. Concerning the growth of entrepreneurship, access to strategic capital from some sort of financing has been strongly influenced by opportunies presented in environments with limited resources. However, [Rena, 2009] calls for promoting the concept of entrepreneurship as a driver of economic growth in rural areas due to innovations by entrepreneurs. This view is in line with the study, which also investigates AI start-ups as agents of change in technology-based economies.

In the area of education, the effects of limited funding in developing countries have been addressed by other authors from a wider perspective. For instance, [Rena, Kidane, 2009] presented a view that supports the work done and investment in systems but recommends that this should be followed by work on innovation, which correlates well with the ideas presented in the current work regarding structured funding mechanisms for AI start-ups.

Nevertheless, more expansion of technology, investors, and funding instrument connections are still needed for further study. Uncovering these dynamics is crusial to making timely and right decisions about investments and growth within the AI start-up environment [Prado, Bauer, 2022].

To that end, this research aims to understand the complexity of funding for AI start-ups, as well as how investors, regulatory bodies and ecosystem environments impact these companies' success factors.

To understand the features of support for AI start-ups, we need to consider how investors, technology, and the environment

interact, and develop recommendations for improving funding effectiveness and creating new technologies.

Objectives are:

– to assess the impact that investors' preferences have on the probability of funding AI start-ups;
– to determine which processes and value propositions receive the most funding;
– to analyse the influence of innovation hubs, incubators, and accelerators on AI start-up development;
– to analyse how legal requirements and ethical considerations affect funding.

In order to serve as a strategic guideline instrumentally for improving funding results for the aforementioned stakeholders.

Prior studies offer information about different elements of start-up ecosystems, including VC evolution and the influence of technology. However, there is insufficient information to understand the funding dynamics of specific nature to AI start-ups. Many papers focus on technological aspects or the investor's perspective, while the primary dimensions do not provide a holistic view [Filieri et al., 2021; Schulte-Althoff et al., 2021]. Additionally, related research does not focus solely on the regulatory compliance, ethical aspects of AI, the interaction between funding sectors and fields, etc. [Sloane, Zakrzewski, 2022; Bellina, Jungmann, 2023].

This study aims to fill these gaps by analysing the funding prospects for AI start-ups, through the use of quantitative and qualitative methods with an overall goal of narrowing the research gap that exists between technology, investment and policy dimensions.

2. Problem statement

Thus, while the use of artificial intelligence is rapidly gaining momentum, as evidenced by the exponential growth in start-up innovations driven by AI, start-ups themselves face a myriad of challenges when it comes to financing. The problem is that there is no clear understanding of how investors' preferences, technological changes, and support systems affect funding outcomes. This gap hinders the ability of start-ups to align their strategies with those of investors. It also affects the effectiveness of policy interventions aimed at encouraging innovation. Solving this problem is crucial for improving the effectiveness of funding models and ensuring the future financing of breakthroughs in Artificial Intelligence.

Another important fundamental analysis provided by [Schulte-Althoff et al., 2021], who states that VC plays an important role in the funding of early-stage AI innovations. They pointed out that AI tech solutions are portable which supports the main hypothesis that the funding results depend on the availability of a solid innovation environment. In support of these findings, [Kulkov, 2023] makes use of samples that include healthcare AI start-ups as some of the best examples of VC engagement and the way business models can be adapted to attract VCs and respect the needs of the law. In like manner, [Filieri et al., 2021] also look at tourism-specific AI start-ups and describe how select forms of applications can generate funding outcomes.

Some of the people who share these ideas include [Prado, Bauer, 2022], who hold the view that venture capital funding is indispensable in promoting innovation in emerging tech start-ups. They emphasise that the active cooperation between investors and start-ups also increases the availability of the ethical AI solutions and compliance with standards. Similarly, [Bellina, Jungmann, 2023] suggest that better cooperation should be made between established companies and AI start-ups to assist them in removing issues related to funding and operation.

Researchers who hold somewhat dissimilar but comparable ideas are [Rasiwala, Kohli, 2021], are studying fintech. They argue that, given that AI technologies exist in financial services, they disrupt the existing systems. Investors seek to patronise start-up firms that offer high revenue and comply with the regulations. [Sloane, Zakrzewski, 2022] build on this reasoning by offering a view from a socio-technical perspective, evaluating how ethics and societal practices influence funding opportunities for AI start-ups in Europe.

Therefore, authors with opposing views, such as [Huergo, López, 2022; Tricot, 2022], argue that subsidies and government assistance, rather than venture capital, finance the development of AI. They argue that the over-reliance of these firms on VC precipitates short-sighted strategies that primarily target short-term profits, at the expense of long-term technological development and the well-being of society. This dilemma raises a question: where and how strike the right tone between satisfying private investors' gains, on one hand, and considering the social impact of AI, on the other hand?

This leads to our research question: To what extent do investor tastes, technological trends and ecosystems influence the funding of AI start-ups?

To answer this question, we need to address the following issues: the place of venture capital, ethical and regulatory concerns, and the effect of cross-sector partnerships. According to a literature review, a conceptual framework is most appropriate for this study because it combines various ideas into a unified framework.

The most valuable contributions to this framework are [Schulte-Althoff et al., 2021; Prado, Bauer, 2022; Kulkov, 2023]. M. Schulte-Althoff and co-authors, as well as I. Kulkov, highlight general and important aspects of understanding the impact of VC on AI start-up growth, as well as specific industry approaches. This is complemented by T. Prado and J. Bauer who include complexity by discussing collaborative innovation ecosystems.

From this body of work, the following key concepts emerge:

1. Investor influence

Investor decision-making relates to the extent to which investors' choices and knowledge about a specific field will impact the funding allocated to AI start-ups. The basis for evaluating start-ups concerns investors, such as VCs, corporate Venture Arms, and Angel Investors. Evaluation fundamentals include market potential, scalability, and team skills [Schulte-Althoff et al., 2021]. Recognising promising business opportunities usually influences funding outomes, aiming to fund start-ups that match market patterns and future needs [Kulkov, 2023].

For instance, [Prado, Bauer, 2022], explain the fact that venture capital funding focuses more on start-ups with winning proposals of how they plan to execute their ideas

in the market. Likewise, [Rasiwala, Kohli, 2021] also note that investor networks help bring attention to start-ups and increase their legitimacy when it comes to the acquiring funds. However, as E. Huergo and A. López discuss in their paper [Huergo, López, 2022], it could sometimes lead to a focus on profit-oriented outcomes rather than solutions that benefit society. The funding mechanisms that have evolved cover a full cycle starting from traditional sources to social funding, such as crowdfunding. As cited in [Paul, Rena, 2024], digital crowdfunding has brought the social process of entrepreneurship funding closer to everyone and made it more accessible. This insight supports the idea that new players can also turn to new sources of funding to complement conventional VC market investments. Specifically, in this study investor influence will act as a predictor for funding success, with more attention paid to an investor's technology, business model, and ethical choices.

2. Technological innovation

In the case of AI start-ups, technological innovation can be defined as a creation of socially useful, technologically advanced and sustainable AI solutions to a range of problems that meet legal requirements. Companies in the start-up stage which are considered to have a high level of technology, typically receive higher investment in order to change the market share and scale up [Filieri et al., 2021]. This includes the technical feasibility of the solutions, as well as their ethical and regulatory acceptability in specific sectors [Sloane, Zakrzewski, 2022].

For instance, [Kulkov, 2023] points out that presentation-focused AI start-ups that work in the healthcare sector using diagnostic tools and predictive analytics attract more funding to meet the critical needs of the segment. According to [Schulte-Althoff et al., 2021], it also notes that entrepreneurs specialising in cross-sector applications such as fintech or renewable energy consistently receive more attention from investors than those focused strictly on a particular sector.

To this end, the technological innovation in this study will be assessed based on scalability, ethics, and legal compliance with AI solutions, since these factors are essential for decision-making by investors and overall success of the venture.

3. Ecosystem support

Ecosystem support involves incubation stations, innovation stations, accelerators, and all collaborative spaces in the development of AI start-ups. These ecosystems provide a source of infrastructure, guidance, connections, and access to capital, as described by [Bellina, Jungmann, 2023]. They also act as intermediaries between start-ups and investors, often increasing the odds of start-ups receiving funding.

[Schulte-Althoff et al., 2021] found that start-ups located in mature innovation clusters receive feedback from experienced coaches, have access to modern infrastructure, and are visible to potential investors. Similarly, [Filieri et al., 2021] have pointed out that ecosystem support not only improves the chances of start-up survival but also accelerates the journey towards the commercialisation of new solutions. [Prado, Bauer, 2022] note that ecosystems with guidelines and ethical leadership increase the appeal of start-ups to investors. Critical support for the structure of ecosystems for innovation has been addressed from various angles. [Rena, 2002] describes the issue of funding education and emphasises the importance of adequate mechanisms for cost recovery as a key factor in growth. Like any growing industry, innovation hubs and accelerators in the AI ecosystem help support the growth of future start-ups by offering resources for growth and supporting them correctly.

Ecosystem support will be seen as another essential factor in this study, with a focus on how collaborative environments improve funding availability and innovation outcomes for start-ups. These concepts are linked as follows: market and stakeholder pressures control the initiation of funding that goes to technological start-ups in ecosystems offering supportive resources and role models.

3. Critique and rationale

The decision to use a conceptual framework for this study is based on its ability to capture multiple viewpoints on the subject and respond to the complexities arising from the funding process of AI start-ups. While the theoretical framework remains loyal to a particular paradigm or theoretical theory, the conceptual framework combines ideas from different fields to create a comprehensive understanding of a complicated phenomenon [Maxwell, 2013].

From the perspective of this research, the funding environment for AI start-ups concerns the financial, technological, regulatory, and ethical aspects. These dimensions should not be thought of as existing in isolation from each other; a conceptual framework allows for a multiplicity of these dimensions, outside of which research on their interactions may be somewhat constricted. For example, [Schulte-Althoff et al., 2021] emphasise the significance of VC in the development of new AI-based technologies that can meet the needs of a growing number of users. This contribution emphasises the financial gains for investors who are interested in scalable and market-relevant start-ups. In contrast, [Sloane, Zakrzewski, 2022] focus on the ethical aspects of funding decisions, the rules governing such funding, and social responsibility in attracting funds.

Combining these perspectives through a conceptual framework offers several advantages:

1. Multidimensional understanding: Schulte-Althoff and co-authors argue that there are two perspectives on business sustainability, namely profitability and post-crisis business ethics. Sloane and Zakrzewski also note that this framework highlights two views of business sustainability: profitability and the post-crisis business ethics. This is important for understanding how and where monetary incentives meet and mix with social responsibilities among investors [Prado, Bauer, 2022].

2. Practical applicability: It is consistent with research findings on AI start-up funding to capture the multiple players, including investors, entrepreneurs, policymakers and innovation hubs among others. This makes it possible to present the study's findings in a way that is useful for 'practical' end-users of the information, both practitioners and policymakers [Bellina, Jungmann, 2023].

3. Dynamic adaptability: A conceptual framework can be adjusted to accommodate emerging trends and new knowledge, which is impossible with theoretical frameworks. For instance, since the study also takes into account recent changes in the

ethical considerations of AI funding, the framework can adjust to these elements without disrupting its structure [Kulkov, 2023].

The selection of a conceptual framework is also based on the gaps that the chosen framework can fill within the literature review. This information can often be limited by its scope, as prior research has adapted individualistic approaches such as top-line financial indicators or ethical perspectives only. For example, [Filieri et al., 2021] focus on changes in funding activities by sector, noting the tourism sector, while [Rasiwala, Kohli, 2021] examine investment in the fintech sector. Synthesising these various perspectives provides a holistic view of the funding ecosystem through the conceptual framework.

Furthermore, the conceptual framework supports the study goals and objectives in order to offer insights into funding mechanisms. It provides guidelines for policy makers on how to develop policy instruments that will incorporate both money and legal consequences. For investors, it emphasises the importance of integrating funding initiatives with priorities such as technologies and society [Huergo, López, 2022]. To begin with, it serves as a reminder of how entrepreneurial pitches should be designed and presented, especially within ethically and legally acceptable standard, to suit the tastes of investors, particularly for start-ups.

4. Methodology, research design and approach

This study therefore employs a mixed-method research approach to achieve a detailed understanding of the funding processes for external AI start-ups, with a focus on investor choice, technology development and support systems. The use of mixed methods is useful because it combines quantitative and qualitative approaches, from which rich quantitative and qualitative data can be obtained. The study also utilises concepts from [Paul, Rena, 2024] on funding new AI startups through the assessment of digital platforms. By expanding the sample size of the research, the study raises questions about the efficiency of these platforms in terms of funding availability – as a source beyond venture capital, grants and government funding frameworks.

Qualitative research designs used in this study include an explanatory sequential design, whereby quantitative data is analyzed first for propensity, and then qualitative data is analysed to provide an explanation of the recognised propensities [Tashakkori, Teddlie, 2009]. This approach helps to combine the quantitative analysis results with qualitative views to provide a holistic view of different funding ecosystems.

The following data collection methods were used:

1. Quantitative data collection

Quantitative data will be sourced from reputable databases, including:

Furthermore, the financial data for investments have been sourced from Crunchbase, PitchBook, and DealRoom, along with startup-related financial indicators, which include funds raised, investor type, and start-up performance.

Trade journals and references are used for cross-sectoral funding analysis and technological advancements.

Half a million dollars will be allocated to a current dataset of AI start-ups funded between 2019 and 2024. Key variables will include:

– stages of financing or capital increases (seed, A, etc.);
– investors (venture capitalists, Angel investors, government funding);
– ethical, technological, and range elements (ethical, scalabilities, regulatory).

2. Qualitative data collection

Qualitative insights will be gathered through:

These are interviews and focus group discussions with key informants, including start-up founders, individual and institutional investors, as well as managers and staff from innovation hubs. The aim of these interviews is to determine investor preferences, technological needs, and support systems for the ecosystem.

Starting with a review of case studies of established and failed AI start-ups, each selected based on specific contextual characteristics in an effort to identify components that affect funding decisions.

Data analysis methods include

1. Quantitative analysis

Methods: methods of statistical analysis will be used to discover correlations and patterns in the data. Tools include:

We will also use descriptive statistics to describe some of the important variables.

T-tests were used to compare levels of preference and technological importance among samples of investors, both those who were successfully funded and those who weren't.

Software: M, STATA, and Python with supported libraries such as Pandas, Num, and Scikit.

2. Qualitative analysis

Qualitative data will be analysed using:

They identified themes through integrative interviews and case studies of stakeholders.

Since the study adopted interviews and secondary data, content analysis was used to code the findings from interviews, and a comparison was made with secondary data to identify other insights that might have emerged.

Software: NVivo or Atlas. ti to code and regulate the qualitative data.

Validation and reliability

Triangulation: The choice to use both quantitative and qualitative approaches means that the data is already triangulated in order to increase the reliability and validity of the findings [Denzin, 2012].

Data verification: Quantitative data will be collected using various databases such as (Crunchbase & Pitchbook) and qualitative data will be verified through respondent validation (member checking).

The study adheres to ethical research principles by:

– forming consent with the interview participants;
– ensuring the anonymity of all the respondents and the cases used in the survey;
– employing secondary data in accordance with the rules set out in regulatory policies on data sharing.

Such an approach is valid as it combines quantitative and qualitative methods, since the research question is multifaceted

and complex. Quantitative studies provide general knowledge patterns, while qualitative methods provide detailed information and contextual insight; [Creswell, 2014]; They complement each other, with the former providing broad results and the latter explaining the gaps left by much literature that relies on numbers and case studies. This integrative approach allows for a more comprehensive and inclusive understanding of the funding of AI start-ups.

5. Results and discussion

5.1. Results

Funding patterns of over 500 AI start-ups for the timeframe of 2019 – 2024 were examined through quantitative data collection and set against a qualitative backdrop of interviews. The findings are organized around three key themes: the purpose of this paper is to reveal such factors as investor influence, technological innovation, and ecosystem support.

1. Investor influence

The quantitative study showed that specific investors' choice had an impact on the fund receipt rates. AI business start-ups with economically reproducible technologies and well-defined business models were favored by the investors. Specifically:

- Big area of AI technologies, for which investors were keen included generative AI and predictive analysis [Schulte-Althoff et al., 2021; Kulkov, 2023];
- Namely, start-ups that have claimed previous rounds and a partnership with a mature company received larger funding [Prado, Bauer, 2022];
- Ethical concerns have put pressure on some financiers, especially in the healthcare and fintech sectors, where meeting ethical AI standards increased the possibility of receiving funding [Sloane, Zakrzewski, 2022].

In this regard, Paul and Rena argue that innovation in crowdfunding and other digital funding platforms makes AI funding a more viable option for AI start-ups. Consequently, this research shows that these platforms not only complement the initial access to funds but also provide support from peers for start-up undertakings. During more descriptive interviews, investor knowledge emerged as the critical factor. Entrepreneurs highlighted the occasions when investors provided valuable lessons and insights that helped them better adapt their value propositions to market developments.

2. Technological innovation

Start-ups with innovative and compliant AI technologies have consistently been favoured:

Ideas for solving a current social problems, such as in healthcare diagnostics or renewable energy, have been more successful in attracting funding [Filieri et al., 2021; Kulkov, 2023].

Of similar importance was scalability; those technologies that could cross over between sectors received higher funding [Schulte-Althoff et al., 2021].

Data privacy and algorithmic transparency have become other no-go areas for many investors due to increasing regulations in many parts of the world, particularly in the EU. [Rena, 2006] was also concerned about how technology could lead to change and help resolve system-related problems, and this opinion complements the research findings in the method used in this study, which explores how innovative AI solutions can be used to attract investment. Small companies that provide solutions for multiple industries, such as healthcare and green energy, align with this developmental vision.

3. Ecosystem support

Innovation hubs and accelerators have played a pivotal role in enhancing start-up visibility and operational efficiency:

Firms backed by leading incubators or operating from emerging hubs such as Silicon Valley or Berlin were about 40 % more likely to receive funding [Bellina, Jungmann, 2023].

These ecosystems provide networking opportunities, technical support, and visibility for investors [Filieri et al., 2021].

Topical examples showed that accelerators mediate between start-ups and authorities to ensure compliance with regulations and attract investors (see [Prado, Bauer, 2022]). The significance of ecosystem support has been emphasised by [Rena, 2002], who describes how a structured system leads to sustainable growth in education. Similarly, the role of innovation hubs in the AI start-up ecosystem emphasises the importance of infrastructure and mentorship for improving funding.

5.2. Discussion

The results of the current study are consistent with and contribute additional insights to the existing AI start-up funding research. Our findings encompass investor behaviour, technology advancement, and ecosystem factors that define funding trends.

1. Money power and management decisions

The demand for large-scale and equitable AI solutions is understandable in light of the changing focus of investors, who are gradually moving away from the exclusivity of the opportunities to generate money in favour of creating fair and legal products. This is supported by the research done by [Schulte-Althoff et al., 2021; Sloane, Zakrzewski, 2022], as the importance of accountability in innovation continues to grow. However, this study also shows that investors lack knowledge in some of these new AI areas, meaning that they have work to do in engaging with start-ups.

2. Technological innovation: The staff's responsibility

Technological differentiation is still an essential ingredient for funding. Organisations that focus on conveying their value proposition through social advancements and compliance with industry laws achieve asignificant consumer loyalty in a cumulative outcome. Similarly, [Kulkov, 2023] pointed out the importance of sectoral innovation, and [Filieri et al., 2021] noted that recognising industry-specific issues adds value. Compliance focus has provided an important opportunity for start-ups to adopt and implement ethical AI guidelines during the development stages.

3. The second and final element, or domain, is ecosystem support as an enabler

The availability of innovation hubs and accelerators shows that competitive advantages depend greatly on ecosystem support, as regards funding. This agrees with [Bellina, Jungmann, 2023] who use the term 'partnership models' to link start-ups with funding, expertise and capital sources… Nevertheless, the level of access to these ecosystems varies significantly, and in countries where it is less developed, such as many emerging

markets, this poses a challenge that policymakers and global incubators need to address.

Use of the TIP and the pragmatic approach: Explanations for findings, concluding thoughts, and recommendations for practice. Implications for policy.

For start-ups: The approaches to funding should reflect scalability, compliance, and socially responsible funding. One advantage of interacting with innovation hubs is that it can increase the profile and readiness of organisations.

For investors: Other areas that can help achieve a good return on investment include increasing knowledge in AI-related domains and partnering with start-ups.

For policymakers: A lack of such policies can be addressed by introducing policies that support the ethical development of AI, as well as setting up innovation hubs in areas that are not yet well-developed.

Conclusion

Thus, this work aimed to identify funding trends in AI start-ups, to study entrepreneurial, investors, technology and ecosystem interactions. The identified factors included integrated solutions that could be scaled, were ethical, regulatory compliant, and were significant determinants of funding. Investor experience and support from the ecosystem were also noted as significant for determining the likelihood of success. Venture capital was the most popular form of funding, and the trend towards investing in solutions to social problems such as health and energy was evident.

Furthermore, there are ethical concerns and compliance requirements that are equal in importance to funding and, thus, are an essential factor in the success of funding. The role of developing responsible AI has emerged. Related innovative structures, defined as innovation hubs and accelerators, have emerged as central to driving this innovation process by offering strategic resources, knowledge, and connections to capital sources. However, accessibility to such ecosystems remains a concern, and this indicates that inclusive policy interventions are needed.

Practical implications

– for start-ups:

This study builds on the insights proposed by [Paul, Rena, 2024] about the democratisation of funding through digital platforms and recommends incorporating them into more traditional funding environments for AI start-ups. Additionally, the study shares another important aspect with [Rena, 2006; 2009] regarding the implications of entrepreneurship and innovation for development. Thus, it is important to emphasise scalability, compliance, and relevance to society when considering funding applications.

Technological and financial hubs will enhance the visibility and preparedness of engagement in innovation.

Applying ethical AI principles proactively is a way for start-ups to stand out in a crowded funding environment.

– for investors:

The expansion of the understanding of new AI markets and the development of cooperation with start-ups may improve the results of investments.

Potential benefits of implementing ethical considerations in investment procedures involve addressing risks and complying with new regulations.

– for policymakers:

The regional disparities to call can be mitigated by creating policies that would promote ethical development and support innovation clusters.

Grants, subsidies and public-private partnership schemes can significantly stimulate the start-up development in niches that lack such actors.

Theoretical implications. This work enriches research in the field by synthesising multiple paradigms into a single theoretical model that demonstrates the relationship between financial, technological, and regulatory factors. It adds to previous literature by offering survey data on investor preferences and funding ecosystem support within the context of P2B lending.

Future scope of the study.

Exploration of emerging markets. There is potential literature where future studies could attempt to consider funding activities in emerging countries based on the factors that make AI start-ups suitable for these markets exclusively.

Longitudinal studies. Such longitudinal studies might help to understand how funding dynamics evolve as AI start-ups grow and transition to other phases of venture development. Based on the findings of [Paul, Rena, 2024], future studies might explore the opportunities offered by digital crowdfunding platforms in emerging markets. Additionally, systemic implications of [Rena, 2002; 2006] suggest that future research could investigate how learning and economic systems might be modified in order to promote international AI development.

Sector-specific analysis. More works could explore geographical differences in funding. It could look at venture capital funding for biotechnology or AI in finance, and renewable energy, to name a few areas.

Impact of ethical AI policies. It would be useful to understand how start-up founders and investors plan for and respond to new and changing ethical AI policies to allocate funding.

Integration of alternative funding mechanisms. Subsequent research might also explore how funding sources, such as crowdfunding and ICOs, or partnerships, might augment or replace venture capital.

AI-powered funding decision models. As the use of AI continues to drive decision-making, researchers might consider the existence of AI algorithms for assessing start-up viability and guiding funding.

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