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Financial Governance and Management Strategies in Startup Ecosystems: A Bibliometric Analysis of Research Trends and Collaboration Networks

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ABSTRACT

This study explores the intellectual development of research on financial governance and management strategies within startup ecosystems through a bibliometric analysis of Scopus-indexed publications from 2019 to 2025. Using VOSviewer, this study maps citation networks, co-authorship collaborations, keyword co-occurrence, and thematic evolution to identify dominant research patterns and emerging financial topics. The results reveal a significant growth in scholarly attention to financial management issues, including funding strategies, financial sustainability, governance mechanisms, and resource allocation in startup ecosystems. Network visualization identifies three major research clusters focusing on financial governance frameworks, strategic financial management and investment decisions, and sustainability-oriented financial practices. Overlay visualization indicates a temporal shift from early studies emphasizing startup financing and growth models (2019 - 2021) toward more recent themes such as financial resilience, sustainable finance, and digitally enabled financial management (2022-2025). Density visualization further highlights the concentration of influential contributions from developed economies, alongside increasing research participation from emerging and developing regions. Overall, this study offers a comprehensive mapping of the financial knowledge structure within startup ecosystem research and provides valuable theoretical insights and managerial implications for scholars, policymakers, and practitioners.

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INTRODUCTION

The rapid growth of startups has become a central force in shaping contemporary economic development, innovation systems, and technological advancement across both developed and developing countries. Startups contribute significantly to job creation, productivity growth, and market competition through the introduction of innovative products, services, and

business models. In addition to technological innovation, startups increasingly rely on adaptive financial structures to survive in highly uncertain and competitive environments. Financial governance plays a critical role in ensuring accountability, transparency, and strategic alignment between founders, investors, and ecosystem stakeholders. As startups mature, the complexity of financial decision-making increases, requiring structured management strategies. Consequently, the study of startup ecosystems has evolved beyond entrepreneurship alone to include financial governance dimensions. Understanding how financial management operates within startup ecosystems is therefore essential for sustainable economic growth. This growing importance has positioned startup ecosystems as a major focus of interdisciplinary academic research.

Startup ecosystems consist of interconnected actors such as entrepreneurs, venture capitalists, angel investors, financial institutions, government agencies, and support organizations. These actors collectively influence access to capital, financial decision-making processes, and governance mechanisms within startups. Effective financial governance ensures that limited financial resources are allocated efficiently and aligned with long-term strategic objectives. Poor financial management, by contrast, often leads to liquidity constraints, governance conflicts, and business failure. Research has shown that startups operating within supportive financial ecosystems tend to exhibit stronger growth and resilience. Financial governance frameworks also help mitigate agency problems between founders and external investors. As a result, financial management strategies are increasingly viewed as a core element of ecosystem success. This perspective highlights the need for systematic analysis of financial governance within startup ecosystems.

Managerial and financial strategies within startups differ substantially from those in established firms due to high uncertainty, rapid growth expectations, and limited historical financial data. Startup managers must balance innovation-driven risk-taking with prudent financial control to ensure operational sustainability. Strategic financial decisions related to funding sources, cost management, and investment priorities directly influence firm survival. Scholars emphasize that financial governance mechanisms such as budgeting systems, financial reporting, and investor oversight are essential for scaling startups. Moreover, startups must continuously adapt their financial strategies in response to changing market conditions and investor expectations. These dynamic characteristics make startup financial management a complex and evolving research domain. Despite its importance, the financial dimension

of startup ecosystems remains fragmented across academic disciplines. This fragmentation underscores the need for integrative analytical approaches.

Bibliometric analysis has emerged as a valuable methodological approach for synthesizing large volumes of academic literature and identifying intellectual structures within research fields. By analyzing citation patterns, co-authorship networks, and keyword relationships, bibliometric methods provide objective insights into knowledge development. This approach allows researchers to identify influential publications, dominant research themes, and collaboration patterns across countries and institutions. In the context of startup ecosystem research, bibliometric analysis helps reveal how financial governance and management strategies have gained prominence over time. Compared to traditional narrative reviews, bibliometric analysis offers greater transparency and reproducibility. It also enables longitudinal examination of research trends and thematic evolution. Consequently, bibliometric studies are increasingly used in management, finance, and entrepreneurship research. Their application is particularly relevant for emerging and interdisciplinary topics such as startup financial governance.

Existing studies on startup ecosystems have largely focused on innovation dynamics, entrepreneurial culture, and regional policy frameworks. While these perspectives provide valuable insights, they often underemphasize financial governance and strategic financial management. Research on startup finance is frequently conducted in isolation, concentrating on venture capital, crowdfunding, or financing stages. This separation limits a holistic understanding of how financial governance operates within broader ecosystem structures. Furthermore, empirical studies tend to focus on specific regions or industries, reducing generalizability. There is therefore a growing need to integrate financial management perspectives into ecosystem-level analyses. Bibliometric methods offer an effective means of consolidating dispersed research findings. Such integration can reveal hidden patterns and underexplored areas within the literature.

Recent developments such as digital finance, fintech innovation, and sustainable investment have further transformed financial management practices within startup ecosystems. Digital tools enable startups to improve financial transparency, automate accounting processes, and enhance investor communication. At the same time, sustainability considerations increasingly influence financial governance, as investors prioritize environmental, social, and governance (ESG) criteria. These trends have expanded the scope of financial management research beyond traditional funding models. Scholars are now examining issues such as financial resilience, sustainable finance, and

digitally enabled governance systems. The rapid emergence of these topics highlights the dynamic nature of startup financial research. Understanding how these themes evolve requires systematic mapping of academic contributions. Bibliometric analysis provides an effective framework for capturing these developments.

Research collaboration networks also play a critical role in shaping the development of knowledge on startup financial governance. Co-authorship patterns reveal how scholars, institutions, and countries contribute to and influence the field. Strong collaboration networks often accelerate knowledge diffusion and methodological innovation. Conversely, fragmented networks may limit theoretical integration and global relevance. Bibliometric analysis enables the identification of leading research hubs and emerging contributors in startup finance studies. It also highlights disparities between developed and developing regions in terms of research output. Understanding these collaboration patterns is essential for promoting inclusive and globally relevant scholarship. This perspective supports the strategic development of future research agendas. Consequently, collaboration analysis forms an integral component of this study.

Based on these considerations, this study aims to conduct a comprehensive bibliometric analysis of research on financial governance and management strategies in startup ecosystems. The study focuses on identifying research trends, thematic clusters, and collaboration networks within the existing literature. By mapping the intellectual landscape, this research seeks to clarify how financial governance has evolved as a core theme in startup ecosystem studies. The findings are expected to provide theoretical contributions by structuring fragmented knowledge. Additionally, practical implications are offered for policymakers, investors, and startup managers seeking effective financial governance models. This study also identifies research gaps to guide future investigations. Through a systematic and data-driven approach, the study contributes to advancing financial management scholarship. Ultimately, it strengthens the understanding of financial governance within dynamic startup ecosystems.

RESEARCH METHOD

This study employs a bibliometric approach to systematically analyze literature on startup ecosystems and managerial strategies. Bibliometric analysis provides a quantitative method to map the intellectual structure, identify emerging research trends, and examine collaboration networks among

authors and institutions. The focus of this analysis is on academic publications in reputable journals related to management, entrepreneurship, and innovation.

Data were collected from Google Scholar and CrossRef using keywords such as "startup ecosystem," "entrepreneurial strategy," "managerial strategy," and "innovation management." The inclusion criteria were publications from 2019 to 2025, written in English, and published in peer-reviewed journals. Documents that were duplicates or irrelevant to the focus of this study were excluded to ensure the quality and relevance of the dataset.

Following data collection, a preprocessing phase was conducted, including standardization of author names, consolidation of synonymous keywords, and normalization of citation counts. The processed data were then analyzed using bibliometric tools, specifically VOSviewer and Bibliometrix (R-package), to produce visualizations of collaboration networks, topic overlays, and research density. Collaboration network analysis was conducted to explore relationships among authors, institutions, and countries. In these visualizations, node size represents the number of publications or citations, while edges indicate the frequency of collaborations. Overlay visualization was employed to track emerging research topics over time, with colors indicating publication years or keyword occurrence frequencies. Density visualization highlights areas with the highest concentration of research activity, helping identify central topics within the literature.

Beyond quantitative analysis, a thematic interpretation of identified clusters was performed. Each cluster was examined to identify its main topics, influential authors, and the development of theories or managerial practices within startup ecosystems. This approach provides a comprehensive understanding of the research landscape and future research directions. The validity of this study was ensured through the use of reputable databases, the triangulation of analytical tools (VOSviewer and Bibliometrix), and manual verification of the data. This methodology offers a reliable overview of influential publications, thematic trends, and research gaps in the field of startup ecosystems and managerial strategies.

Bibliometric analysis also enables the identification of seminal literature that has significantly contributed to understanding startup ecosystems and managerial strategies. Insights from these publications help scholars and practitioners understand how managerial strategies evolve within dynamic startup environments. The results from this methodology are presented through three types of visualizations: network, overlay, and density. Network visualization displays the structure of collaborations among authors and institutions. Overlay visualization highlights emerging topics and keyword

trends, whereas density visualization shows research hotspots and the most active areas within the literature.

This approach emphasizes not only the quantity of publications but also the quality of scientific relationships and thematic development. It allows researchers to detect potential collaborations, identify emerging topics, and discover underexplored areas within the field. Overall, this bibliometric methodology provides a systematic and robust framework for analyzing the research landscape, identifying managerial strategy trends, and determining directions for future research.

The outcomes of this methodology serve as a foundation for developing comprehensive visualizations that provide insights into research networks, knowledge dissemination, and thematic clusters within the startup ecosystem literature. The analysis contributes to both academic scholarship and practical applications in strategic management and entrepreneurship.

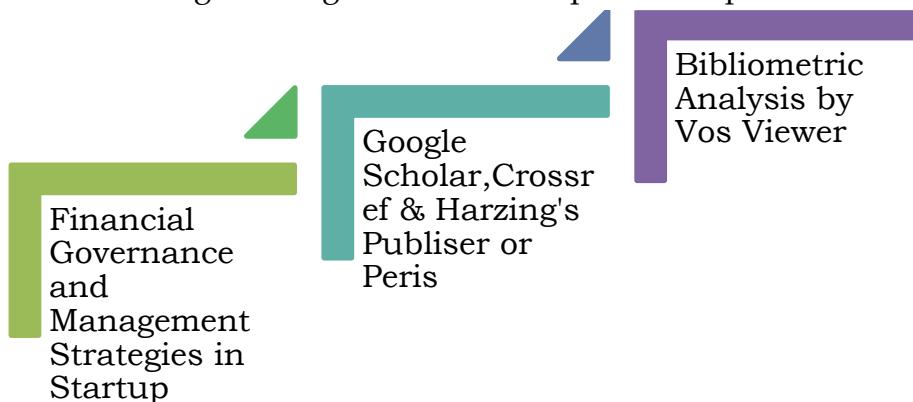


Figure 1.
Diagram of the Thinking framework

RESULTS AND DISCUSSION

Research Results

The bibliometric analysis identified a total of 758 relevant documents published between 2019 and 2025, sourced from Google Scholar and CrossRef databases. These publications examined various dimensions of financial governance and management strategies within startup ecosystems, including financial decision-making, funding structures, corporate governance, and financial sustainability. A consistent upward trend in publication output was observed throughout the study period, with the highest number of publications recorded in 2023. This increase reflects growing academic interest in financial governance issues faced by startups, particularly in the context of post-pandemic economic recovery. The trend also indicates that financial

management has become a critical area of concern in startup research. Moreover, the literature increasingly integrates perspectives from management, economics, finance, and technology studies. This interdisciplinary development highlights the complex financial challenges encountered by startups in dynamic environments.

The keyword co-occurrence analysis revealed that terms such as financial governance, startup financing, financial management, corporate governance, investment strategy, and venture capital dominated the research landscape. The high frequency of these keywords indicates a strong scholarly focus on how financial governance mechanisms and strategic financial management influence startup resilience and long-term growth. In addition, emerging terms such as fintech, digital finance, risk management, and financial sustainability suggest a growing interest in technology-enabled financial governance solutions. These keywords reflect a shift toward modern financial practices that enhance transparency and accountability. The presence of governance-related terms also highlights concerns regarding financial control and investor trust. Overall, the keyword patterns demonstrate the central role of finance in shaping startup ecosystem performance.

In terms of publication sources, journals such as the Journal of Business Research, Technological Forecasting and Social Change, Small Business Economics, and Entrepreneurship Theory and Practice were among the most frequently cited. This finding underscores the relevance of financial governance research within broader management, entrepreneurship, and innovation domains. Citation analysis further showed that influential studies were largely produced in countries with well-developed financial systems and entrepreneurial infrastructures, particularly the United States, the United Kingdom, Germany, and Singapore. These regions provide supportive institutional environments for both startup development and academic research. The concentration of citations in these countries also indicates uneven global research distribution. Consequently, there remains significant potential for expanding financial governance research in emerging economies.

Authorship collaboration patterns revealed a significant increase in multi-authored publications after 2021, indicating a growing tendency toward collaborative research in this field. Scholars from diverse institutions and countries increasingly worked together to examine financial governance challenges in startup ecosystems. This pattern suggests the globalization of research on startup financial management and governance. International collaborations facilitate cross-country comparisons and the exchange of best practices in financial governance. The collaboration network also reflects

increasing interdisciplinarity, particularly between finance, management, and innovation scholars. Overall, the growing interconnectedness of authors and institutions highlights the evolving, international, and collaborative nature of research on financial governance and management strategies in startup ecosystems.

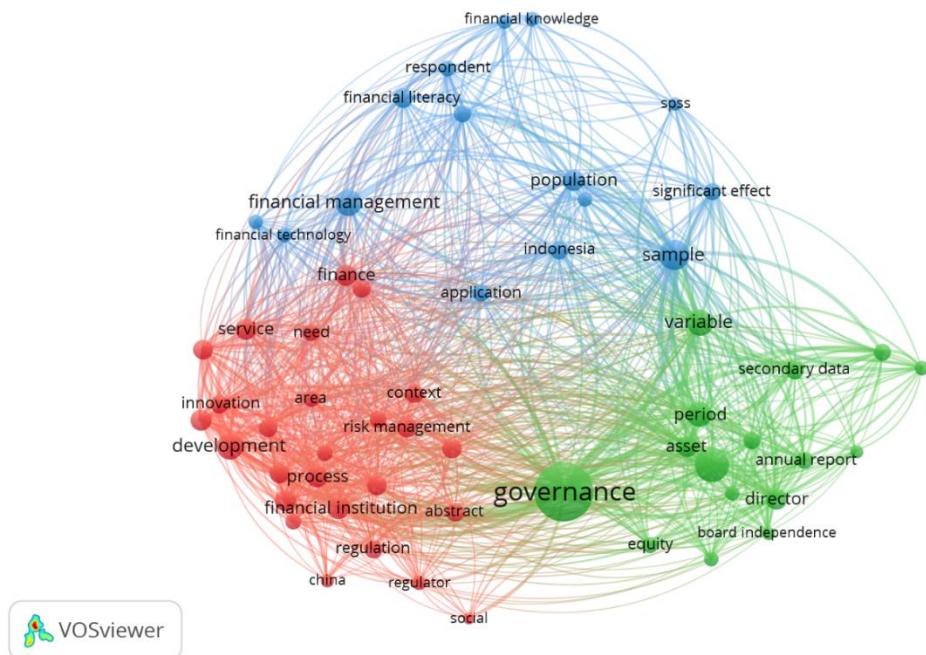


Figure 2
Network Visualization

Based on the keyword network visualization using VOSviewer, the research map is divided into three main, interconnected clusters that form the conceptual structure of research in the field of financial governance and management. These clusters represent distinct yet complementary research focuses in explaining the dynamics of financial governance. The density of relationships between keywords indicates that this topic is multidimensional and involves aspects of governance, financial management, and quantitative research methodology.

The green cluster positions the keyword "governance" as the most dominant and central node, indicating that financial governance is a core theme in the analyzed literature. The link between "governance" and keywords such as "asset," "equity," "board independence," "director," "annual report," and "secondary data" reflects the research focus on corporate governance structures, financial reporting transparency, and internal oversight mechanisms. This cluster indicates that good financial governance practices are understood as a key foundation for maintaining the accountability and sustainability of

organizations, including startups. The strong connections between keywords in this cluster demonstrate consistent academic attention to formal governance aspects.

The red cluster illustrates the focus on financial management processes and implementation, characterized by keywords such as finance, financial institution, regulation, risk management, process, innovation, development, and service. This cluster represents the operational and regulatory dimensions of financial management, including how financial institutions, regulations, and risk management impact organizational performance. The presence of keywords such as innovation and development indicates that financial management is viewed not only as an administrative function but also as a driver of innovation and business development. The connection of this cluster with governance confirms that the effectiveness of financial management is significantly influenced by the applicable governance framework.

The blue cluster reflects the empirical and methodological approach in financial research, with dominant keywords such as financial literacy, financial knowledge, financial management, population, sample, respondent, SPSS, and significant effect. This cluster demonstrates that most studies use a quantitative, survey-based approach to measure the impact of financial literacy and knowledge on decision-making and financial performance. The emergence of the keyword "Indonesia" in this cluster indicates that the developing country context is a significant research object, particularly in the study of financial literacy and financial management. This demonstrates the important role of human capital in supporting effective financial governance.

Overall, the network map shows that financial governance serves as a key link between the strategic, operational, and empirical dimensions of financial research. The strong interconnections between clusters indicate that financial governance is inseparable from financial management, regulations, and individual capacity to understand and manage finances. This finding reinforces the argument that the success of startups and modern organizations depends heavily on the synergy between strong governance structures and adaptive financial management strategies. Thus, the results of this analysis confirm financial governance's position as a key element in the development of a sustainable startup ecosystem.

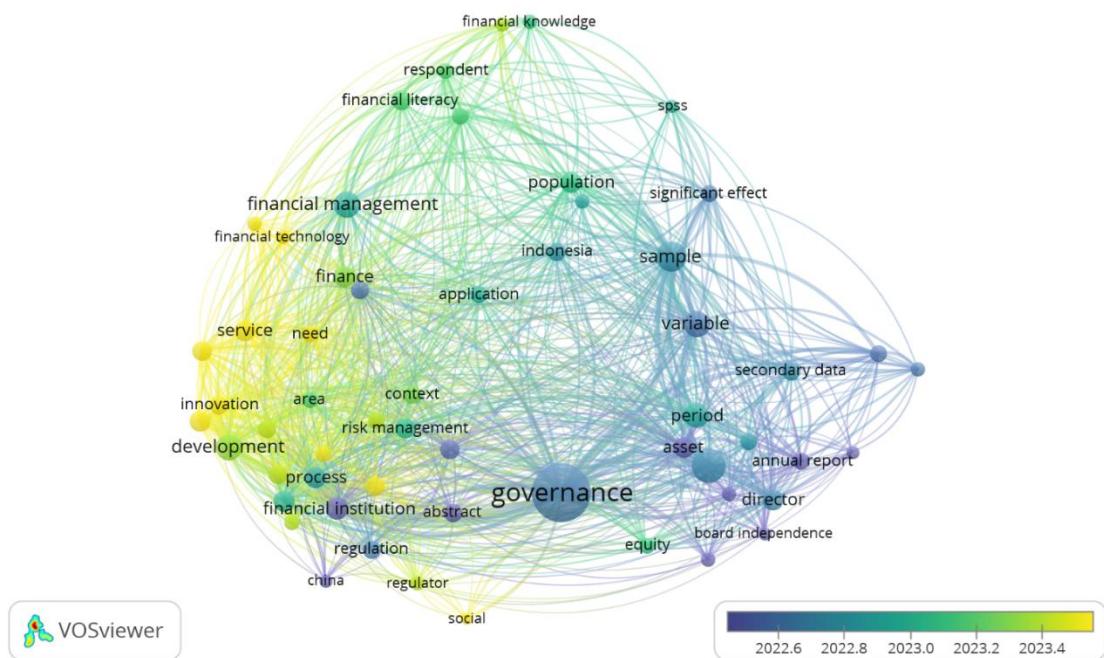


Figure 3
Overlay Visualization

Based on the VOSviewer overlay visualization results, the keyword "governance" occupies the most central position and has the largest node size, indicating the highest level of occurrence and interconnectedness within the analysis period. The dominant purplish-blue color of this keyword indicates that initial research in 2022 focused more on governance aspects, such as organizational structure, accountability, and financial oversight mechanisms. The connection between "governance" and the keywords "asset," "equity," "director," "board independence," and "annual report" reflects the research focus on corporate governance and financial transparency. This indicates that initial studies placed greater emphasis on the institutional foundations of financial management. Thus, governance becomes the primary framework for understanding the dynamics of financial management in organizations and startups.

Over time, the green color of several keywords, such as "financial management," "financial literacy," "financial knowledge," "population," "sample," and "respondent," indicates a shift in research focus toward human resources and financial decision-making. These topics began to develop around 2023 and reflect increasing attention to the role of individuals in effective financial management. The link between financial literacy and financial management indicates that governance quality is determined not only by formal structures but also by the knowledge capacity of economic actors.

Survey-based empirical approaches are becoming increasingly dominant, as demonstrated by the emergence of SPSS keywords and significant effects. This shift signals the integration of governance and behavioral aspects in financial research.

Keywords colored yellowish green to yellow, such as innovation, development, service, need, process, and financial technology, reflect relatively newer topics in the literature. This indicates that recent research is beginning to highlight the role of innovation and financial technology in supporting effective financial governance and management. Financial technology is emerging as a link between operational efficiency and financial transparency, particularly in the context of services and business development. The focus on innovation and development indicates that financial management is now viewed as a strategic instrument for growth and competitiveness. Thus, the literature is moving toward utilizing technology and innovation as an integral part of financial governance.

Overall, the color patterns and interrelationships between keywords in the overlay visualization demonstrate the evolution of research from a structural governance approach to a more dynamic, innovation-based approach. Financial governance remains the core of the study, but is increasingly enriched by aspects of financial literacy, technology, and managerial innovation. The strong interconnections between these topics indicate that financial management in the startup ecosystem requires synergy between good governance, managerial skills, and technology adoption. These findings confirm that current research tends to adopt a holistic perspective in understanding the challenges and opportunities of financial management. Therefore, future research is predicted to increasingly focus on the integration of governance, financial strategy, and digital innovation within the startup ecosystem.

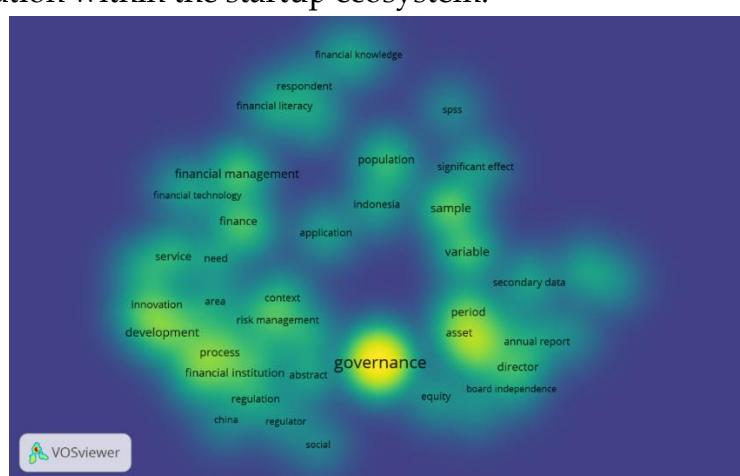


Figure 4
Density Visualization

Based on the density visualization generated by VOSviewer, the areas with the brightest yellow color represent the most intensively studied and frequently occurring topics in the literature. The keyword governance appears as the most prominent and densely concentrated theme, indicating that financial governance is the central focus of the analyzed studies. This high density suggests that governance plays a fundamental role in discussions related to financial management, accountability, and control mechanisms. Its central position also reflects its function as a core concept connecting various financial and managerial themes. In the context of startup ecosystems, this finding confirms that strong governance structures are widely recognized as essential for sustainability and long-term performance.

The next highest density areas are clustered around keywords such as asset, period, equity, director, board independence, and annual report, which are located close to the governance core. This pattern indicates a strong research emphasis on corporate governance mechanisms, including asset management, ownership structure, board roles, and financial disclosure practices. The concentration of these topics reflects scholarly interest in transparency and monitoring as key instruments for protecting stakeholder interests. In startup ecosystems, these governance-related aspects are particularly relevant due to high uncertainty and investment risk. The visualization suggests that governance practices related to reporting and oversight are considered critical components of effective financial management.

Areas with medium density, shown in green tones, include keywords such as financial management, finance, financial technology, risk management, process, innovation, and development. These terms represent the operational and strategic dimensions of financial management that support organizational growth. The linkage between financial management and innovation indicates that financial decisions are increasingly viewed as strategic drivers rather than purely administrative functions. The presence of financial technology highlights the growing role of digital tools in enhancing efficiency and transparency. Overall, this cluster reflects an integrated approach where financial management supports innovation and development within organizations.

Lower-density areas, indicated by green-blue to blue colors, include keywords such as financial literacy, financial knowledge, respondent, sample, population, SPSS, significant effect, and secondary data. These terms relate mainly to empirical research methods and the measurement of individual financial capabilities. Although less dominant, this area shows the importance of quantitative and survey-based approaches in examining financial behavior and outcomes. The visualization as a whole demonstrates that research in this

field is heavily centered on governance, supported by studies on financial management practices, innovation, and empirical analysis, forming a comprehensive framework for understanding financial governance in startup ecosystems.

Discussion

Based on the density visualization produced by VOSviewer, the research landscape is strongly concentrated on the theme of governance, which appears as the most dominant and densely populated area. This indicates that financial governance is the primary focus of existing studies, reflecting its critical role in ensuring accountability, transparency, and control in financial management. The central position of governance suggests that it serves as the main conceptual anchor connecting various topics related to finance and management. In the context of startup ecosystems, this dominance highlights the importance of establishing sound governance structures to manage financial uncertainty and support sustainable growth. The high intensity of this theme also implies a mature body of literature that consistently addresses governance-related issues.

Closely surrounding the governance core are keywords such as asset, equity, director, board independence, period, and annual report, which represent formal corporate governance mechanisms. The density of these terms indicates strong scholarly attention to ownership structures, board roles, and financial reporting practices. These aspects are essential for strengthening investor confidence and improving decision-making quality, particularly in high-risk startup environments. The findings suggest that research places significant emphasis on monitoring and disclosure as tools to mitigate agency problems. This cluster reflects a structural approach to financial governance that prioritizes institutional arrangements and regulatory compliance.

The visualization also reveals a medium-density cluster related to financial management, finance, financial technology, risk management, innovation, development, and process. This area represents the strategic and operational dimensions of financial governance, where financial management is viewed as a driver of innovation and organizational development. The inclusion of financial technology indicates a growing interest in digital solutions to enhance efficiency and transparency in financial processes. This cluster suggests a shift toward more dynamic and adaptive financial management strategies that support competitiveness. In startup ecosystems, these themes highlight the role of financial strategy in enabling innovation and scaling.

Lower-density areas consist of keywords such as financial literacy, financial knowledge, sample, respondent, population, SPSS, significant effect, and secondary data, which are associated with empirical and methodological approaches. Although less prominent, this cluster demonstrates the importance of quantitative analysis and human capital in understanding financial behavior and performance. These studies contribute evidence-based insights into how financial knowledge influences management outcomes. Overall, the visualization illustrates a comprehensive research structure in which governance forms the core, supported by strategic financial management, innovation, and empirical analysis, offering a holistic understanding of financial governance and management strategies within startup ecosystems.

CONCLUSION

1. Based on the bibliometric analysis and VOSviewer visualizations, it can be concluded that financial governance is the most dominant and central theme in studies related to financial management and startup ecosystems. The strong concentration of research on governance indicates that transparency, accountability, and control mechanisms are widely recognized as critical factors for ensuring financial sustainability and organizational performance. The close linkage between governance and elements such as asset management, equity structure, board independence, and financial reporting highlights the importance of formal governance frameworks. These findings suggest that effective financial governance serves as the foundation for managing financial risks and supporting long-term growth in startup ecosystems.
2. Furthermore, the integration of financial management, innovation, and financial technology reflects an evolving research focus that views financial management as a strategic function rather than merely an administrative activity. The presence of empirical and methodological themes, such as financial literacy and quantitative analysis, indicates growing attention to human capital and evidence-based decision-making. Overall, the literature demonstrates that startup success is increasingly dependent on the alignment between strong governance structures, strategic financial management, and the ability to adapt to technological and environmental changes.

Suggestions

1. Future research is recommended to broaden the geographical and institutional scope of analysis by including more studies from developing and emerging economies. This approach would provide a more

comprehensive understanding of how financial governance and management strategies operate in different regulatory and cultural contexts. In addition, combining quantitative bibliometric methods with qualitative case studies could offer deeper insights into practical governance challenges faced by startups. Such mixed-method approaches would enrich the theoretical and empirical contributions of future studies.

2. For practitioners and policymakers, it is suggested to strengthen financial governance frameworks by enhancing transparency, accountability, and regulatory compliance within startup ecosystems. Efforts should also be directed toward improving financial literacy and managerial capabilities among startup founders and managers. Moreover, encouraging the adoption of financial technology can support more efficient, transparent, and innovative financial management practices. These strategies are expected to foster more resilient, competitive, and sustainable startup ecosystems.

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