

QUALITY SIGNALS IN EARLY-STAGE VENTURE CAPITAL DECISION-MAKING IN THE AGE OF AI

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1 INTRODUCTION

Over the past few years, many industries have undergone significant transformation following the advent of large datasets and the growing use of Artificial Intelligence. The motivation behind this research is to investigate various possibilities for using advanced AI models to identify high-potential startup companies in their early stages, where financial information is scarce, and investors are relying on other signals to make their decisions. Doing so might improve the success rate of the commonly cited “1 in 10” of successful VC investments [1].

2 MATERIAL AND METHODS

This study implements a mixed-method design, combining bibliometric analysis and AI-driven signal extraction. Data are collected from venture capital databases (e.g. Crunchbase, PitchBook), and also from scholarly sources (e.g. Scopus, Web of Science). Social media platforms like LinkedIn is used to capture founder profiles and affiliations. LLMs (Large Language Models) extract and analyse these quality signals, such as entrepreneurial background, social capital and create different clusters. Extracted variables are statistically validated using regression models to test their predictive value on funding outcomes and startup success indicators.

3 RESULTS

In seed or startup investment rounds, where uncertainty is high and reliable information is exceptionally scarce, quality signals are essential to assess new nascent ventures [2]. The entrepreneurial reputation, track record, educational background, different networks, or even third-party affiliations can endorse the quality of the new venture [3]. However, those signals could remain unnoticed. Since VCs face high uncertainty and limited information or information asymmetry, especially in the early stages of finance [4], they highly rely on observable characteristics or quality signals. To find these signals, LLMs (large language models) have begun appearing in academic literature and industry studies, which explore how artificial intelligence is applied to due diligence (DD) and investment decision-making, particularly in early-stage or high-risk environments. For example, Bai and Zhao demonstrate how incorporating machine learning into venture capital scorecards can provide a more objective evaluation of investment prospects [5]. It acts as an assistant, helping process large sets of data, executing different analyses, and identifying patterns [6]. While AI offers significant support in financial

decision-making, it has limitations. Neural networks and machine learning (ML) models are dynamic and continuously evolving over time. As a result, the same model used in a DD can produce different suggestions and even generate misleading information. Though it might be less of a risk in the later stages where business plans, financial statements, and clear firm characteristics are presented, this paper focuses on the early stages. It explores AI as a tool to support VC decision-making by finding and assessing different signals and entrepreneurial competence. The previously mentioned educational background could be of such signal, or previous success in venture creation [7]. Others like Baum and Silverman, pick winner startups by identifying three broad segments in the valuation of new nascent ventures – alliance capital, intellectual capital, and human capital – as equally important components [1].

4 CONCLUSIONS

This study will be grounded in the philosophy of positivism, aiming to build upon and contribute to the existing literature in the fields of venture capital (VC) decision-making and quality signaling theory. It analyzes observable and quantifiable variables, identified and evaluated using artificial intelligence (AI), to investigate potential correlations between early-stage signals and venture success. In doing so, the research seeks to either propose a framework or methodology for leveraging AI in VC evaluation processes or to demonstrate that current AI capabilities remain insufficient for reliably distinguishing high-potential startups from less successful ones, particularly when human behavioral traits are involved.

While challenges such as model transparency, evolving outputs, and bias remain, the transformative potential of AI to enhance efficiency, objectivity, and predictive power in venture capital decision-making – particularly in the early stages – warrants further investigation into its long-term impact, limitations, and ethical implications.

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