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## THE INFLUENCE OF RISK PERCEPTION, PROJECT UNCERTAINTY, AND INVESTMENT APPRAISAL TECHNIQUES ON CAPITAL BUDGETING DECISIONS: A SYSTEMATIC LITERATURE REVIEW



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### Abstract

This study aims to map the development of capital budgeting research with a focus on risk perception, project uncertainty, and investment appraisal techniques. A systematic literature review was conducted by integrating bibliometric analysis using Bibliometrix software on 101 articles retrieved from the Scopus and Dimensions databases. The analysis covers publication trends, author collaboration, and dominant research themes. The results indicate a significant increase in publications over the last decade, particularly in the areas of project risk management and advanced investment appraisal methods. The findings also reveal a thematic shift from traditional capital budgeting approaches toward risk- and uncertainty-based frameworks, along with the integration of non-financial factors in investment decision-making. This study provides a comprehensive overview of the evolution of capital budgeting research and offers a foundation for future studies as well as managerial practices that are more adaptive to risk and uncertainty.

**Keywords:** Capital Budgeting, Risk Perception, Project Uncertainty, Investment Appraisal Techniques

## INTRODUCTION

Capital budgeting represents a critical managerial process through which firms allocate financial resources to long-term investment projects that determine future performance and sustainability. Over the past five decades, capital budgeting has remained a central topic in accounting and finance research, reflecting its strategic importance in corporate decision-making (Sureka et al., 2022). Despite the widespread use of traditional techniques such as Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period, prior studies suggest that capital budgeting decisions are often influenced by managerial judgment, risk perception, and contextual uncertainty rather than purely objective financial criteria (Alkaraan & Northcott, 2006).

Recent literature highlights that risk perception plays a crucial role in shaping managerial behavior in capital budgeting. Decision-makers facing high perceived risk tend to adopt conservative investment strategies, which may lead to underinvestment even in projects with positive expected value (Hartmann & Weissenberger, 2024). Furthermore, project uncertainty arising from volatile market conditions, technological change, or incomplete information significantly increases the likelihood of biased cash flow forecasts and capital misallocation (Charoenwong et al., 2024). These findings suggest that traditional capital budgeting models may be insufficient to address complex and uncertain investment environments.

To mitigate the adverse effects of risk and uncertainty, firms increasingly rely on investment appraisal techniques that extend beyond conventional discounted cash flow methods. Advanced approaches such as real options analysis, scenario analysis, and Monte Carlo simulation have been shown to enhance decision quality by incorporating managerial flexibility and uncertainty into the evaluation process (Alkaraan, 2020; Wouters & Stadtherr, 2024). Empirical evidence further indicates that the choice of appraisal techniques varies across organizational contexts, firm size, and institutional environments, particularly between SMEs and large firms (Purnamasari & Adriza, 2024; Al-Wahaibi et al., 2024).

Although prior studies have examined risk perception, project uncertainty, and investment appraisal techniques separately, a comprehensive synthesis that integrates these dimensions within the capital budgeting literature remains limited. Moreover, recent research points to emerging themes such as sustainability, corporate social responsibility, and institutional factors that further complicate capital budgeting practices (Hunjra et al., 2024; Puwanenthiren, 2024). Addressing this gap, the present study conducts a systematic literature review to map the evolution of capital budgeting research, analyze the interrelationship between risk perception, project uncertainty, and investment appraisal techniques, and identify future research directions in an increasingly uncertain investment environment.

## REVIEW OF LITERATURE

### Capital Budgeting and Strategic Investment Decisions

Capital budgeting refers to the process through which organizations evaluate and select long-term investment projects that significantly affect future performance and value creation. Traditional capital budgeting techniques such as Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period have long dominated both academic research and managerial practice (Sureka et al., 2022). However, prior studies argue that capital budgeting

decisions are not purely mechanical but involve managerial judgment, organizational context, and strategic considerations (Alkaraan & Northcott, 2006).

Recent research emphasizes that capital budgeting should be viewed as a strategic decision-making process rather than a purely financial calculation. Firms increasingly incorporate qualitative assessments, flexibility considerations, and long-term strategic alignment when evaluating investment projects (Alkaraan, 2020).

### **Risk Perception in Capital Budgeting Decisions**

Risk perception reflects managers' subjective assessment of uncertainty and potential losses associated with investment projects. In the capital budgeting context, risk perception influences how decision-makers interpret financial information and select evaluation techniques. Hartmann and Weissenberger (2024) show that higher perceived risk leads managers to adopt more conservative investment behavior, potentially resulting in underinvestment.

Empirical evidence further suggests that differences in risk perception contribute to heterogeneity in capital budgeting practices across firms and industries. Charoenwong et al. (2024) demonstrate that elevated uncertainty exacerbates capital misallocation, particularly when decision-makers rely on simplified or biased projections. These findings highlight the cognitive dimension of capital budgeting decisions.

### **Project Uncertainty and Capital Misallocation**

Project uncertainty arises from incomplete information, market volatility, technological change, and regulatory dynamics. Such uncertainty complicates cash flow forecasting and increases the probability of decision errors. Alkaraan and Northcott (2006) argue that uncertainty requires decision-makers to adopt more flexible and adaptive evaluation frameworks.

Recent studies confirm that high project uncertainty is strongly associated with capital misallocation and inefficient investment outcomes (Charoenwong et al., 2024). In response, firms increasingly seek appraisal approaches that explicitly incorporate uncertainty into decision-making processes.

### **Investment Appraisal Techniques as a Moderating Mechanism**

Investment appraisal techniques serve as analytical tools that help managers structure decision-making under risk and uncertainty. Beyond traditional discounted cash flow methods, advanced techniques such as real options analysis, scenario analysis, and Monte Carlo simulation allow firms to account for uncertainty and managerial flexibility (Alkaraan, 2020).

Empirical evidence indicates that the adoption of sophisticated appraisal techniques improves capital budgeting effectiveness by reducing the negative impact of risk perception and uncertainty (Wouters & Stadtherr, 2024). Differences in technique adoption have also been observed between SMEs and large firms, reflecting resource constraints and institutional environments (Purnamasari & Adriza, 2024; Al-Wahaibi et al., 2024).

### **Emerging Themes in Capital Budgeting Research**

Recent literature highlights the expansion of capital budgeting research into broader organizational and societal contexts. Studies increasingly link capital budgeting practices with sustainability, corporate social responsibility (CSR), and stakeholder management (Hunjra et al., 2024). Cross-country evidence further suggests that institutional and cultural

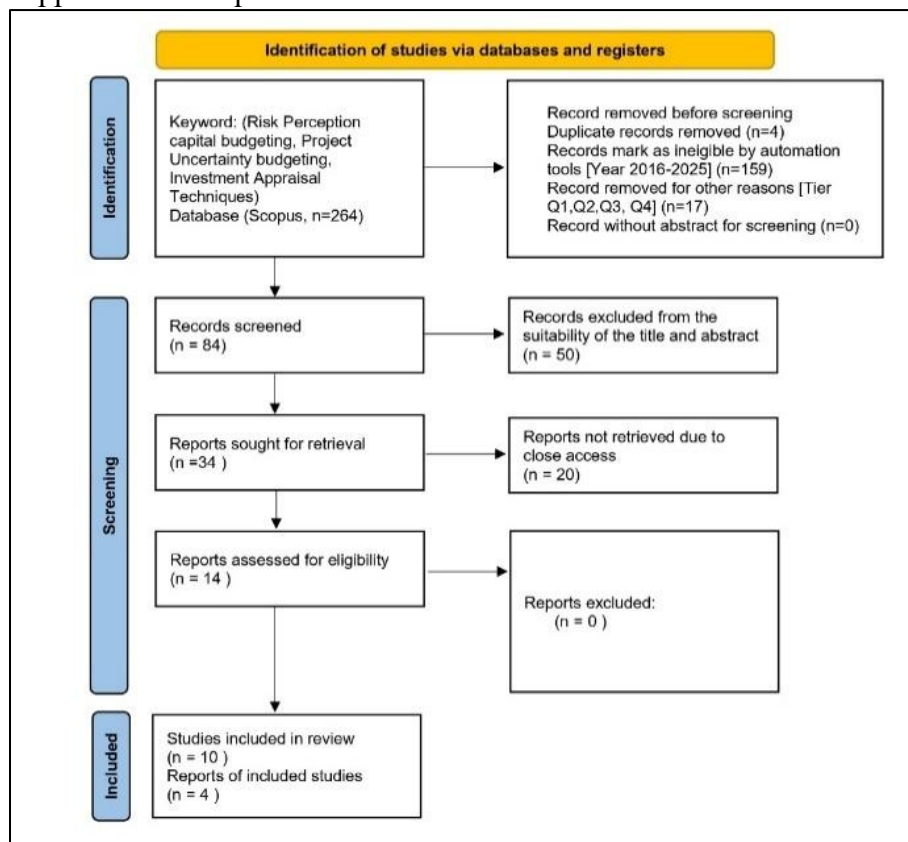
factors influence capital budgeting practices, leading to variations across national development levels (Puwanenthiren, 2024; Sospeter & Awuzie, 2024).

These developments indicate that capital budgeting has evolved into a multidimensional research domain integrating financial, managerial, institutional, and sustainability perspectives.

## RESEARCH METHOD

A Systematic Literature Review (SLR) approach was employed using secondary data obtained from the Scopus and Dimensions AI databases. Literature searches were conducted using selected keywords, including capital budgeting, investment appraisal techniques, risk perception, project uncertainty, net present value (NPV), internal rate of return (IRR), payback period, and real options, combined using Boolean operators (AND/OR).

The PRISMA framework was applied to illustrate the literature screening and selection process related to capital budgeting, risk perception, project uncertainty, and investment appraisal techniques.



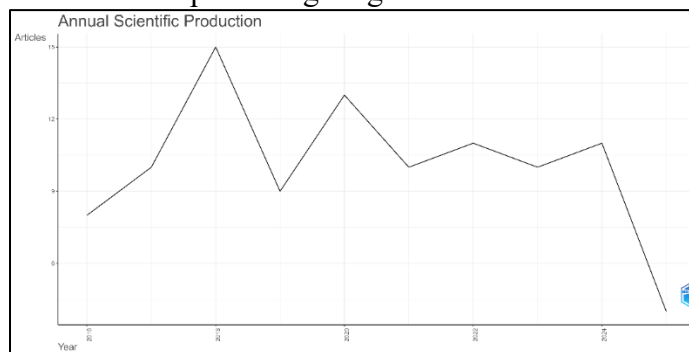
**Figure 1.**  
**PRISMA Flow Diagram**

After screening and eligibility assessment, a total of 101 articles published between 2016 and 2025 were included in the analysis. Bibliometric analysis was performed using Bibliometrix software to identify publication trends, journal sources, keyword frequency, and thematic evolution.

## RESULTS AND DISCUSSION

### Publication Trends

A total of 101 articles published between 2016 and 2025 were identified. The annual publication trend shows fluctuations, with a noticeable increase in recent years, indicating growing academic attention to capital budgeting and its associated variables.



**Figure 2.**  
**Annual Publication Trends (2016-2025)**

The figure illustrates that although publication numbers fluctuate year by year, capital budgeting research remains consistently relevant across the observed period.

### Journal Distribution

**Table 1.**  
**Distribution of Journals and Number of Articles**

Index	Sources	Total Articles Used
Q2	Accounting Perspectives	2
Q3	Asian Journal of Management Cases	2
Q3	Cogent Economics and Finance	2
Q3	International Journal of Business and Globalisation	2
Q3	International Journal of Managerial and Financial Accounting	2
Q4	International Journal of Recent Technology and Engineering	2
Q2	Issues in Accounting Education	2
Q2	Journal of Risk and Financial Management	2
Q3	PSU Research Review	2
Q2	Public Budgeting and Finance	2
Q2	Qualitative Research in Accounting and Management	2
Q2	Sustainability (Switzerland)	2
Q1	Accounting and Business Research	1
Q1	Accounting Forum	1
Q2	Accounting History	1
Q1	Accounting, Organizations and Society	1
Q4	Advanced Science Letters	1

Q3	Asian Journal of Business and Accounting	1
Q2	Australasian Accounting, Business and Finance Journal	1
Q2	Australian Accounting Review	1
Q2	Australian Journal of Management	1
Q2	Benchmarking	1
Q2	BioResources	1
Q1	British Accounting Review	1
Q3	Cogent Business and Management	1
Q2	Contaduria y Administracion	1
Q4	Corporate Ownership and Control	1
Q2	Critical Perspectives on International Business	1
Q2	Critical Policy Studies	1
Q3	Electronic Journal of Applied Statistical Analysis	1
Q1	European Accounting Review	1
Q1	Expert Systems with Applications	1
Q4	Finance India	1
Q1	Foundations and Trends in Accounting	1
Q1	Global Finance Journal	1
Q2	IIMB Management Review	1
Q3	International Journal of Engineering and Technology (UAE)	1
Q4	International Journal of Engineering Research and Technology	1
Q3	International Journal of Management and Decision Making	1
Q3	International Journal of Management Practice	1
Q3	International Journal of Mathematics in Operational Research	1
Q3	International Journal of Procurement Management	1
Q2	International Journal of Public Administration	1
Q4	International Journal of Revenue Management	1
Q1	Journal of Accounting Education	1
Q2	Journal of Advances in Management Research	1
Q3	Journal of Applied Business Research	1
Q2	Journal of Behavioral and Experimental Finance	1
Q2	Journal of Business Economics	1
Q1	Journal of Cleaner Production	1
Q3	Journal of Construction in Developing Countries	1
Q4	Journal of Ecohumanism	1
Q1	Journal of Finance	1

Q1	Journal of Financial Economics	1
Q2	Journal of Financial Reporting and Accounting	1
Q4	Journal of Health Care Finance	1
Q1	Journal of Hospitality and Tourism Management	1
Q2	Journal of Intelligent and Fuzzy Systems	1
Q3	Journal of International Business Education	1
Q2	Journal of Management Control	1
Q3	Journal of Management Information and Decision Science	1
Q4	Journal of Multiple-Valued Logic and Soft Computing	1
Q2	Journal of Public Budgeting, Accounting and Financial Management	1
Q3	Journal of Reviews on Global Economics	1
Q1	Journal of the Operational Research Society	1
Q2	Operations and Supply Chain Management	1
Q3	Gadjah Mada International Journal of Business	1
Q3	International Journal of Technology	1
Q3	Journal of Information Systems Engineering and Business Intelligence	1
Q3	Journal of Indonesian Economy and Business	1
Q3	APTISI Transactions on Technopreneurship	1
Q4	Jurnal Kajian Bali	1
Q4	Record and Library Journal	1
Q4	Prabandhan: Indian Journal of Management	1
Q1	Process Safety and Environmental Protection	1
Q4	Public and Municipal Finance	1
Q1	Public Money and Management	1
Q2	Qualitative Research in Financial Markets	1
Q2	Quality and Quantity	1
Q1	Research in International Business and Finance	1
Q1	Review of Accounting Studies	1
Q1	Review of Economic Studies	1
Q3	Review of Pacific Basin Financial Markets and Policies	1
Q4	Revista Iberoamericana de Psicología del Ejercicio y el Deporte	1
Q2	Scientia Iranica	1
Q1	Small Business Economics	1
Q3	Social and Environmental Accountability Journal	1
Q3	State and Local Government Review	1
Q3	Translational Animal Science	1

The distribution of publications across journal sources demonstrates that research on capital budgeting, risk perception, project uncertainty, and investment appraisal techniques appears in a wide range of international journals spanning accounting, finance, management, and applied sciences. This diversity confirms the interdisciplinary and global nature of capital budgeting research.

**Keyword Frequency and Thematic Patterns**



Figure 3.

**Keyword Word Cloud (Bibliometrix Output)**

Overall frequency patterns indicate that recent literature emphasizes the integration of core capital budgeting concepts with managerial practices and investment evaluation techniques. The high frequency of the term *capital budgeting* compared to other keywords confirms its role as the central research theme, closely associated with risk, uncertainty, and evaluation methodologies.

**Topic Evolution**

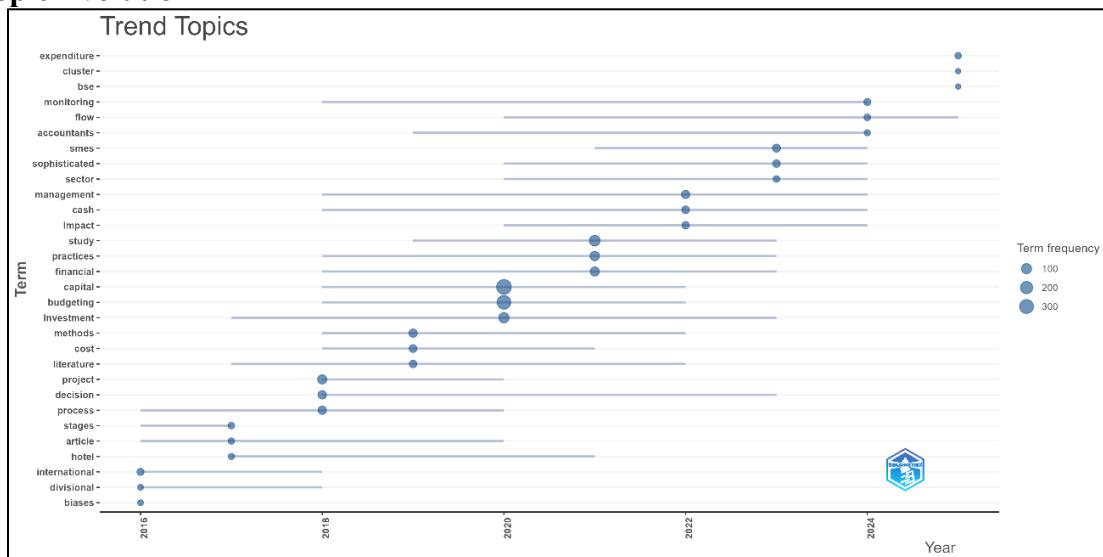


Figure 4.

**Annual Trend Topics**

The analysis shows that the terms capital and budgeting dominate throughout the observation period, reflecting consistency in research focus while gradually incorporating more contextual and methodological variations.

### Keyword Co-Occurrence Network

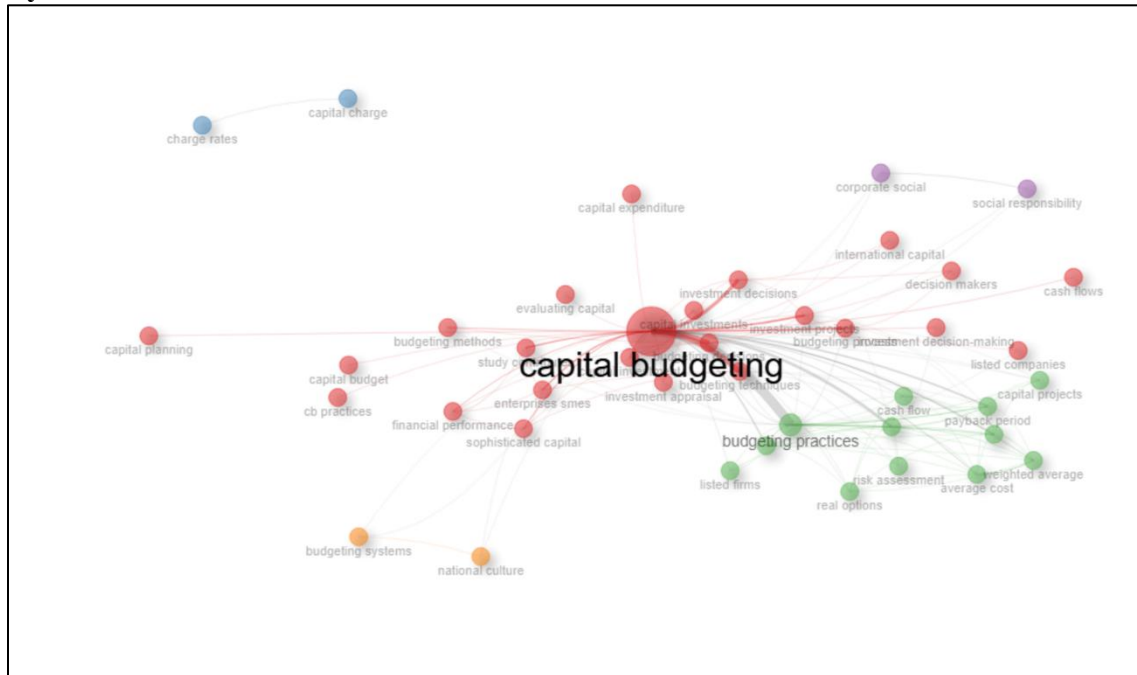


Figure 5.

### Bigram Co-Occurrence Network

The keyword co-occurrence network illustrates associative relationships among research themes based on joint keyword appearances. The size of each node reflects keyword frequency, while edges represent relational strength. *Capital budgeting* occupies the central position with the largest node, confirming its role as the primary research focus.

Several thematic clusters emerge:

1. A red cluster centered on capital budgeting is linked to capital expenditure, budgeting methods, financial performance, and sophisticated capital techniques.
2. A green cluster associated with budgeting practices, including risk assessment, real options, cash flow, payback period, and weighted average cost of capital.
3. A purple cluster involving corporate social responsibility and international capital.
4. An orange cluster related to budgeting systems and national culture.
5. A blue cluster comprising capital charges and charge rates.

These clusters indicate that capital budgeting research extends beyond technical project evaluation toward managerial, institutional, sustainability, and international dimensions.

### Discussion

This study provides a comprehensive synthesis of capital budgeting research by integrating risk perception, project uncertainty, and investment appraisal techniques through a systematic literature review and bibliometric analysis. The findings confirm that capital

budgeting remains a central and evolving research domain, characterized by increasing complexity and contextualization in response to uncertain investment environments.

First, the dominance of capital budgeting as a core research theme reflects its enduring strategic importance in organizational decision-making. The observed shift from traditional evaluation methods toward more sophisticated and risk-sensitive approaches supports prior reviews indicating that capital budgeting has evolved beyond static financial calculations (Sureka et al., 2022). The increasing use of real options, scenario analysis, and simulation-based techniques suggests that firms and researchers recognize the limitations of conventional discounted cash flow models in capturing uncertainty and managerial flexibility (Alkaraan, 2020; Wouters & Stadtherr, 2024).

Second, the discussion of risk perception highlights the cognitive dimension of capital budgeting decisions. The literature consistently shows that managerial perceptions of risk significantly influence investment behavior, often leading to conservative decision-making and underinvestment when perceived uncertainty is high (Hartmann & Weissenberger, 2024). This finding aligns with behavioral finance perspectives, which argue that subjective judgment plays a critical role in capital allocation processes. The synthesis further supports evidence that risk perception, rather than objective risk alone, shapes how decision-makers interpret appraisal outcomes and select evaluation techniques.

Third, project uncertainty emerges as a key structural factor contributing to capital misallocation. Studies reviewed in this analysis demonstrate that uncertainty related to market volatility, technological change, and incomplete information increases forecasting errors and weakens the reliability of projected cash flows (Charoenwong et al., 2024). The discussion reinforces the argument that uncertainty amplifies inefficiencies in capital budgeting, particularly in contexts where firms rely on simplified or rigid evaluation frameworks (Alkaraan & Northcott, 2006).

Fourth, the role of investment appraisal techniques is central in moderating the adverse effects of both risk perception and project uncertainty. The literature indicates that advanced appraisal techniques provide more adaptive analytical frameworks, allowing decision-makers to incorporate uncertainty, flexibility, and strategic considerations into investment evaluations (Alkaraan, 2020). Differences in technique adoption across firm size and institutional settings especially between SMEs and large firms underscore the importance of organizational capability and contextual factors in shaping capital budgeting practices (Purnamasari & Adriza, 2024; Al-Wahaibi et al., 2024).

Beyond technical considerations, the discussion reveals a clear expansion of capital budgeting research into broader managerial and societal contexts. The emergence of sustainability and corporate social responsibility (CSR) themes indicates that investment decisions are increasingly evaluated not only on financial returns but also on social and environmental implications (Hunjra et al., 2024). Additionally, cross-country and institutional differences highlight that capital budgeting practices are shaped by national development levels, cultural norms, and regulatory environments (Puwanenthiren, 2024; Sospeter & Awuzie, 2024).

Overall, this discussion confirms that capital budgeting decisions are the result of an interaction between cognitive factors (risk perception), contextual conditions (project uncertainty), and methodological tools (investment appraisal techniques). This integrated perspective explains why capital budgeting outcomes vary across firms and environments

and why a one-size-fits-all approach to investment evaluation is increasingly inadequate in uncertain and dynamic contexts.

## CONCLUSION

Capital budgeting remains a central research domain with increasingly contextualized themes. Risk perception shapes managerial conservatism, project uncertainty increases misallocation risk, and investment appraisal techniques mitigate these challenges through adaptive analytical approaches. Effective capital budgeting decisions, therefore, emerge from the interaction of cognitive, contextual, and methodological factors.

### Implications and Research Gap

This study reinforces capital budgeting as a multidimensional research field. Identified gaps include limited empirical studies on SMEs in developing economies, insufficient integration of sustainability and CSR metrics, and minimal application of advanced analytical tools such as machine learning and big data analytics.

### Limitations

This review is limited to Scopus and Dimensions databases, potentially excluding relevant studies from other sources. The 2016-2025 period may overlook foundational contributions, and the bibliometric approach emphasizes quantitative patterns over in-depth qualitative interpretation.

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