01-007 – Decision-making competency in project, program and portfolio management: a bibliometric approach – Toma de decisiones como competencia en dirección de proyectos, programas y portafolios: un enfoque bibliométrico

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Decision-making has been established as a critical area of study due to its direct impact on the successful performance of projects, programs, and portfolios. However, this skill has not been explicitly recognized as a key competency in major reference models, bodies of knowledge, and international standards. This research systematically searches academic databases, including Scopus and Web of Science, to analyze the existing literature on decision-making in project management, focusing on its inclusion as a specific competency. Articles published between 2010 and 2025 were reviewed, identifying technical, behavioral, and contextual dimensions applied to decision-making in projects, programs, and portfolios. The results reveal a gap in current frameworks, where this skill is implicitly present in related competencies but lacks explicit recognition. The study proposes the incorporation of decision-making as an independent competency in the skill and competency frameworks for project, program, and portfolio managers. The findings have significant implications for managers' training, evaluation, and selection, contributing to improving professional standards and the success of projects, programs, and portfolios.

Keywords: *Decision-making; Competency; Skill, project; Program; Portfolio*

La toma de decisiones se ha consolidado como un área de estudio crítica, debido a su impacto directo en el desempeño exitoso de los proyectos, programas y portafolios. Sin embargo, esta habilidad no ha sido reconocida explícitamente como una competencia clave en los principales modelos de referencia, cuerpos de conocimiento y estándares internacionales. Esta investigación realiza una búsqueda sistemática en bases de datos académicas, incluyendo Scopus y Web of Science para analizar la literatura existente sobre la toma de decisiones, con un enfoque en su inclusión como competencia específica. Se revisaron artículos publicados entre 2010 y 2025, identificando dimensiones técnicas, conductuales y contextuales aplicados a la toma de decisiones en proyectos, programas y portafolios. Los resultados evidencian una brecha en los marcos actuales, donde esta habilidad se encuentra implícita en competencias relacionadas, pero no recibe un reconocimiento explícito. Se propone la incorporación de la toma de decisiones como una competencia independiente en los marcos de habilidades y competencias de los directores de proyectos, programas y portafolios. Los hallazgos tienen implicaciones significativas para la formación, evaluación y selección de directores, contribuyendo a la mejora de los estándares profesionales y al éxito de proyectos, programas y portafolios.

Palabras claves: *Toma de decisiones; Competencia; Habilidad; Proyectos; Programas; Portafolios*

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1. Introduction

Decision-making has historically been recognized as essential to achieving project, program, and portfolio management (PPPM) success (Hübner et al., 2018; Valencia et al., 2009). In environments characterized by uncertainty, complexity, and pressure for results, the manager's judgment becomes a critical success factor (Dainty et al., 2005; Ngo et al., 2022). Notwithstanding, decision-making represents a daily activity and a complex professional competency that requires development, evaluation, and support with appropriate tools (Aramo-Immonen et al., 2011; Lee et al., 2022; Marmier et al., 2014).

At the institutional level, the central normative bodies of the discipline, such as the PMI Project Manager Competency Development Framework (PMCDF), the IPMA Individual Competence Baseline (ICB), and the APM Competence Framework (APM-CF), recognize this competence as transversal to all areas of knowledge (Nijhuis et al., 2018). Nevertheless, recent studies have indicated that this inclusion is general and declarative, lacking enough systematization of decision problems, the rational processes involved, and the analytical or prescriptive techniques that could strengthen professional practice (Ochoa Pacheco et al., 2023).

Indeed, the literature highlights a gap between recognizing the importance of making informed decisions and the lack of methodological tools that integrate competency frameworks with analytical, operational, or model-based approaches (Varajão & Cruz-Cunha, 2013). This disconnection is also reflected in the scientific production on the topic, which has addressed decision-making from multiple perspectives behavioral, organizational, cognitive, and rational but without a clear articulation with the practical reality of professionals who lead strategic projects and manage portfolios (Aragonés-Beltrán et al., 2010; Chitongo & Pretorius, 2024).

Given this fragmentation, a rigorous and structured analysis of the current state of scientific knowledge on decision-making as a competency in PPPM is deemed necessary. Bearing in mind this purpose, the present research proposes an exploratory bibliometric analysis with a pragmatic epistemological approach, understanding that the value of decision-making as a competency lies in its usefulness for solving real, contextualized, and relevant problems for the profession. In this context, the following research questions are posed:

- How has the academic production on decision-making as a competency in PPPM evolved during the period 2005-2025?
- Which authors, journals, and countries are the most influential in shaping the field of decision-making as a competency in PPPM?
- Which methods, frameworks, or epistemologies are prevalent in the academic discourse on decision-making as a competency in PPPM?
- How is the concept of competency represented in the literature, and to what extent is it integrated with decision-making research?
- To what extent has PPPM been incorporated into the research on decision-making competency, especially in program and portfolio management?

2. Methodology

For the development of this research, an exploratory and descriptive bibliometric analysis was applied, aimed at examining the evolution, scientific networks, and thematic gaps in the academic production of decision-making as a competency in the management of projects, programs, and portfolios (PPPM). This technique identifies publication patterns, influential authors, prevalent theoretical frameworks, and methodological trends essential for building a solid and helpful research framework (Donthu et al., 2021).

2.1 Data sources and search strategies

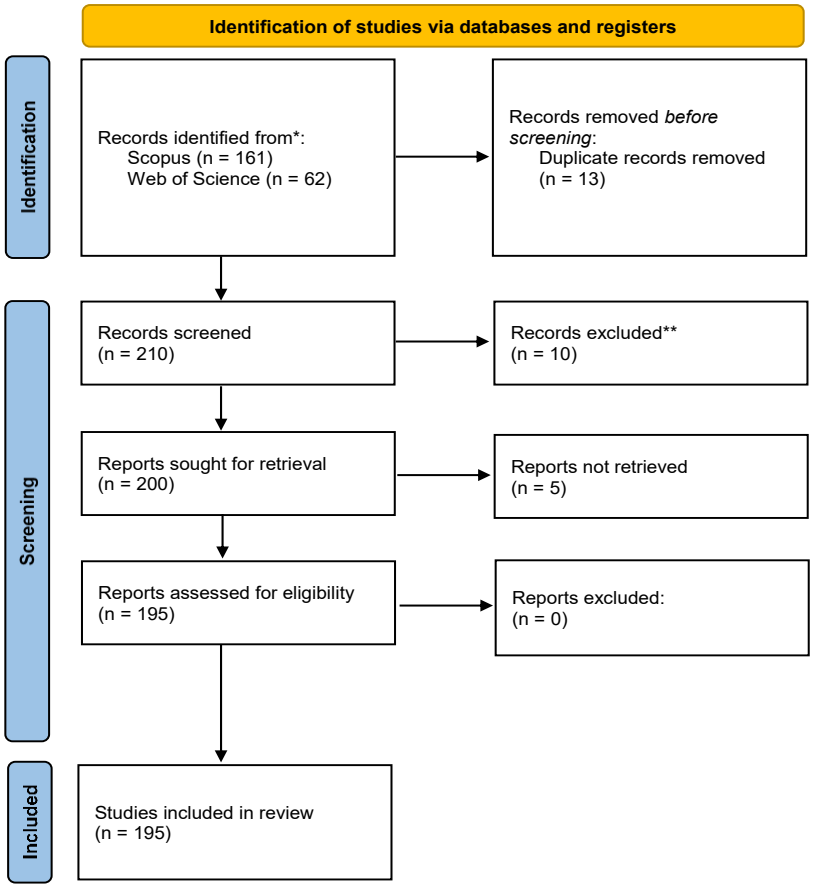
Scopus and Web of Science (WoS) were used as scientific databases due to their extensive coverage and relevance in indexing high-impact academic literature (Pranckutė, 2021). The search was limited from 2005 to 2025 to capture a two-decade evolution that included foundational contributions and recent developments. The search criteria were operationalized through boolean operators adapted to each platform, which is resumed in Table 1.

Table 1: Search criteria for identification.

Database	Search criterio	Results
Scopus	(TITLE-ABS-KEY ("decision making" AND (competence OR competency) AND "project management") OR TITLE-ABS-KEY ("decision making" AND (competence OR competency) AND "program management") OR TITLE-ABS-KEY ("decision making" AND (competence OR competency) AND "portfolio management")) AND PUBYEAR > 2004 AND PUBYEAR < 2026 AND (LIMIT-TO (EXACTKEYWORD , "Project Management") OR LIMIT-TO (EXACTKEYWORD , "Program Management") OR LIMIT-TO (EXACTKEYWORD , "Portfolio Management"))	161
Web of Science	TS=("decision making" AND (competence OR competency) AND "project management") OR TS=("decision making" AND (competence OR competency) AND "program management") OR TS=("decision making" AND (competence OR competency) AND "portfolio management") AND PY=(2005-2025)	62

2.2 Research screening and eligibility: PRISMA approach

Figure 1: PRISMA flow diagram in this research.



To ensure methodological quality and reduce potential biases in the literature review, the PRISMA methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) was adopted, as shown in Figure 1, which allowed for a transparent structuring of the stages of the document selection process (Page et al., 2021). The key stages of this method are detailed below:

- **Identification:** Initially, 62 articles were identified in Web of Science and 161 in Scopus. After the removal of 13 duplicates, 210 unique documents were obtained.
- **Screening:** Titles, abstracts, and keywords were reviewed, excluding 10 articles that did not meet the defined thematic criteria. Subsequently, 5 additional articles were excluded due to lack of access to the full text.
- **Included:** Finally, 195 articles were included in the bibliometric analysis. This final set of publications represents the foundation upon which the research was conducted.

2.3 Network visualization software: VOSviewer

For bibliometric analysis and the visualization of scientific networks, the VOSviewer software was used, which allows for the graphical representation of significant relationships between bibliographic elements (Van Eck & Waltman, 2009).

The final dataset (195 articles) was processed to apply the following analysis techniques:

- **Co-occurrence analysis by keywords** allowed for identifying the most recurrent concepts in the literature and mapping the dominant and emerging thematic areas around decision-making as competency in project, program, and portfolio management.
- **Co-citation analysis by authors** facilitated the identification of the most influential and frequently co-cited authors, revealing possible common theoretical frameworks and emerging or consolidated scientific communities.
- **Co-citation analysis** by journals allowed the detection of the scientific journals that act as reference hubs within the field and the degree of convergence or fragmentation of the published knowledge.
- **Bibliographic coupling analysis by countries** allowed the exploration of the connections between countries based on the standard bibliographic references used by their publications, which offers a geographical perspective on research lines and academic cooperation.

This set of analyses contributes to understanding the structure and evolution of decision-making as a competency field and identifying knowledge gaps, key authors, and opportunities for research development with a pragmatic focus and applied orientation.

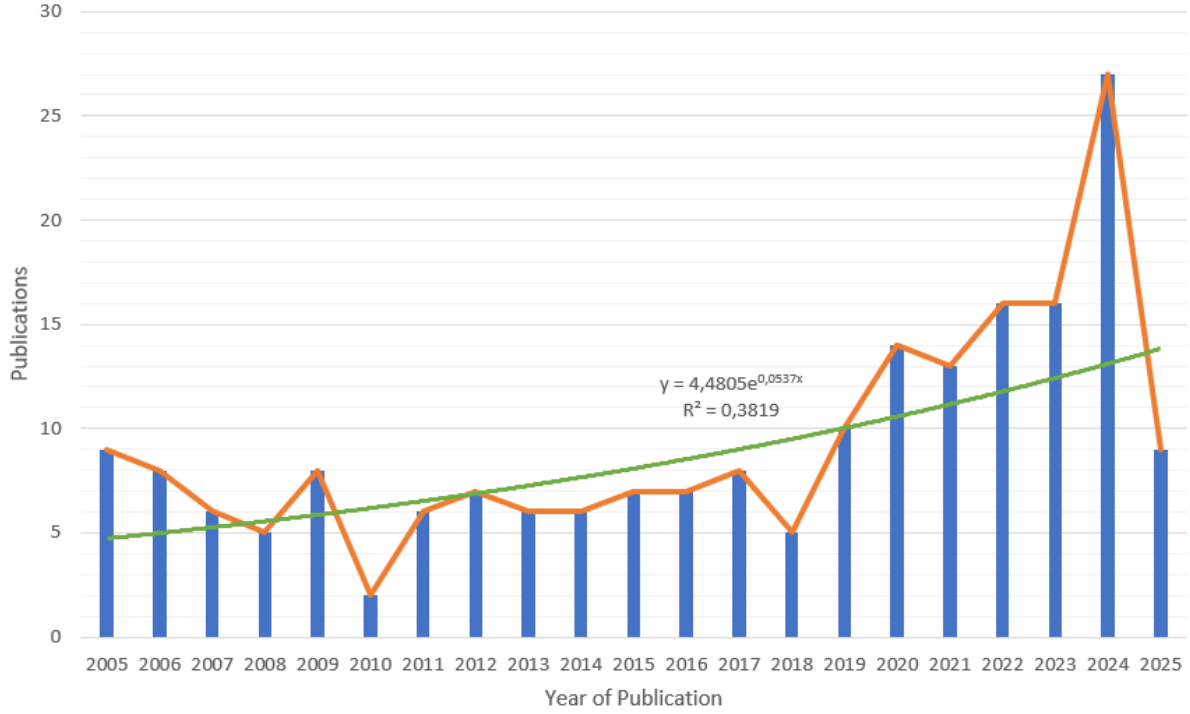
3. Results

3.1 Growth pattern in publications

Figure 2 illustrates the annual publication trend on decision-making as a competency in project, program, and portfolio management from 2005 to 2025. The chart displays the yearly publication count, the smoothed exponential growth curve, and the corresponding model. The data reveals a steady increase in scholarly output over the 20 years. Although there are fluctuations, particularly between 2005 and 2017, the general trajectory shows a positive upward trend in the number of publications.

- **Early phase (2005–2014):** This period is marked by relative stagnation, with annual publications between 4 and 8. A noticeable drop occurred in 2010, suggesting a limited academic focus.
- **Transitional phase (2015–2018):** The output becomes more stable but modest. The field began to consolidate gradually, reflecting an emerging academic interest in the intersection of decision-making and project management competencies.
- **Growth phase (2019–2024):** A significant surge in publications is observed, particularly between 2020 and 2024, with a peak in 2024 nearing 28 publications. This indicates that the topic has gained increased relevance and recognition, possibly influenced by evolving professional standards and the integration of decision support, AI, or analytics tools.

Figure 2: Annual growth trend.



3.2 Top cited journals and categories

Table 2 identifies the top 15 journals contributing to the academic discourse on decision-making competency in project, program, and portfolio management, considering publication count and impact metrics, stand out for their strong JIF and SIF. The International Journal of Managing Projects in Business leads in volume with six publications. At the same time, high-impact journals like the International Journal of Project Management and the Journal of Management in Engineering have consistent Q1 rankings, demonstrating that much of the core research is published in top-notch journals.

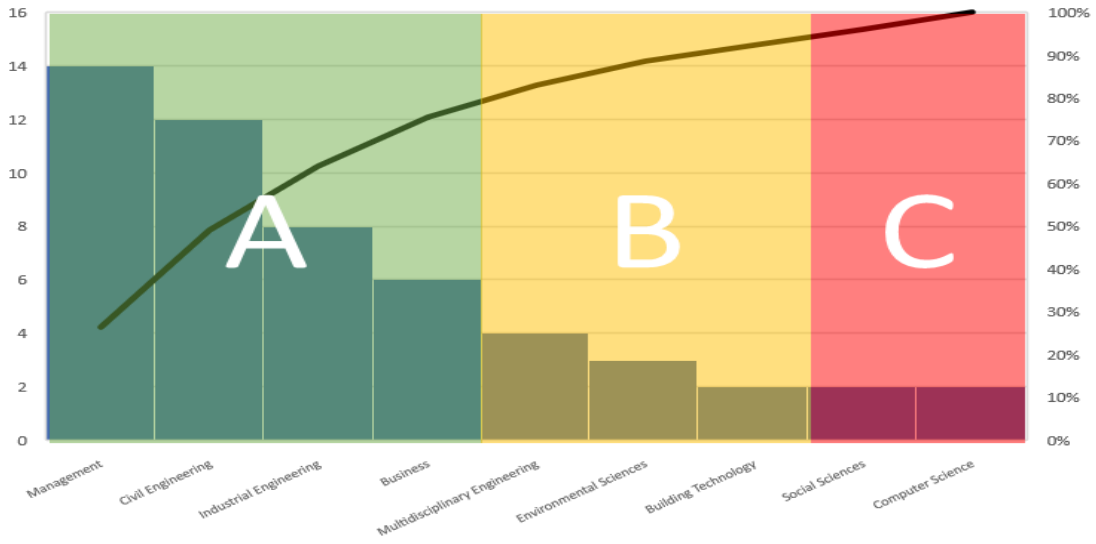
Complementary Figure 3 shows that most research on decision-making competency in project, program, and portfolio management is concentrated in a few core disciplines based on the analysis above. Specifically, the “A” zone, which comprises management, civil engineering, industrial engineering, and business, accounts for approximately 80% of the publications, reinforcing earlier findings that most top journals operate at the intersection of engineering and management sciences (Gebretekle et al., 2023; Robinson et al., 2005; Wang et al., 2003).

Table 2: Top 15 journals in decision-making competency publications.

Journal	Publications	JIF	SIF	JCR Quartil	SJR Quartil
International Journal of Managing Projects in Business	6	2.3	0.7	Q3	Q2
Journal of Management in Engineering	4	5.3	1.6	Q1	Q1
International Journal of Project Management	4	7.4	1.9	Q1	Q1
Sustainability	3	3.3	0.7	Q2	Q1
Journal of Civil Engineering and Management	3	4.3	0.7	Q1	Q1
Journal of Construction Engineering and Management	3	4.1	1.1	Q1	Q1
Project Management Journal	2	5.1	1.1	Q1	Q1
Buildings	2	4.7	1.2	Q1	Q1
Results in Engineering	2	3.1	0.7	Q2	Q1
Built Environment Project and Asset Management	2	6.0	1.2	Q1	Q1
Construction Innovation	2	1.9	0.6	Q2	Q1
Journal of Modern Project Management	2	3.1	0.8	Q2	Q1
International Journal of Engineering Education	2	---	0.2	---	Q4
Journal of Project Management	2	0.7	0.3	Q3	Q3

In contrast, the “B” and “C” zones represent emerging or underrepresented areas such as Environmental Sciences, Multidisciplinary Engineering, Building Technology, Social Sciences, and Computer Science. While their contribution is minor, these fields suggest opportunities for cross-disciplinary exploration, particularly in integrating sustainability concerns, behavioral insights, or AI-driven decision tools (Morin & Romero-Torres, 2024).

Figure 3: Pareto analysis of the top 15 journals categories.



3.3 Co-occurrence analysis by keywords

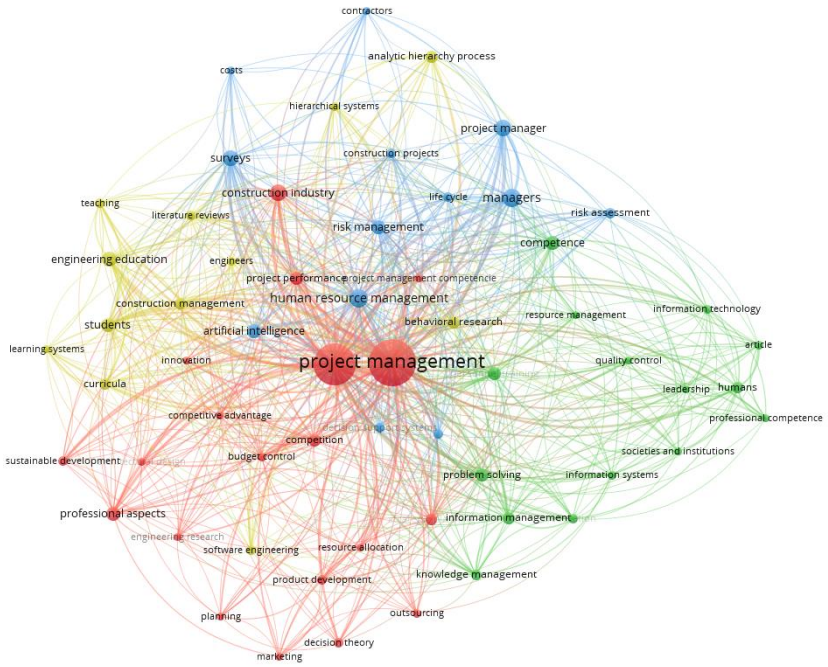
Figure 4 presents the results of the co-occurrence analysis of keywords using bibliometric mapping techniques for the period 2005–2025, aimed at identifying the conceptual structure and thematic clusters within the research on decision-making as a competency in project, program, and portfolio management. A list of 60 keywords met the minimum threshold of 5 occurrences, forming 4 distinct clusters, which integrate strategic, technical, behavioral, and educational themes.

The red cluster is the largest and most central cluster, with terms associated with strategic planning, resource use, competitive advantage, and project control systems. It reflects a quantitative and systemic approach to decision-making, focusing on efficiency, innovation, and performance optimization. The green cluster highlights human and cognitive aspects of decision-making, emphasizing skills, knowledge management, education, and leadership. It is closely tied to competency development and behavioral dimensions, bridging organizational learning with decision performance (Azhar, 2016).

Furthermore, the blue cluster is focused on technical project environments, linking decision-making with engineering practices, risk analysis, AI tools, and support systems. It represents a practical, data-driven approach commonly found in civil and construction project contexts. Finally, the yellow cluster is oriented toward training and academic formation. This cluster reflects an emerging interest in how educational settings contribute to developing decision-making competencies, particularly in engineering disciplines (Colomo-Palacios et al., 2020).

Nevertheless, the lack of program and portfolio management representation in the thematic core suggests a significant opportunity and need for expanding the research scope in these knowledge areas**.** Such omission suggests that the conceptualization and measurement of decision-making competency in higher-order governance structures (programs/portfolios) remain underexplored. This may hinder the formulation of comprehensive competence models that reflect real-world hierarchical complexity.

Figure 4: Co-occurrence analysis map by keywords from 2005 to 2025.



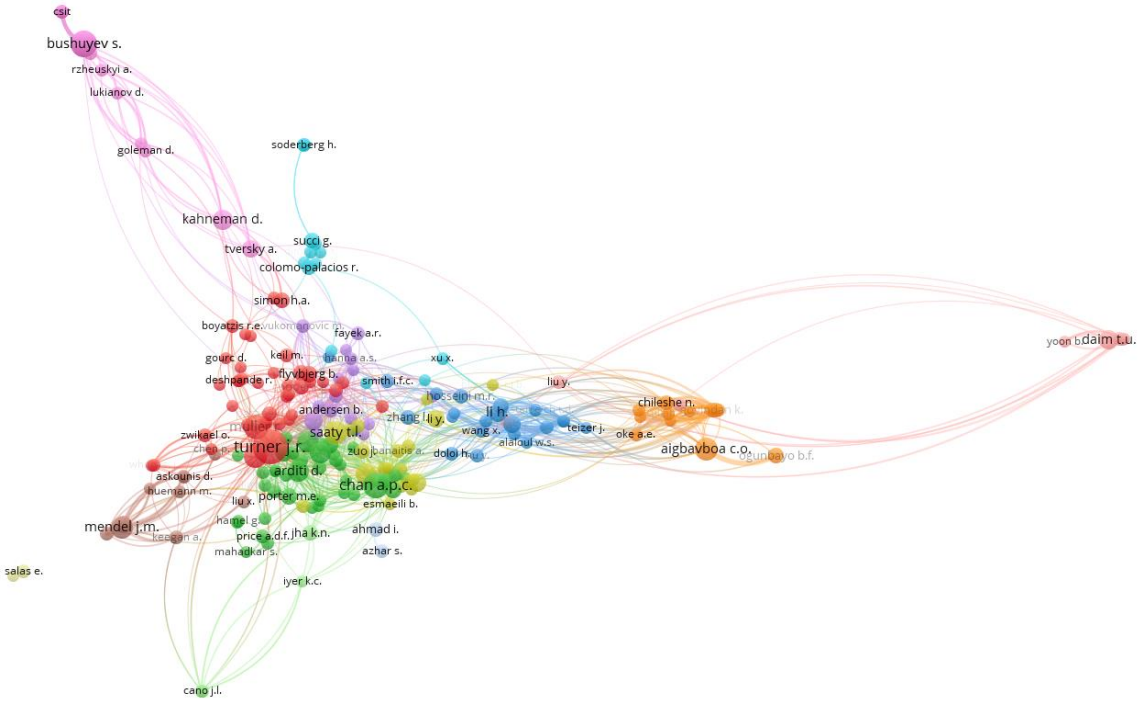
3.4 Co-citation analysis by authors

Figure 5 presents the results of the co-citation analysis of authors for the period 2005–2025, based on a dataset of 199 authors with significant citation impact. This network demonstrates a rich and interdisciplinary foundation**,** combining elements of project management theory**,** decision science, behavioral economics, and engineering**.** The diversity of co-cited authors highlights the fragmented yet complementary nature of the field, where quantitative tools (e.g., AHP, fuzzy systems), cognitive frameworks (e.g., bounded rationality), and practice-based knowledge (e.g., IPMA competency model, PMI frameworks) converge.

In the end, 13 clusters were identified, indicating a highly interconnected knowledge network. These clusters represent intellectual sub-communities structured around competency theory, professional standards, and decision-making under uncertainty, engineering and systems modeling, leadership and human factors in project contexts, innovation, and knowledge management in project settings. Müller and Turner, with several citations and the highest total link strength, are the most influential authors in terms of co-citation. Their work, deeply embedded in project governance and competency frameworks, appears as a core intellectual reference across multiple clusters, connecting theoretical and applied dimensions of project management.

Other highly cited authors include Chan, known for his contributions to construction project performance and stakeholder decision dynamics (Xia et al., 2009). Mendel's work bridges fuzzy logic and decision modeling (Wu & Mendel, 2007), and Müller's work influences project decision-making's leadership and behavioral aspects (Müller & Turner, 2010). Although with lower raw co-citation numbers, Kahneman and Tversky, as well as Simon, seminal authors in behavioral and bounded rationality theories, highlight the epistemological diversity in the field (Simon, 1987; Tversky & Kahneman, 1974). The presence of authors like Saaty, creator of AHP (Saaty, 2008), and Daim, who focused on technology forecasting and decision systems (Daim et al., 2018), shows the integration of multi-criteria and quantitative decision-making models within the literature.

Figure 5: Co-citation analysis map by authors from 2005 to 2025.



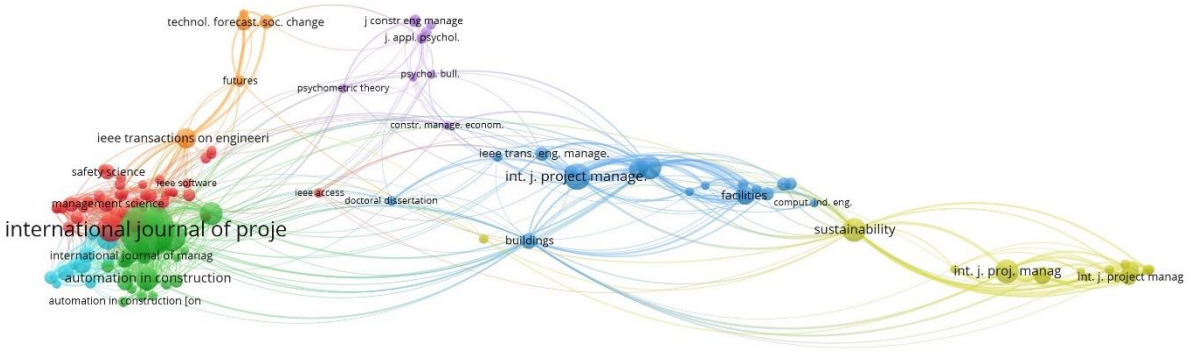
3.5 Co-citation analysis by journal

Figure 6 presents the results of the co-citation analysis of journals, which reveals how frequently pairs of journals are cited across the 2005–2025 dataset. This analysis uncovers the intellectual proximity and disciplinary influence within the research field. A total of 135 journals were included, distributed across 7 thematic clusters. The network's density and interconnectivity confirm that a mature and interdisciplinary journal ecosystem supports research on project, program, and portfolio management decision-making competencies.

The dominance of journals from the construction and engineering project management disciplines suggests a strong technical and systems-oriented influence in decision-making research**.** The International Journal of Project Management (IJPM) is the most dominant source regarding citations and total link strength, confirming its central role as the intellectual hub of decision-making in project management (Isik et al., 2009; Marques et al., 2011).

Other highly co-cited journals include the Journal of Construction Engineering and Management, Construction Management and Economics, Project Management Journal, and International Journal of Project Management. Conversely, the presence of journals like Sustainability and the European Journal of Operational Research reflects the integration of socio-environmental concerns and quantitative decision science as part of their publications.

Figure 6: Co-citation analysis map by journal from 2005 to 2025.

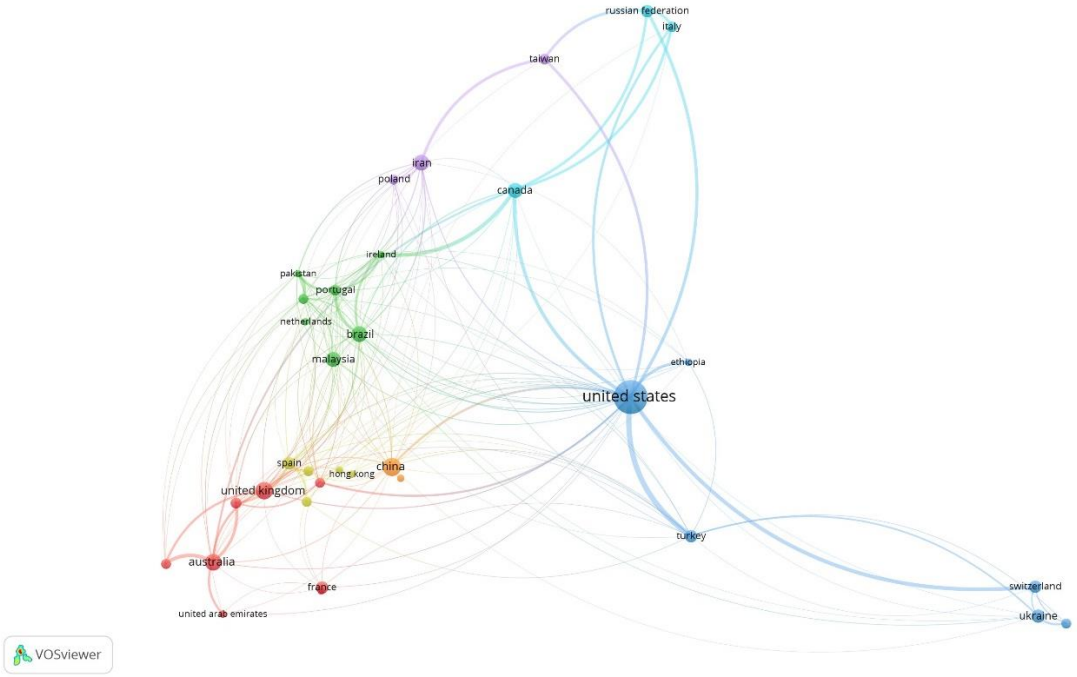


3.6 Bibliographic coupling by country

Figure 7 illustrates the bibliographic coupling network among 34 countries that have contributed to the academic literature on decision-making competency in project, program, and portfolio management between 2005 and 2025. The analysis generated 7 clusters**,** indicating moderate global collaboration and thematic convergence. This map reveals that while North America and parts of Europe lead the field in volume and connectivity, a growing presence exists in Asia, the Middle East, and Africa (Ogunbayo et al., 2024; Yan et al., 2023).

The lack of dominance by any single continental bloc and the presence of multiple moderately connected clusters supports the idea that decision-making as competency in project, program, and portfolio management is an internationally relevant but still decentralized research domain**.** The results indicate a strong intellectual base in the Global North and opportunities for greater collaboration and thematic alignment with underrepresented regions. These insights are especially relevant to developing globally adaptable frameworks for decision-making competencies, highlighting the need for more inclusive and cross-regional research initiatives.

Figure 7: Bibliographic coupling map by country from 2005 to 2025.



4. Conclusions

The present study explores the intellectual landscape, thematic evolution, and conceptual gaps in the literature on decision-making as a competency in project, program, and portfolio management (PPPM**)** from 2005 to 2025**.** Through a systematic bibliometric analysis using Scopus and Web of Science and applying co-occurrence, co-citation, and bibliographic coupling techniques via VOSviewer, this research identified key contributors, disciplinary orientations, thematic clusters, and underexplored areas within the field.

These findings reveal that while decision-making is widely recognized as a core activity in project management, it is underdeveloped as a formal, measurable competency, particularly in program and portfolio contexts. The field remains primarily project-centric, with limited conceptual or methodological integration across levels of governance. This fragmentation presents a significant opportunity for advancing research that bridges competency theory, decision science, and multi-level project governance.

Furthermore, the strong presence of educational keywords suggests increasing attention to how decision-making skills are formed. Nevertheless, the lack of standardization across definitions and models limits their application in professional certification and evaluation systems. In addition, this research is limited by its reliance on two bibliographic databases (Scopus and Web of Science), which, although comprehensive, may not include relevant grey literature or regionally indexed publications.

Finally, future research directions include exploring competency models that explicitly incorporate decision-making at the program and portfolio levels, extending the scope to include non-English and regionally published research**,** especially from underrepresented countries identified in the bibliographic coupling map, investigating more how emerging decision-making tools (e.g., AI-based systems) can be integrated with competency frameworks for more robust professional development.

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Use of Generative Artificial Intelligence

The authors of this article declare that no generative artificial intelligence (AI) or AI-assisted technologies were used to generate content, ideas, or theories during the writing of this article. The authors ensured that human eyes and judgment thoroughly revised the manuscript. The authors fully comprehend that authorship comes with responsibilities and tasks that can only be attributed to and performed by humans. The authors have adhered to these guidelines in preparing this manuscript.

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