# Mapping the Landscape of MCDM Applications in IT Strategic Planning: A Bibliometric and Systematic Literature Review

Agusta Praba Ristadi Pinem[1*], Achmad Fitro[2], Otong Saeful Bachri[3], Adil M.Y. Khalil[4]

[1]Information System, Semarang University, Semarang, Indonesia.
[2]Digital Business, State University of Surabaya, Surabaya, Indonesia.
[3]Informatics Engineering, Muhadi Setiabudi University, Brebes, Indonesia.
[4]University of Bahri, Sudan.

*Email: agusta.pinem@usm.ac.id

**Abstract.** This study explores the evolving landscape of Multi-Criteria Decision Making (MCDM) applications in the context of IT strategic planning through a comprehensive bibliometric and systematic literature review. Based on 197 articles published between 2015 and 2025, the bibliometric analysis reveals a rising trend in integrating MCDM with strategic IT decision-making, with AHP, fuzzy logic, and hybrid models being the most frequently applied techniques. Key thematic areas include ICT sustainability, smart systems, and digital governance. A focused review of 32 core articles shows a clear dominance of hybrid approaches, primarily combining AHP with methods like TOPSIS, and a growing but limited use of strategic frameworks such as SWOT, BSC, and scenario planning. These findings highlight current research gaps and provide valuable insights for researchers and practitioners aiming to enhance IT strategy formulation using structured, multi-criteria approaches in complex and dynamic environments.

**Keywords:** Multi-Criteria Decision Making (MCDM), IT Strategic Planning, AHP, Hybrid Models, SWOT Analysis, Bibliometric Analysis, Systematic Literature Review, ICT Sustainability

## Introduction

In an era marked by digital transformation, organizations are increasingly relying on strategic Information Technology (IT) planning to remain agile, competitive, and sustainable. Strategic IT planning serves as a critical function that aligns technological capabilities with long-term organizational goals. However, the decision-making processes underpinning IT strategy are often complex and uncertain, requiring a careful balance of multiple, and at times conflicting, criteria related to technology, cost, risk, infrastructure, and organizational impact.

These complexities resonate strongly with the global agenda of the Sustainable Development Goals (SDGs), particularly in targets associated with innovation and infrastructure (SDG 9), sustainable industry (SDG 12),

and inclusive institutions (SDG 16). Strategic technology management is no longer a technical endeavor alone—it is now an integral part of broader societal and economic development frameworks. As such, the need for structured, transparent, and holistic decision-making tools is more urgent than ever.

Multi-Criteria Decision Making (MCDM) methods have gained prominence in this context. Techniques such as the Analytic Hierarchy Process (AHP), Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), fuzzy logic, and hybrid models are widely applied to support decision-makers in handling complexity and subjectivity. Recent studies have shown that MCDM methods are increasingly being combined with strategic analysis tools such as SWOT (Strengths, Weaknesses, Opportunities, and Threats) to enhance objectivity in formulating IT priorities (Elomiya et al., 2024a; Koubaa et al., 2024a; Rahbari et al., 2023; Wang et al., 2024). This integration allows for both qualitative and quantitative dimensions to be evaluated within a unified decision-support framework.

Although numerous studies have applied MCDM to IT planning, research in this area remains scattered across domains and lacks a consolidated overview of trends, methods, and application contexts. Most existing reviews focus on isolated methods or narrow application areas without addressing the broader methodological landscape or evolution. Moreover, the link between MCDM and IT strategy development—particularly in relation to sustainable and adaptive governance—has not been systematically explored.

To bridge this gap, this study conducts a comprehensive bibliometric and systematic literature review of 197 peer-reviewed articles published between 2015 and 2025. The purpose is to map the landscape of MCDM applications in IT strategic planning, identify prevailing methods and hybrid approaches, explore the thematic trends and application domains, and uncover research gaps that require further investigation. In doing so, this research provides both scholars and practitioners with a synthesized understanding of how MCDM contributes to strategic decision-making in complex IT environments.

## Methods

This study employs a twofold methodological approach that combines bibliometric analysis and systematic literature review (SLR) to comprehensively map the academic landscape of Multi-Criteria Decision Making (MCDM) applications in IT strategic planning. This dual-method design allows for both quantitative and qualitative insight into publication patterns, thematic developments, and methodological trends over the last decade (2015–2025).

1. Bibliometric Analysis
   Bibliometric analysis was conducted to identify publication trends, prolific authors, influential journals, citation patterns, and co-occurring keywords related to MCDM and IT strategic planning. The dataset was derived from the Scopus database using a structured search query:

   TITLE-ABS-KEY ( ( "multi criteria decision making" OR "MCDM" ) AND ( "IT strategy" OR "strategic IT planning" OR "strategic planning" ) ) AND PUBYEAR > 2014 AND PUBYEAR < 2026 AND ( LIMIT-TO ( DOCTYPE , "ar" ) OR LIMIT-TO ( DOCTYPE , "cp" ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) )

   The final dataset included 197 peer-reviewed articles published between 2015 and 2025. Data was exported in.CSV formats for further processing. Bibliometric visualization and mapping were carried out using R Bibliometrix (Biblioshiny), focusing on:
   a. Annual publication trends
   b. Keyword co-occurrence networks

c. Three-fields plot
d. Thematic evolution
e. Thematic map

This analysis provided a macro-level understanding of how MCDM is evolving in the context of IT strategic planning and which areas dominate scholarly discourse.

2. Systematic Literature Review (SLR)

To complement the quantitative trends, a systematic literature review was conducted following a transparent selection and screening process. From the 197 bibliometric entries, a refined set of 112 articles was initially identified as topically relevant. These were further filtered based on contextual alignment with Information Technology (IT) and Information Systems (IS), resulting in a core set of 32 highly relevant studies.

The SLR procedure followed the PRISMA framework and included the following steps:

a. Identification: Articles were identified through database search using structured keywords related to "MCDM", "strategic planning", "IT strategy", and "decision making".
b. Screening: Abstracts and keywords were manually reviewed to remove irrelevant publications, duplicates, and non-IT studies.
c. Eligibility: Full-text evaluation was applied to ensure methodological relevance (use of MCDM techniques) and domain specificity (strategic IT/IS context).
d. Inclusion: Only empirical or conceptual studies that clearly applied MCDM methods in IT strategic contexts were retained.

The selected 32 articles were then analyzed thematically to extract key insights regarding:

a. Types of MCDM methods used (e.g., AHP, TOPSIS, fuzzy, hybrid)
b. Strategic IT/IS domains addressed (e.g., project selection, IT governance, digital transformation)
c. Integration with decision frameworks (e.g., SWOT, BSC)

## Result and Discussion

1. Bibliometric Analysis

a. Annual Scientific Production

The annual trend of scientific production (Figure 1) reveals a steady growth in publications related to MCDM and IT strategic planning between 2015 and 2025.

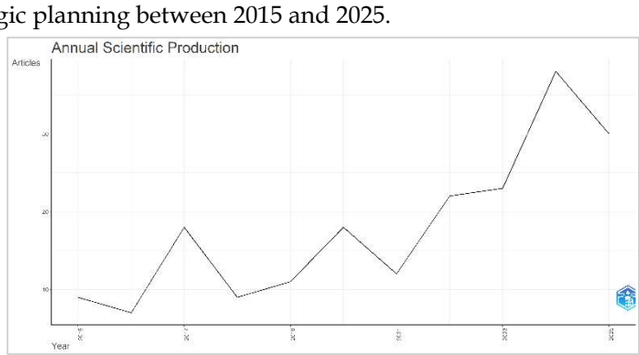


**Figure 1**. Annual Scientific Production

Early years (2015–2017) showed modest activity, with fewer than 20 articles per year. However, starting in 2020, publication output increased significantly, peaking in 2024 with over 35 articles. This upward trend indicates a growing scholarly interest in applying decision-making methodologies to support IT strategy formulation, particularly in response to digital transformation and sustainability goals.

b. Keyword Co-Occurrence Network

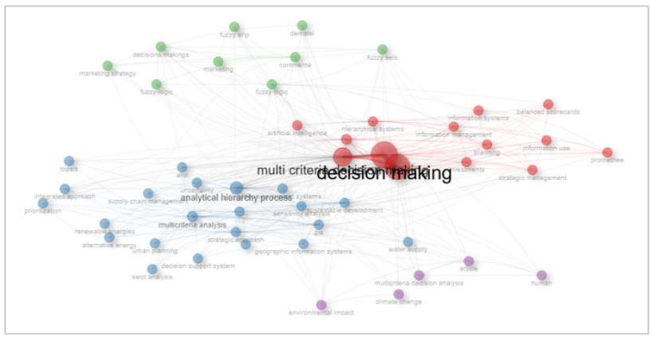


**Figure 2**. Keyword co-occurrence network

The keyword co-occurrence network (Figure 2) highlights "decision making", "multi criteria decision making", "analytical hierarchy process", and "strategic planning" as the most central terms, forming dense clusters with associated themes such as "fuzzy logic", "supply chain management", "information systems", and "uncertainty". This suggests that MCDM methods are frequently contextualized in strategic environments, especially when addressing uncertainty and prioritization challenges in IT and business domains. The presence of supporting concepts like “SWOT analysis”, “GIS”, and “balanced scorecards” further indicates hybrid methodological integrations.

c. Three-Fields Plot

The three-fields plot (Figure 3) illustrates the relationship among countries, source journals, and dominant keywords.

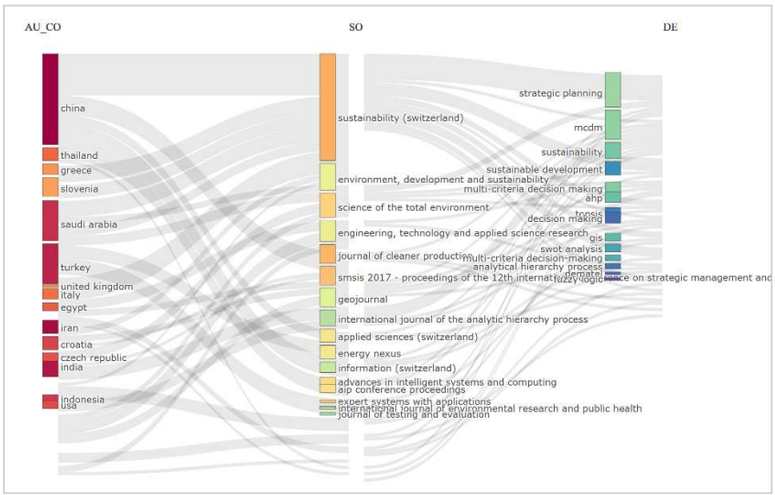


**Figure 3**. The three-fields plot

China, India, and Turkey emerge as leading contributors, with journals like Sustainability (Switzerland) and Environment, Development and Sustainability being the primary outlets. Keywords such as "strategic planning", "AHP", and "MCDM" dominate the thematic axis, reflecting the integration of these methods into mainstream sustainability and digital strategy discourse. This structure confirms the global interest in strategic IT decision-making, especially in emerging economies.

d. Thematic Evolution

The thematic evolution diagram (Figure 4) shows how concepts and methods have shifted over three main periods.

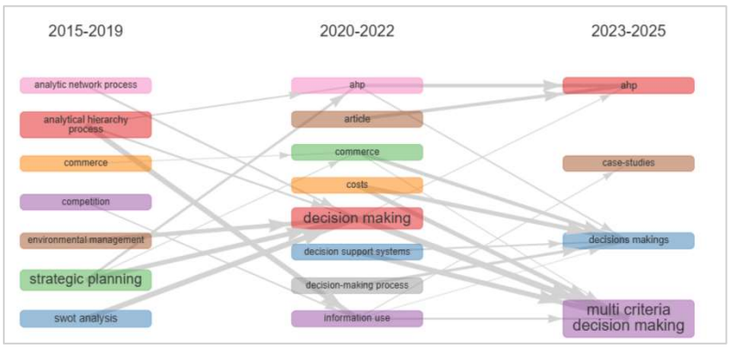


**Figure 4**. Thematic evolution

From 2015–2019, themes were dominated by "analytical hierarchy process", "SWOT analysis", and "strategic planning". In the 2020–2022 period, these evolved into broader terms like "decision making", "decision support systems", and "AHP", indicating increased formalization. By 2023–2025, the emergence of "multi criteria decision making" and "case studies" signals a methodological consolidation and a focus on applied, real-world contexts in IT strategy.

e. Thematic Map

The thematic map (Figure 5) positions "strategic planning", "decision making", and "multi criteria decision making" in the Basic Themes quadrant, signifying their high relevance but moderate development. Meanwhile, “multicriteria analysis”, “sustainable development”, and “strategic approach” appear in the Motor Themes quadrant, suggesting they are both well-developed and central to the field.

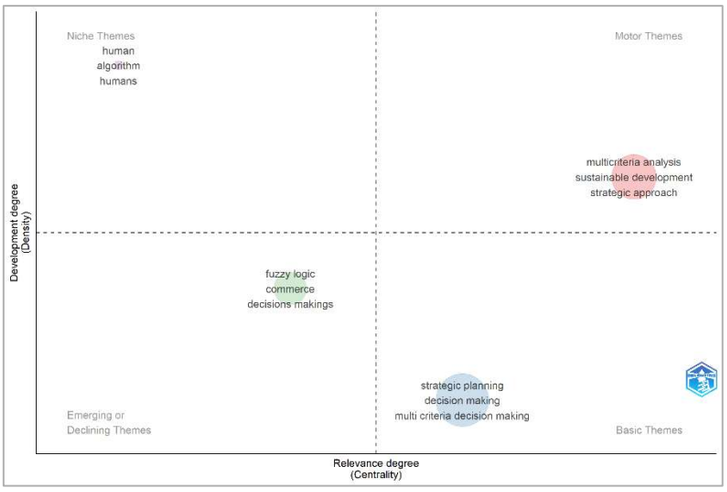


**Figure 5**. Thematic evolution

In contrast, “fuzzy logic” and “commerce” fall under Emerging or Declining Themes, indicating either nascent interest or diminishing focus in recent years. The absence of strong Niche Themes implies that current research is still heavily oriented around foundational and widely applicable concepts.

Overall, the bibliometric analysis paints a clear picture of a field that is rapidly evolving and gaining traction within both academic and practical domains. The steady growth of publications, the emergence of hybrid methodologies such as SWOT-AHP, and the global distribution of research contributions all underscore the importance of MCDM as a foundational tool in IT strategic planning. Thematically, the

field remains grounded in core concepts such as strategic decision-making and performance evaluation, yet it also shows promising shifts toward sustainability, integration, and real-world application.

These findings do more than map trends—they provide a lens through which we can understand how researchers across the globe are grappling with the complexity of IT governance, digital transformation, and strategic alignment. They reveal a vibrant, collaborative, and interdisciplinary space where decision-making is not just a technical exercise, but a strategic imperative.

2. Systematic Literature Review (SLR)

The 32 selected articles demonstrate a diverse application of Multi-Criteria Decision Making (MCDM) methods in IT and IS strategic planning. The most commonly used technique is the Analytic Hierarchy Process (AHP), either in its basic form or in combination with fuzzy logic and other MCDM tools (table 1). TOPSIS and hybrid models (such as SWOT-AHP or AHP-TOPSIS) also appear frequently, emphasizing the need for structured prioritization and complex evaluations.

**Table 1**. Summary of MCDM/MADM Methods

| No | MCDM/MADM Method | Number of Articles | References |
|---|---|---|---|
| 1 | Hybrid (AHP-TOPSIS/Fuzzy/etc) | 18 | (Abdelaal et al., 2024a; Ayyildiz et al., 2025a; Elomiya et al., 2024a; Fang et al., 2025a; Florio et al., 2018a; Li & Zhao, 2024; Malviya et al., 2024a; Marra & Grimaldi, 2024; Nguyen & Chaysiri, 2025a; Syah, Satria, Elveny, & Nasution, 2023; Wang et al., 2024; Zhou et al., 2022a) |
| 2 | AHP (Analytic Hierarchy Process) | 7 | (Alabi, n.d.; Elomiya et al., 2024a; Li & Zhao, 2024; Liangrokapart & Sittiwatethanasiri, 2023a; Syah, Satria, Elveny, & Nasution, 2023, fitro et al, 2020) |
| 3 | TOPSIS | 10 | (Abdelaal et al., 2024b; Elomiya et al., 2024b; Gheibi et al., 2018a; Hosseini Dehshiri & Amiri, 2023a; Jittamai et al., 2025a; Koubaa et al., 2024b; Madanchian & Taherdoost, 2025a; Moshiul et al., 2023) |
| 4 | Fuzzy AHP | 2 | (Acuña-Carvajal et al., 2019; Jayaraman et al., 2017) |
| 5 | SWARA | 2 | (Ayyildiz et al., 2025b; Hosseini Dehshiri & Amiri, 2023a) |

The analysis shows that hybrid MCDM methods are the most frequently employed, appearing in over half of the selected articles. This reflects a growing preference for combining structured decision-making tools like AHP with methods such as TOPSIS or fuzzy logic to handle complex strategic evaluations. Meanwhile, traditional methods like AHP and SWARA continue to be adopted in more specific or standalone contexts.

The thematic analysis of the 32 selected articles reveals that the majority of studies concentrate on ICT sustainability and renewable energy-related planning, reflecting the alignment between digital infrastructure and environmental concerns (table 2). In contrast, only a few studies directly address strategic areas such as digital transformation, e-government, and technology innovation. This distribution highlights a current research trend where MCDM methods are predominantly applied in contexts that support sustainable development and infrastructure decision-making, rather than core business-oriented IT strategic formulation.

**Table 2**. Strategic Planning Domains

| No | Strategic Planning Domain | Number of Articles | References (Title Snippet + Year) |
|---|---|---|---|
| 1 | Technology Adoption / Innovation | 1 | (Liangrokapart & Sittiwatethanasiri, 2023a) |
| 2 | ICT Sustainability / Renewable Planning | 24 | (Aldulaimi et al., 2022; Ayyildiz et al., 2025c; Butdee et al., 2024; Dağıdır & Özkan, 2024a; Dhumras et al., 2024; Divjak et al., 2023; Elomiya et al., 2024c; Fang et al., 2025b; Florio et al., 2018b; Hosseini Dehshiri & Amiri, 2023b; "Identification of a Multi-Criteria Model of Location Assessment for Renewable Energy Sources," 2016; Jittamai et al., 2025b; Joo & Moon, 2025; Košnjek et al., 2025a; Koubaa et al., 2024c; Madanchian & Taherdoost, 2025b; Malviya et al., 2024b; Nguyen & Chaysiri, 2025b; Syah, Satria, Elveny, & K. M. Nasution, 2023; Yan et al., 2025; Zhang & Kontou, 2025; Zhou et al., 2022b) |
| 3 | Smart Systems / Infrastructure | 3 | (Elomiya et al., 2024d; Gheibi et al., 2018b; Makki & Alqahtani, 2024a) |
| 4 | Digital Transformation | 1 | (Kadoić et al., 2024) |
| 5 | E-Government Strategy | 2 | (Gheibi et al., 2018c; Makki & Alqahtani, 2024b) |

ICT sustainability and energy-related decision-making are the dominant strategic concerns in current literature, suggesting an opportunity to expand MCDM applications into broader domains such as enterprise IT governance and digital policy design.

Several articles incorporated strategic analysis models to support the prioritization and structuring of IT/IS strategic decisions (table 3). The SWOT analysis model emerged as the most frequently used, demonstrating its versatility and ease of integration with MCDM techniques such as AHP and TOPSIS. Other structured approaches, including Balanced Scorecard (BSC) and Scenario Planning, were also employed in specific contexts to capture multidimensional perspectives and long-term uncertainties.

**Table 3**. Strategic Analysis Approaches

| No | Strategic Analysis Approach | Number of Articles | References (DOI) |
|---|---|---|---|
| 1 | SWOT | 3 | (Dağıdır & Özkan, 2024b; Košnjek et al., 2025b; Liangrokapart & Sittiwatethanasiri, 2023b) |
| 2 | Scenario Planning | 2 | (Nguyen & Chaysiri, 2025c; Yang et al., 2024) |
| 3 | BSC (Balanced Scorecard) | 1 | (Acuña-Carvajal et al., 2019) |

This trend reflects a growing awareness of the need to combine qualitative strategic insights (e.g., internal-external analysis) with quantitative MCDM frameworks for more robust IT strategy formulation. The limited use of formal strategic models suggests a research gap where future studies could benefit from deeper integration of established frameworks like PESTEL, BSC, or even value chain mapping.

The results of this review demonstrate a growing intersection between MCDM methods and IT strategic planning, with hybrid models and sustainability-oriented domains taking center stage. Despite the integration of models like SWOT and BSC, their use remains limited, indicating a gap for future research to incorporate more diverse strategic analysis frameworks. Overall, this study provides a structured map of current practices and highlights opportunities to enhance decision-making approaches in complex IT environments.

## Conclusion

This study presents a comprehensive exploration of the application of Multi-Criteria Decision Making (MCDM) methods in IT strategic planning through a combined bibliometric and systematic literature review. The analysis reveals a dominant use of hybrid MCDM models, particularly combinations involving AHP and TOPSIS, which offer flexibility in handling complex and uncertain decision contexts. Thematically, the majority of applications are concentrated in sustainability-related ICT planning, with fewer studies focusing on core enterprise IT strategy and governance. Moreover, while SWOT remains the most commonly integrated strategic analysis tool, the overall use of formal strategic frameworks is still limited. These findings point to significant opportunities for future research to expand MCDM applications across broader strategic domains and integrate more robust strategic analysis techniques.

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