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Bibliometric Analysis of Capital Structure & Capital Costs

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ABSTRACT

This study does a thorough bibliometric analysis of worldwide research on capital structure and capital costs to delineate publication trends, intellectual frameworks, and topic development within the discipline. The study analyzes co-authorship networks, keyword co-occurrence patterns, institutional collaborations, and country-level links using data taken from Scopus and processed with VOSviewer and Bibliometrix. The findings indicate that conventional finance subjects—namely leverage, cost of capital, profitability, and corporate governance—persist as predominant, constituting the essential clusters of the discipline. Recent rese arch indicates an increasing multidisciplinary focus on subjects like as sustainability, energy efficiency, cost optimization, human capital, and social capital. The worldwide collaboration map underscores the pivotal roles of the United States, China, India, and various European nations in influencing global research trends. This study provides a systematic and empirical assessment of the field's evolution, delivering significant theoretical insights and practical recommendations for scholars, practitioners, and policymakers.

Keywords: *Capital Structure, Cost of Capital, Bibliometric Analysis, Vosviewer, Financing Decisions, Sustainability, Investment Optimization.*

1. INTRODUCTION

Capital structure and capital expenses have historically been essential concepts in corporate finance, impacting a firm's strategic choices, risk assessment, and long-term viability. The foundational study by Modigliani and Miller (1958) commenced contemporary discussions by asserting that, in ideal market conditions, a firm's value is unaffected by its financing choices. The underlying idea was subsequently refined when the same authors recognized the impact of taxes [1], igniting considerable debate regarding the appropriate debt-equity structure. Subsequent theoretical advancements—namely trade-off theory [2], pecking-order theory [3], market timing theory [4], and agency theory (Jensen & Meckling, 1976)—have intensified academic interest, rendering the field one of the most extensively studied in finance. As globalization accelerates and competitive press ures increase, companies continually evaluate financing strategies, rendering capital structure and capital costs subjects of persistent academic and practical significance.

Alongside theoretical developments, empirical research has increased significantly. Initial research concentrated on firm-specific variables including profitability, size, asset composition, and growth [5]. Researchers have broadened this scope to include governance quality, institutional contexts, macroeconomic indicators, and financial market conditions [6], [7]. The assessment of capit al costs has progressed from the conventional weighted average cost of capital (WACC) to more advanced models that include risk premiums, credit ratings, asymmetric information, and sustainability performance [8], [9]. These advancements indicate a transition towards multidime nsional and interdisciplinary methodologies, enhancing the diversity of literature.

The swift digitalization of academic research transforms the creation, evaluation, and dissemination of knowledge regarding capital structure and capital costs. Bibliometric analysis, em ploying tools like VOSviewer, Bibliometrix, and CiteSpace, has emerged as a predominant technique for delineating scientific landscapes and recognizing structural trends across extensive literary corpora [10], [11]. In contrast to conventional narrative reviews, bibliometric methods enable

researchers to methodically analyze publishing trends, citation networks, topic clusters, and intellectual connections. Utilizing bibliometric tools in this field yields profound insights into the progression of capital structure research, revealing the interactions, overlaps, and divergences among concepts, contexts, and theories.

Recent worldwide occurrences have rekindled academic interest in capital structure and capital costs. Variable interest rates, increased financial risks, global supply chain interruptions, and the incorporation of sustainability considerations, including Environmental, Social, and Governance (ESG) disclosures, have impacted company financing choices [12], [13]. The emergence of financial technology, data analytics, and digital lending ecosystems introduces new factors that alter the dynamics of capital costs. These changes require revised assessments of how academic research addresses, interprets, and incorporates these modern advancements into existing theoretical fr ameworks. A bibliometric synthesis is crucial for monitoring conceptual evolution across decades.

Notwithstanding the substantial corpus of literature, current evaluations on capital structure and capital costs are sometimes disjointed—often confined to certain ideas, industries, or geographic areas. Numerous assessments are descriptive instead than analytical, providing scant insight into the philosophical frameworks that underpin the topic. As academic output proliferates across databases like Scopus and Web of Science, it becomes progressively challenging for academics to discern overarching patterns without careful mapping. A bibliometric approach might mitigate this disadvantage by quantifying scientific output, identifying the most influential sources, and delineating conceptual progression. This will enable scholars to comprehend not only the subjects that have been examined, but also the evolution of the area, the key contributors to the discourse, and the potential avenues for future exploration.

Despite the well-established nature of capital structure and capital costs in corporate finance, a complete bibliometric mapping that synthesizes global publication patterns, key contribut ors, intellectual frameworks, and thematic developments within the discipline remains absent. Current review studies frequently use a narrative format or possess a restricted scope, inadequately reflecting the interrelations of ideas, the evolution of research clusters, or the dynamics of collaboration networks across authors and countries. The substantial increase in publication volume in recent years necessitates a rigorous, data-driven bibliometric evaluation that incorporates co-citation, co-authorship, keyword co-occurrence, and thematic evolution analysis. This investigation will uncover concealed trends, address knowledge deficiencies, and provide insights into the intellectual progression of the discipline.

This study seeks to conduct a thorough bibliometric analysis of worldwide research on capital structure and capital costs by investigating publishing trends, intellectual impact, and thematic evolution within the discipline. The analysis concentrates on five primary objectives: (1) evaluating publication trends, citation patterns, and the predominant journals or sources; (2) identifying key contributors, including the most influential authors, institutions, and countries influencing scholarly discourse; (3) delineating the intellectual structure of the field through co-citat ion, co-authorship, and keyword co-occurrence networks; (4) revealing significant thematic clusters and monitoring their evolution over time; and (5) identifying existing gaps and proposing avenues for future research concerning capital structure and capital costs. This integrated bibliometric method elucidates the knowledge environment, scholarly collaboration patterns, and emerging research frontiers in corporate finance.

2. METHODS

This study utilized a quantitative bibliometric methodology to thoroughly delineate the intellectual terrain of research concerning capital structure and capital expenses. The Scopus database was chosen as the principal data source because of its extensive coverage of peer-reviewed journals and its dependability for citation analysis (Burnham, 2006A thorough search query with keywords like "capital structure," "capital cost," "cost of capital," "financial leverage," and "corporate financing decisions" was executed on titles, abstracts, and keywords. The investigation concentrated on articles and reviews published from 1980 to 2025, adhering to bibliometric criteria for documenting the progression of established research domains [14]. Only documents in the English language were preserved. Upon eliminating duplicates, non-academic materials, irrelevant papers, and non-journal publications, the final dataset comprised all pertinent articles that directly addressed issues linked to capital structure or capital cost.

Subsequent to the generation of the dataset, bibliometric indicators were produced and examined utilizing two complementary instruments: VOSviewer and Bibliometrix. VOSviewer is extensively utilized for the construction and visualization of bibliometric networks, owing to its advanced clustering algorithms and capacity to map co-authorship, co-citation, and keyword co-occurrence associations [11]. Bibliometrix, a R program for extensive science mapping, was used to conduct performance studies encompassing citation metrics, h-index scores, source influence, annual publishing patterns, and topic progression [10]. The utilization of both techniques strengthened the findings and enabled the study to incorporate network visualization, performance evaluation, and temporal mapping of research issues.

The investigation adhered to recognized bibliometric methodologies. The performance study initially assessed publication growth trends, leading journals, prominent authors, and frequently cited papers, adhering to the guidelines proposed by Donthu et al. (2021). Secondly, science mapping techniques—such as co-citation analysis, bibliographic coupling, co-authorship mapping, and keyword co-occurrence—were utilized to delineate intellectual structures, collaboration patterns, and conceptual clusters within the literature. Thematic evolution analysis examined the progression of core subjects throughout time and identified fresh developing research fronts [15]. Collectively, these techniques provide an extensive comprehension of the knowledge framework pertaining to capital structure and capital costs, allowing the study to discern deficiencies and suggest avenues for further research.

3. RESULTS AND DISCUSSION

3.1 Network Visualization

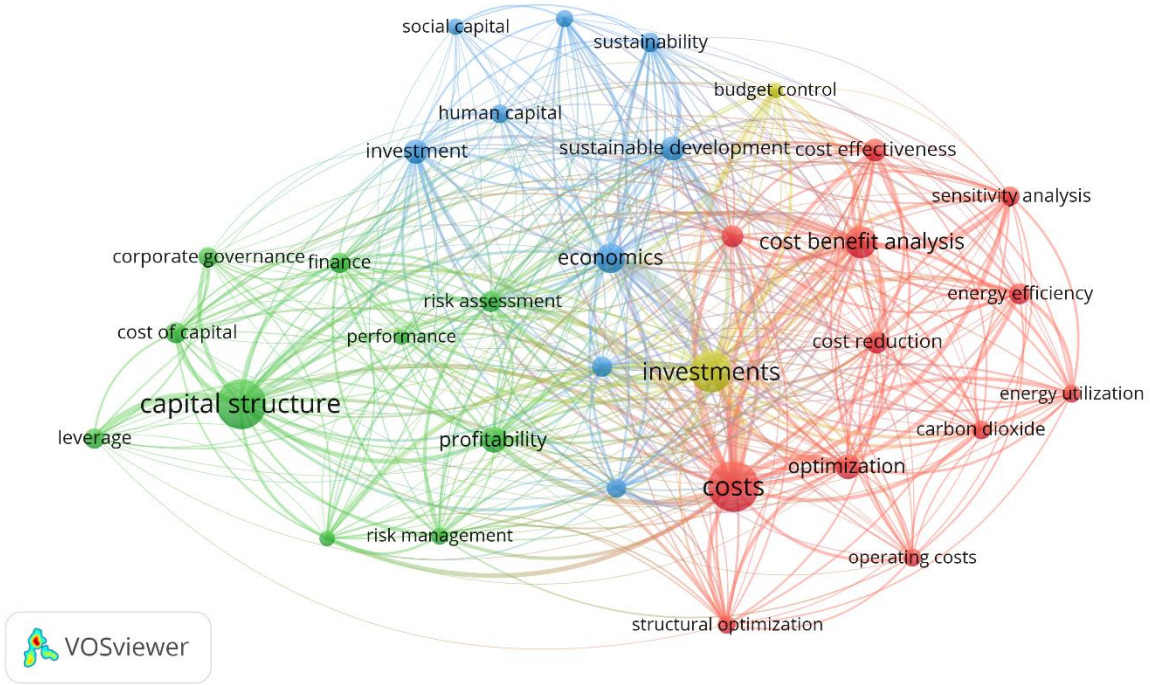

Figure 1. Network Visualization
Source: Data Analysis Result, 2025

The VOSviewer map depicts the keyword co-occurrence four principal topic clusters that delineate the intellectual framework of research concerning capital structure and capital expenses. The green cluster, positioned on the left side, is characterized by phrases including capital structure, cost of capital, leverage, profitability, corporate governance, and risk management. This cluster embodies the traditional finance viewpoint, wherein academics investigate the equilibrium between debt and equity, the impact of governance structures on financing choices, and the implications of capital structure decisions on performance and risk. The richness and thickness of linkages within this cluster suggest that capital structure is a pivotal and foundational issue in the literature, functioning as a nexus linked to various other study avenues.

On the right side of the graphic, the red cluster signifies subjects related to costs, cost-benefit analysis, optimization, energy efficiency, operating expenses, and carbon dioxide emissions. This cluster is predominantly focused on engineering and sustainability, illustrating the evolution of cost of capital research into operational optimization, environmental factors, and energy efficiency. The inclusion of terminology like energy efficiency and carbon dioxide indicates an increasing convergence of financial decision-making with sustainability indicators and environmental cost frameworks. This illustrates that cost-related economics extends beyond financial variables to encompass energy economics, climate policy, and infrastructure optimization.

The blue cluster, positioned at the top, pertains to themes including sustainability, social capital, human capital, investment, and the cost-effectiveness of sustainable development. This signifies a conceptual connection between financial frameworks and wider socio-environmental phenomena. The recurrent association of "sustainability" with "investment" indicates that contemporary research is progressively assessing the influence of sustainable development goals (SDGs) on investment behavior, financing frameworks, and corporate competitiveness. The inclusion of "human capital" and "social capital" in this cluster indicates a broadening of financial research to encompass intangible resources and the creation of social value, suggesting that capital costs are now assessed not only through monetary metrics but also through non-financial performance indicators.

The middle yellow cluster, centered on the keyword investments, functions as a pivotal hub connecting all other clusters—capital structure (green), sustainability (blue), and cost optimization (red). This center position indicates that investment decisions function at the convergence of all principal themes within the domain. The cluster encompasses the keyword economics, signifying that investment analysis constitutes the central analytical domain integrating financial, operational, and sustainability-related research. This centrality indicates that investment decisions are the principal means by which capital structure limitations, cost factors, and sustainability issues are integrated into business decision-making.

The map depicts a study domain that is intricately interwoven, multidimensional, and progressing towards multidisciplinary integration. Conventional finance concepts like leverage and cost of capital continue to be fundamental; however, the discipline has evolved to include sustainability, social and human capital, and energy efficiency optimization. The intricate web of connections demonstrates significant intellectual convergence, indicating that research increasingly integrates financial models with environmental, operational, and socio-economic viewpoints. This indicates a prospective study direction that further amalgamates corporate finance with sustainability science, risk management, and technological optimization, mirroring the intricate landscape in which contemporary organizations undertake financing and investment decisions.

3.2 Overlay Visualization

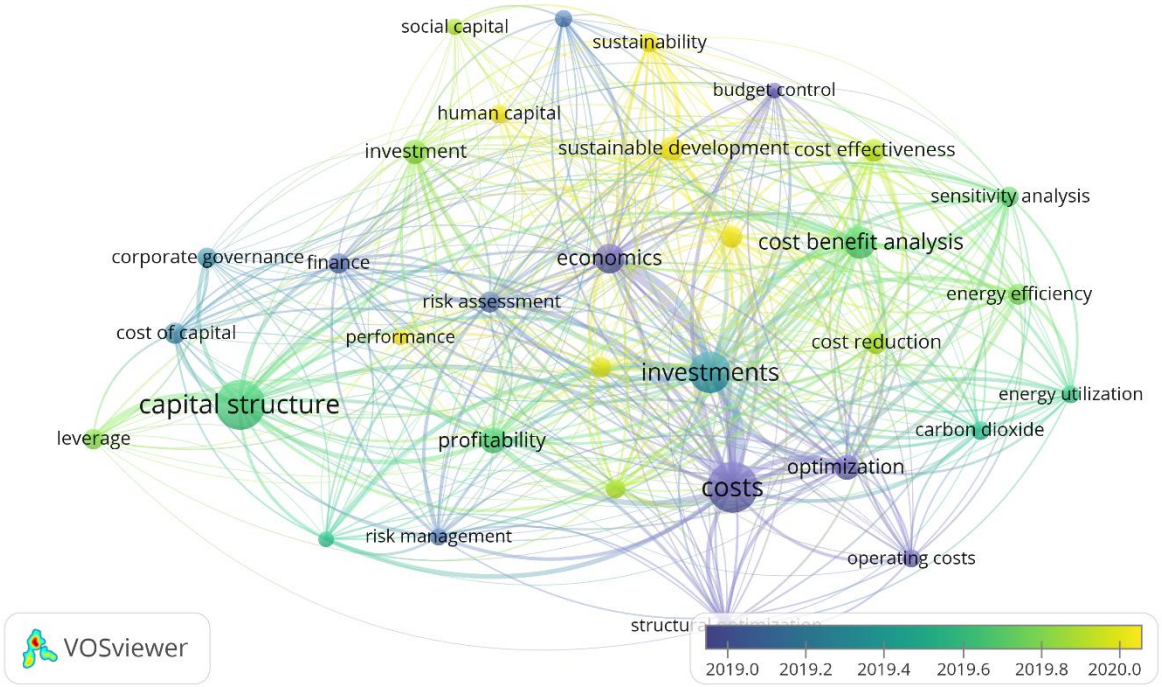

Figure 2. Overlay Visualization
Source: Data Analysis Result, 2025

The overlay visualization illustrates a distinct chronological progression in the research subjects pertaining to capital structure and capital expenses. Previous studies—represented by deeper blue nodes—focused predominantly on traditional finance subjects, including cost of capital, corporate governance, finance, and risk management. These fundamental notions constitute the initial intellectual underpinning of the area, embodying conventional issues of optimal leverage, capital budgeting, company performance, and managerial decision-making. The pronounced clustering of "capital structure" and "cost of capital" in blue signifies that these subjects predominated previous academic discussions and were the theoretical foundation of corporate finance literature.

Domains, particularly those pertaining to sustainability and cost optimization. Keywords s uch sustainability, human capital, social capital, sustainable development cost-effectiveness, and budget control are highlighted in vibrant yellow hues, indicating publications from the more recent years of 2019 to 2020. This indicates a transition from solely financial factors to more extensive socio-environmental aspects in capital decision-making. The emergence of sustainability-related concepts in recent clusters indicates that scholars are progressively incorporating ESG considerations, long-term development objectives, and stakeholder-oriented viewpoints into the analysis of investment decisions, corporate financing, and cost structures.

The yellow-to-green clusters related to cost-benefit analysis, energy efficiency, carbon dioxide, energy consumption, and optimization indicate a concurrent transition towards environmental economics and operational cost management. These subjects exemplify the latest convergence of financial analysis and engineering/sustainability science, illustrating how cost-related research now integrates energy usage, carbon reduction, and structure optimization. The st rong interconnections between contemporary themes and fundamental finance subjects suggest that the area is increasingly multidisciplinary. The overlay map illustrates a chronological progression from traditional capital structure theory (initial phase) to performance and governance (intermediate phase) to sustainability, cost optimization, and environmental efficiency (recent phase), indicating that the discipline is continually adapting to global economic and environmental challenges.

3.3 Citation Analysis

A citation-based assessment of the most referred works was performed to identify the most impactful academic contributions in the areas of capital structure, capital costs, and associated financial decision-making research. Prominently recognized works frequently function as intellectual foundations that influence theoretical evolution, methodological benchmarks, and empirical trajectories within a discipline. The subsequent table displays the most influential publications derived from the bibliometric dataset, highlighting the variety of themes—from fundamental corporate finance theories to contemporary issues like sustainability, financial fragility, and technological advancements in industry measurement. These pieces not only illustrate the historical development of the topic but also emphasize the multidisciplinary foundations that persist in shaping modern academic discourse.

Table 1. The Most Impactful Literatures

Citations	Authors and year	Title
3360	Westoby, M.J., Brasington, J., Glasser, N.F., Hambrey, M.J., Reynolds, J.M. (2012)	'Structure-from-Motion' photogrammetry: A low-cost, effective tool for geoscience applications
2912	Graham, J.R., Harvey, C.R. (2001)	The theory and practice of corporate finance: Evidence from the field
1598	Barnea, A., Rubin, A. (2010)	Corporate Social Responsibility as a Conflict Between Shareholders
974	Fonstad, M.A., Dietrich, J.T., Courville, B.C., Jensen, J.L., Carbonneau, P.E. (2013)	Topographic structure from motion: A new development in photogrammetric measurement
955	Cochrane, J.H. (2011)	Presidential Address: Discount Rates

Citations	Authors and year	Title
942	Hovakimian, A., Opler, T., Titman, S. (2001)	The debt-equity choice
839	Diamond, D.W., Rajan, R.G. (2001)	Liquidity risk, liquidity creation, and financial fragility: A theory of banking
836	Li, L. (2018)	China's manufacturing locus in 2025: With a comparison of "Made-in-China 2025" and "Industry 4.0"
730	Leary, M.T., Roberts, M.R. (2005)	Do firms rebalance their capital structures?
698	Cassar, G. (2004)	The financing of business start-ups

Source: Scopus, 2025

The table illustrates key ideas regarding the intellectual framework of the discipline. The inclusion of [16], [17], [18], [19]underscores the significant impact of classical corporate finance literature, especially research focused on capital structure decisions, debt-equity selections, financial constraints, and practical managerial applications. The incorporation of [20] extensively referenced research on discount rates highlights the significance of valuation theory in capital cost analysis. The elevated citation counts for [21] underscore the significance of liquidity, fragility, and financial intermediation in the development of contemporary finance structures. The dataset comprises highly cited articles from unrelated yet methodologically significant fields, such as Structure-from-Motion photogrammetry and Industry 4.0, indicating interdisciplinary convergence through common themes like measurement innovation, structural modeling, and cost efficiency. Collectively, these articles provide the foundation of the academic landscape, offering theoretical, empirical, and methodological underpinnings that persistently influence modern research on capital structure and capital costs.

3.4 Density Visualization

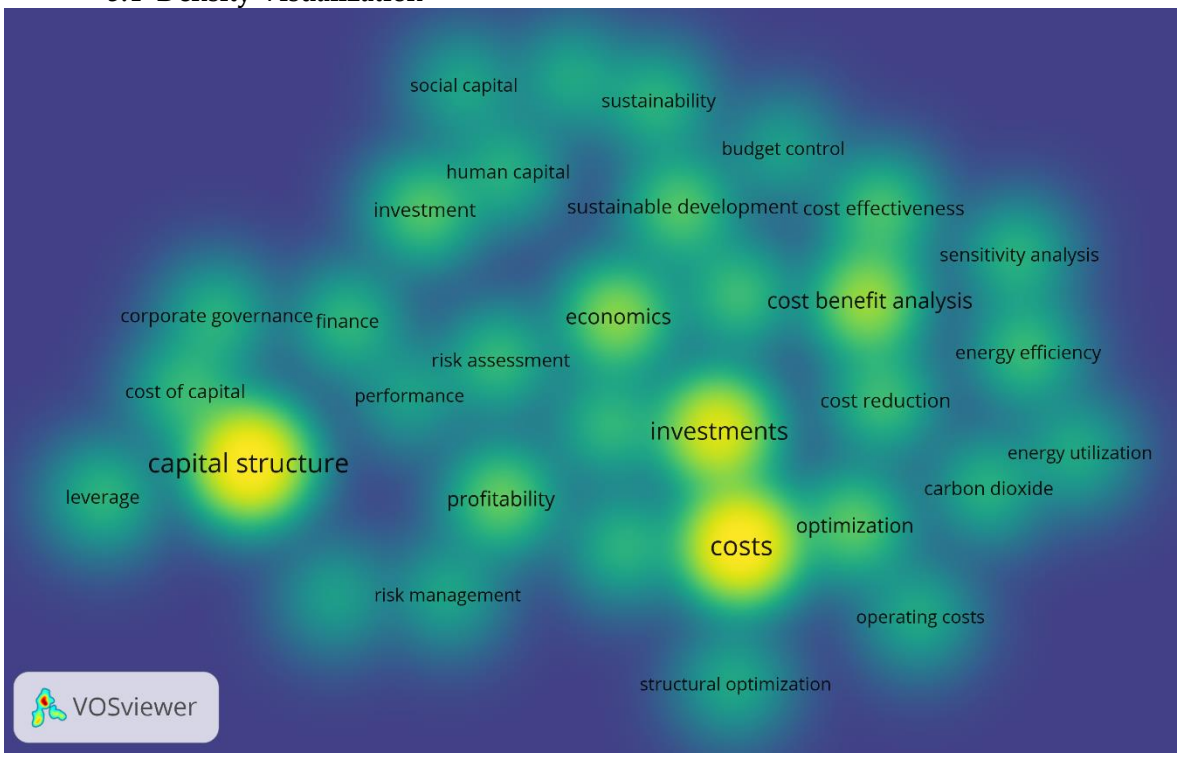

Figure 3. Density Visualization

Source: Data Analysis Result, 2025

The density graphic illustrates distinct "hotspots" of study intensity, denoted by bright yellow regions, signifying the most frequently co-occurring and significantly influential themes in the literature. The most prominent and concentrated area is "capital structure," indicating that it remains the central and most influential notion in the dataset. The interconnected yellow clusters regarding costs, investments, and cost-benefit analysis indicate that a significant portion of academic focus is dedicated to assessing the impact of financing decisions on organizational cost structures, operational efficiency, and economic results. Adjacent domains including corporate governance, cost of capital, risk management, profitability, and economics exhibit notable, if secondary, research effort, establishing a conceptual link between conventional finance and expansive organizational decision-making.

Conversely, the peripheral green-to-blue areas—encompassing sustainability, human capital, social capital, energy efficiency, carbon dioxide, and structural optimization—signify nascent or more specialized study fields. Their lower density indicates that although these subjects are attracting academic attention, they have not yet attained the prominence of traditional financial topics. Nonetheless, their closeness to the primary hotspots signifies a growing convergence between financial structure analyses and sustainability-oriented cost factors, illustrating a transition towards interdisciplinary methodologies. The density map illustrates a study landscape mostly focused on conventional corporate finance topics, while gradually incorporating environmental economics, optimization, and sustainable development.

3.5 Co-Authorship Network

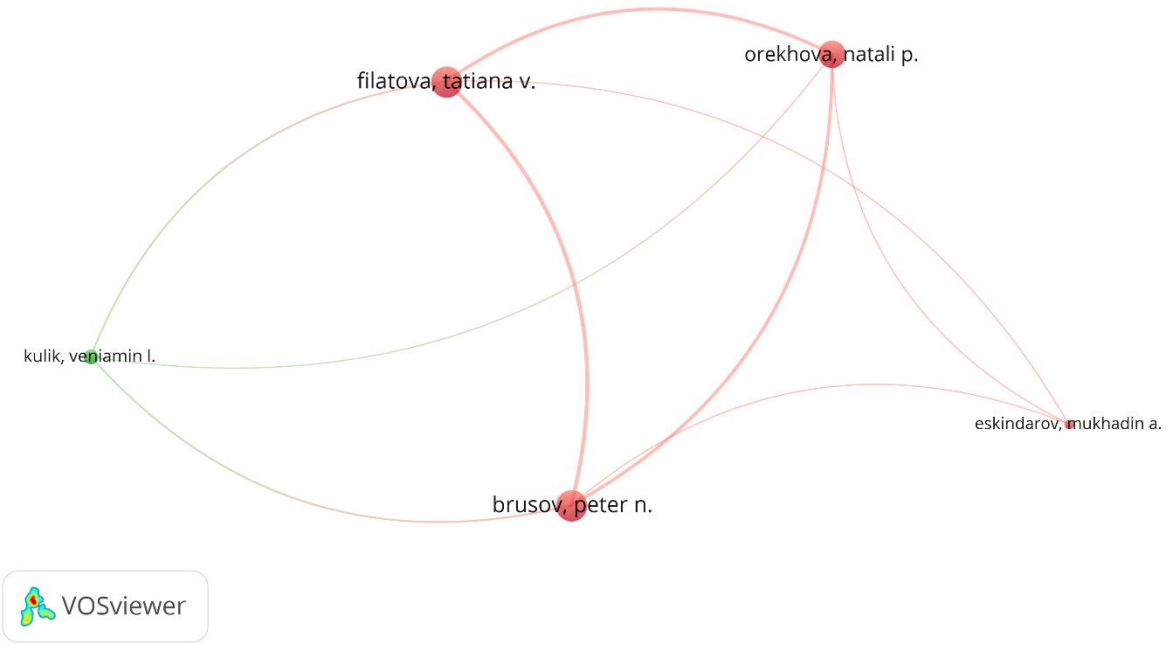

Figure 4. Author Visualization
Source: Data Analysis Result, 2025

The VOSviewer co-authorship network visualization a compact yet closely linked network of researchers who often co-author inside the same cluster. The most robust collaborative connections are seen among Brusov, Peter N., Filatova, Tatiana V., and Orekhova, Natali P., as demonstrated by the thick red linking lines that signify elevated co-authorship intensity. This indicates a primary research group that consistently collaborates on publications, likely making substantial contributions to theoretical or methodological advancements in the discipline, commonly

observed in specialized areas like capital structure modeling or financial optimization. Peripheral writers like Eskindarov, Mukhadin A., and Kulik, Veniamin I. have weaker, more selective associations with the central group, as indicated by the slender green-to-yellow links. Their location suggests sporadic collaboration rather than consistent co-authorship tendencies. The visualization underscores a research landscape marked by clustered intra-group collaboration rather than extensive inter-group networks, indicating that significant contributions in this dataset are likely derived from concentrated scholarly teams rather than widespread, dispersed author networks.

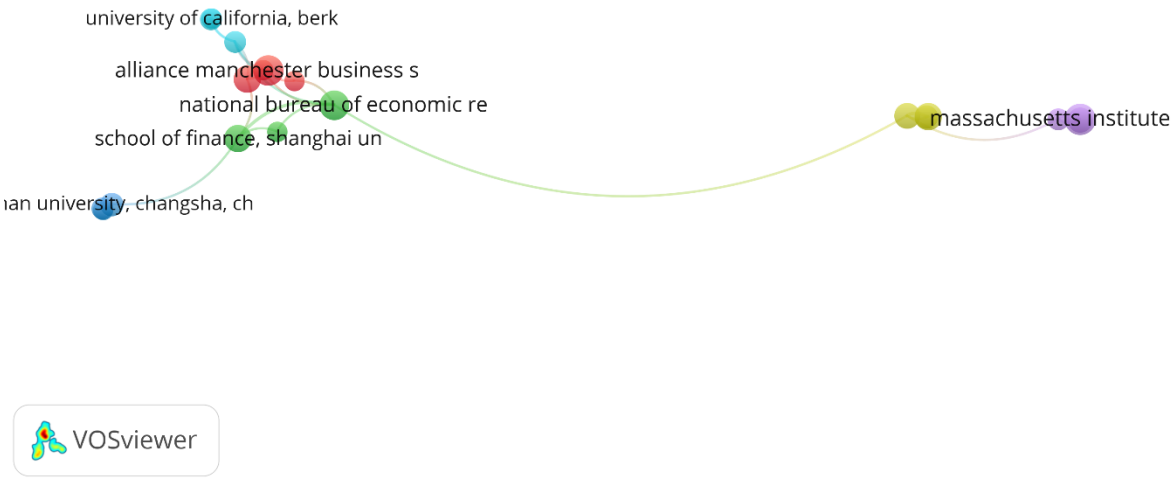

Figure 5. Affiliation Visualization
Source: Data Analysis Result, 2025

The institutional collaboration map reveals a compact yet distinctly organized network of universities and research entities, suggesting that a restricted number of institutions participate in regular co-authorship within this dataset. On the left side, a tightly grouped assemblage of nodes—including the University of California, Berkeley, Alliance Manchester Business School, National Bureau of Economic Research (NBER), Shanghai University School of Finance, and Hunan University—constitutes a dense collaboration network. Their closeness and the robust connections indicate that these institutions participate in ongoing collaborative research, presumably impacting mainstream finance subjects such as capital structure, corporate governance, and financial economics. Simultaneously, the Massachusetts Institute of Technology (MIT) seems more isolated on the right, linked via a lengthy, unique collaborative connection. This signifies that MIT researchers produce significant contributions in the subject through chosen collaborations rather than extensive multi-institutional networks. The image underscores a research landscape characterized by collaboration concentrated among a limited number of institutions, while globally esteemed research centers such as MIT engage in the field through more focused, high-impact research affiliations.

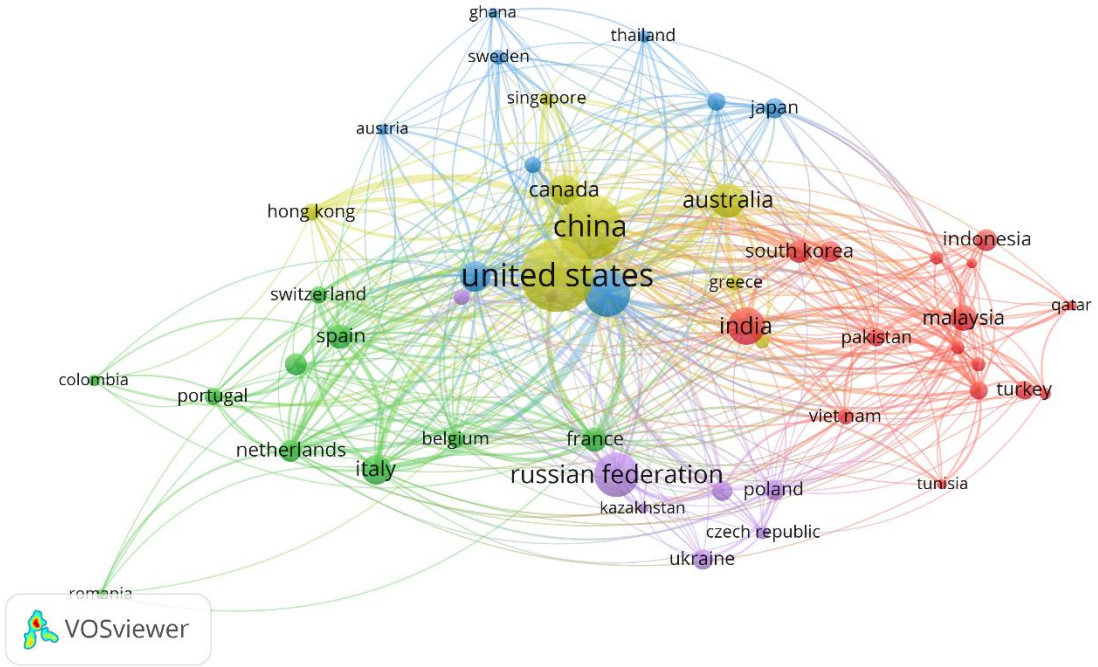

Figure 6. Country Visualization
Source: Data Analysis Result, 2025

The VOSviewer co-country collaboration map depicts a highly integrated global research landscape, with numerous nations emerging as crucial centers of intellectual activity. The United States and China are the most significant and central nodes, reflecting both substantial publication volume and broad international collaboration. Their robust connections to nations throughout Europe, Asia, and Oceania illustrate their position as worldwide leaders in capital structure and financial research. Adjacent to these hubs are other significant contributors, including the United Kingdom, Australia, Canada, Japan, and India, which collectively create dense clusters interconnected by numerous co-authorship and citation networks. The European network, comprising Italy, Spain, the Netherlands, Switzerland, France, and Belgium, exhibits significant cohesion, indicative of longstanding ties in economic and financial research.

Simultaneously, growing economies such Malaysia, Indonesia, Turkey, Pakistan, Vietnam, and Qatar constitute a dynamic regional cluster marked by robust intra-Asian cooperation. Despite a lower average publishing output compared to Western nations, the thick red network signifies a growing involvement in cross-border research, especially in areas like as corporate finance, investments, and cost analysis. The Russian Federation, in conjunction with Eastern European allies such as Poland, the Czech Republic, Ukraine, and Kazakhstan, constitutes a unique regional cluster, indicating focused research initiatives within this geographical area. The image illustrates a domain characterized by global engagement, regional collaborative networks, and robust connections among leading research economies, underscoring the worldwide significance of capital structure and capital costs in influencing economic development and financial decision-making.

Discussions

Practical Implications

This bibliometric analysis presents significant practical consequences for policymakers, financial managers, and industry professionals. The study delineates the prevailing themes and the most impactful countries, institutions, and authors in the subject, offering stakeholders a guide to the production of innovative knowledge and highlighting areas that need strategic focus. For

practitioners—such as corporate finance managers, investment analysts, and consultants—the pronounced clustering around capital structure, cost management, optimization, and sustainability underscores the necessity of integrating financial decision-making with comprehensive operational and environmental factors. The growth of issues such as energy efficiency, carbon reduction, cost-benefit analysis, and sustainable development indicates that companies must progressively integrate sustainability measures into capital budgeting and financing decisions. Policymakers and regulators can utilize these insights to synchronize financial rules and corporate governance frameworks with worldwide research trends, so ensuring that policies facilitate the adoption of efficient, sustainable, and globally competitive financing practices. The visualization of international collaboration networks can assist governments and universities in establishing strategic academic relationships to enhance their research ecosystems.

Theoretical Contributions

This paper provides substantial theoretical contributions by delineating the intellectual framework of research on capital structure and capital costs over several decades. The study eluc idates the influence of foundational theories—namely trade-off theory, pecking-order theory, agency theory, and market-timing theory—on contemporary research through the analysis of co-occurrence networks, citation patterns, and thematic evolutions, while also revealing the emergence of new theoretical domains. This research illustrates the growing integration of sustainability, optimization, and human/social capital elements into conventional financial models, indicating a transition towards more comprehensive theories of corporate finance. The work enhances bibliometric scholarship by employing sophisticated science-mapping approaches in a domain traditionally characterized by narrative literature evaluations. The study utilizes VOSviewer's network, overlay, and density visualizations to provide a systematic and empirical basis for comprehending the interconnections, overlaps, and evolution of various hypotheses. This enhances theoretical clarity and offers a foundation for future researchers to develop integrated models that include both financial and non-financial factors influencing capital structure and cost dynamics.

Limitations

Notwithstanding its thorough methodology, the study possesses multiple limitations intrinsic to bibliometric research. The dataset is confined to publications indexed in Scopus, which, while extensive and esteemed, may omit pertinent items from alternative academic databases such as Web of Science, Google Scholar, or specialist regional journals. This may restrict the compreh ensiveness of the worldwide research landscape. Secondly, bibliometric approaches are significantly dependent on the precision of keywords and the quality of database indexing; misclassified, inc onsistently labeled, or insufficient information can affect network architecture and thematic grouping. Third, the application of co-occurrence and citation analysis yields insights on frequency and interrelatedness, although it fails to assess the methodological rigor, empirical quality, or theoretical robustness of individual papers. The study ultimately offers a macro-level summary without doing an in depth qualitative synthesis of the content in each subject cluster. Future study may integrate bibliometrics with systematic literature reviews or meta-analysis methodologies to bridge these gaps and provide more detailed findings.

CONCLUSION

This bibliometric analysis offers a thorough delineation of the intellectual terrain of capital structure and capital costs, illustrating the evolution, expansion, and diversification of the topic during recent decades. The analysis reveals that classical financial concepts—such as leverage, cost of capital, profitability, and corporate governance—remain pivotal to academic discourse, constituti ng significant and impactful clusters that persist in grounding theoretical advancement. The results indicate a distinct transition towards interdisciplinary integration, with themes such as

sustainability, energy efficiency, cost optimization, social capital, and human capital increasingly incorporated into finance research. This history demonstrates the adaptation of corporate finance to global concerns, extending beyond solely economic models to include environmental, social, and operational aspects of business decision-making. The depiction of worldwide collaboration networks underscores the global character of research in this domain, with the United States, China, India, and European nations significantly influencing knowledge generation. The structural patterns reveal robust regional clusters and integrated worldwide alliances, highlighting the common significance of financial decision-making principles across various economic circumstances. Moreover, the co-authorship and institutional networks indicate that research production is frequent ly propelled by small yet highly productive collaborative groups, implying potential for enhancing multidisciplinary and cross-institutional collaboration. The study enhances the literature by providing an empirical, data-driven analysis of the evolution of research on capital structure and capital costs, identifying areas of intellectual impact and emerging topics. These insights assist scholars in identifying deficiencies, enhancing theoretical frameworks, and suggesting novel study avenues that consider the evolving dynamics of global finance. The findings simultaneously assist practitioners and policymakers in harmonizing financial plans and regulatory frameworks with current developments in financial research and practice.

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