Popularity of Multi-Criteria Decision Analysis Methods
A Comprehensive Visibility Ranking

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Abstract: This article presents a comprehensive ranking of the most well-known multi-criteria decision analysis (MCDA) methods, assessed across six dimensions of visibility and usage: general web presence, academic mentions, academic publications, citation impact, reported academic applications, and real-world (industrial and public sector) use cases. Rather than evaluating theoretical performance or methodological robustness, this study focuses on visibility: the extent to which an MCDA method has achieved prominence through public display, name recognition, effective dissemination, and perceived distinctiveness. The analysis indicates that method popularity correlates with narrative appeal, acronym memorability, and early adoption effects. AHP emerges as the most dominant method across all six dimensions, followed by TOPSIS, PROMÉTHÉE and ÉLECTRE. Newer methods such as BWM demonstrate rapid growth, particularly when supported by purpose-built software tools. By contrast, established methods such as MACBETH, while academically respected, exhibit more niche or regionally concentrated use.

Keywords: Multi-Criteria Decision Analysis, Popularity, Visibility Ranking, Academic and Industrial Use

1. Introduction

Multi-criteria decision analysis (MCDA) methods help decision-makers evaluate options against multiple criteria. This study presents a comprehensive ranking of popular MCDA methods, grouped by method families (variants consolidated), and ranks them based on various visibility metrics. We consider six perspectives: general web mentions, academic mentions, academic articles, academic citations, reported academic use cases, and reported industrial use cases. Each method's placement is justified with data from a wide range of sources, including but not limited to recent literature (e.g. systematic reviews, bibliometric studies), extensive web searches, academic search sites such as Scopus and Google Scholar (although the latter sometimes inflates citation numbers), publisher webpages, and reported real-world applications.

The methods in this article were found through the sources mentioned above because of their spread and reach. Those at the top of the lists are the most commonly used methods in decision analysis by a relatively wide margin. Their usage and citation patterns suggest that method popularity often reflects branding success. The prominence of certain methods appears to be driven by factors such as catchy acronyms, compelling narratives, and academic network effects. This was noted already by Belton and Stewart (2002). Additionally, being early to the methods scene has afforded some approaches a lasting advantage, allowing them to establish a dominant position before competing approaches emerged, further reinforced by cumulative citation effects. In classic marketing theory, users are locked in to a product or a service by branding and narratives, creating a mental barrier to switching. The proliferation of some MCDA methods resembles a form of implicit marketing, where name recognition and earlier citations

heavily influence uptake. While these high-profile methods promote structured decision making, their branding leverage some of the very cognitive biases they aim to mitigate, such as the availability heuristic and affective association, both well-known from descriptive decision theory and ironically at play in the meta-selection of the methods themselves. A recent book (Danielson, 2023) discusses the impact of brand names and perceived USPs (unique selling points) on methodological choices within MCDA, both for researchers and practitioners. This article is a follow-up to the book, looking at brands and visibility in more detail.

2. Background

MCDA encompasses a family of formal methodologies designed to support decision making in contexts involving multiple, often conflicting, criteria. Originating in response to the inadequacy of single-criterion optimisation frameworks for real-world problems, MCDA spans a broad range of applications (Belton & Stewart, 2002; Greco et al., 2016). While differing in structure and computational approach, all MCDA methods share the central objective of enabling a decision-maker to navigate trade-offs among incommensurate values in a transparent, structured, and rationally defensible manner. The fundamental challenge addressed by MCDA is that preferences over alternatives cannot be represented as a function of a single attribute without loss of crucial evaluative nuance. Alternatives may differ in cost, risk, efficiency, equity, sustainability, and qualitative factors such as political acceptability, none of which admit to aggregation under a single cardinal scale without prescriptive assumptions. MCDA therefore constructs procedures that allow such dimensions to be weighted, synthesised, and compared in a way that reflects the decision-maker's priorities (Keeney & Raiffa, 1993).

The intellectual foundations of MCDA draw from disparate traditions, notably decision theory, operational research, and utility theory. The axiomatic structure of rational choice, as formalised in the von Neumann-Morgenstern and Savage frameworks, provides the baseline for prescriptive coherence in many MCDA methods, especially those that aim to elicit preferences in a cardinal and compensatory manner. Yet MCDA departs from strict Bayesian or utility-maximising frameworks by allowing for partial comparability, non-compensatory judgements, and procedures that do not necessarily presuppose completeness or transitivity in the preference relation (Danielson, 2023). In particular, methods such as ÉLECTRE (Benayoun & Sussmann, 1966) and PROMÉTHÉE (Brans, 1982) introduced the notion of outranking, in which alternatives may be compared based on concordance and discordance rather than strict utility dominance. These methods admit intransitivities and incomparabilities by design, in an effort to reflect the epistemic or prescriptive limitations of real-world judgements. Other approaches, notably the Analytic Hierarchy Process (Saaty, 1977), rely on pairwise comparisons to derive ratio-scale priorities from qualitative judgements, albeit at the cost of imposing completeness and encouraging full comparability even in contexts where such judgements may be context-dependent or unstable.

A central distinction within MCDA methodology lies between compensatory and non-compensatory approaches. Compensatory methods, such as value function models and weighted summation techniques, allow trade-offs between criteria, thereby granting high performance on one criterion the capacity to offset poor performance on another (Keeney & Raiffa, 1993). This assumption aligns with classical economic models of rational choice but has been criticised in domains where moral, ethical, or operational constraints render certain thresholds non-negotiable. Non-compensatory methods, on the other hand, often reflect the view that some criteria represent hard constraints or categorical imperatives; such models are frequently employed in

public sector decision making or in participatory frameworks where stakeholder values are diverse and not easily commensurable (Belton & Stewart, 2002). For example, ÉLECTRE employs veto thresholds that can block an alternative from being selected despite high performance in most other respects. The theoretical divergence between these paradigms reflects a common misunderstanding in decision analysis: whether decision support tools should model an idealised rational agent or not. The actual question is whether the computational core should be conceptually and theoretically sound or be confounded with behavioural process details. The answer is that an outer MCDM layer (with '**M**' as in decision making, a wider concept than '**A**' as in analysis) should address the cognitive and institutional complexity of actual decision environments.

The differences in philosophy and the different brandings of methods should influence the elicitation processes, the presentation formats, group decision mechanisms, and much more, as long as the methods stand on established scientific ground. Substituting a since-long well-established and sound axiomatic core for homemade calculi only leads to questionable results and opaqueness. As does mixing descriptive and psychological factors with an axiomatically grounded computational core; the former should belong only to an outer MCDM layer. The need to stand out by branding and perceived uniqueness should be satisfied in other ways than by a scientifically faulty core, ways less detrimental to the MCDA field (Danielson, 2023).

MCDA is not a monolithic field; rather, it is defined by a heterogeneous landscape of methods, each characterised by its own assumptions about preferences, aggregation, and the nature of acceptable trade-offs. In the deterministic domain, key methods include weighted sum (SAW) models such as SMART but also TOPSIS, VIKOR, ÉLECTRE, PROMÉTHÉE and AHP. Each of these methods introduces a unique mechanism for combining scores across criteria and resolving conflicts between alternatives (Greco et al., 2016; Triantaphyllou, 2000). For instance, TOPSIS constructs a geometric compromise between an ideal and an anti-ideal solution in normalised criterion space, while VIKOR employs a regret-based ranking by evaluating the closeness of alternatives to the best values on each criterion, adjusted by maximum and average deviations. PROMÉTHÉE methods generate positive and negative outranking flows by aggregating preference functions defined for each criterion, facilitating both partial (PROMÉTHÉE I) and complete (PROMÉTHÉE II) rankings (Brans & Mareschal, as cited in Greco et al., 2016). These methods are typically applied under conditions of certainty, where performance evaluations are treated as known or deterministically estimated.

Probabilistic or fuzzy extensions of MCDA methods have been developed to address the reality that information is often uncertain, imprecise, or incomplete. Fuzzy MCDA approaches use linguistic variables and membership functions to express vague preferences, whereas stochastic MCDA introduces probability distributions over performance outcomes (Triantaphyllou, 2000). Such variants complicate both the computation and interpretation of results, raising questions about robustness, elicitation procedures, and the cognitive load placed on decision-makers. Nevertheless, their development reflects a broader commitment within MCDA to capturing the inherent uncertainty and ambiguity of complex decision problems, especially those involving long time horizons, environmental uncertainty, or contested value frameworks. However, such developments have had little impact on the visibility ranking lists, which are dominated by methods being more than 40 years old.

MCDA, in its wider MCDM guise, aims not merely to rank alternatives but to support decision-makers in structuring their problem, clarifying values, and justifying outcomes (Howard & Abbas, 2015). This involves not only computational output but also the design of decision

processes that are inclusive, iterative, and communicative. Several MCDM methodologies have therefore been embedded into participatory decision support systems, especially in areas such as regional planning, public health prioritisation, and environmental impact assessment. The adoption of MCDM in these settings is driven not only by its analytical rigour but also by its ability to foster dialogue among stakeholders with divergent perspectives and conflicting objectives. In this respect, MCDA operates as both a prescriptive and procedural framework, enabling decisions that are better informed, more transparent, and, ideally, more legitimate.

The formal properties of MCDA methods such as monotonicity, invariance, dominance preservation, and rank reversibility have been the subject of extensive theoretical scrutiny (Danielson, 2023; Triantaphyllou, 2000). Desiderata for rationality and consistency have been proposed to evaluate and compare the prescriptive adequacy of competing methods. For example, the independence of irrelevant alternatives is violated by several well-known ranking-based methods under certain conditions (Danielson, 2023). Similarly, weight sensitivity and scale dependence are real concerns: methods that rely on vector normalisation or ratio scales may produce outcomes that shift under rescaling, raising questions about interpretability and robustness.

3. Separate Visibility Rankings

The methodological literature has increasingly emphasised the need for meta-perspectives for method selection. These include considerations of computational tractability, transparency, ease of use, stakeholder acceptability, and theoretical coherence (Greco et al., 2016). Indeed, there is no universally preferred MCDA method. Rather, method selection must be grounded in an understanding of the decision context, the nature of the criteria and preferences involved, and the institutional or stakeholder constraints under which the analysis will be interpreted and implemented. Given those insights on method selection, this article examines the most popular MCDA brands from six perspectives: web presence, academic literature, publication count, citations, academic use cases, and industrial use cases (including public sector), continuing in Section 4 with a total ranking synthesised from the six different perspectives investigated.

This section lists the top ten methods found in each of the six perspectives. The lists were collected separately. Thus, it is not the same ten methods appearing on every list, reflecting different strengths and weaknesses among the methods. However, the number one method is always the same on all six lists, making AHP an undisputed top of the form in the aggregated list in Section 4. Many lists have “others” as the last entry, indicating that it was close between several methods at the bottom end of the respective lists.

3.1 General Web Mentions (Presence on the Web)

1. AHP: AHP has the strongest web presence. It is widely referenced in general articles, forums, and decision-making tutorials. Its use in diverse fields and the availability of simple explanations and case examples have led to a broad online footprint.

2. TOPSIS: TOPSIS also enjoys high web visibility. Many engineering and data science websites discuss TOPSIS for practical decision problems (e.g. as a technique in Excel or Python libraries). Its rather straightforward concept (ideal and nadir solutions) makes it a common example method on the web.

3. Weighted Scoring (SMART/SAW): The generic approach of weighted scoring is very common in online content (often presented as “priority matrices” or “scorecards”). Although the

specific terms SMART or SAW might not always be used, the method itself is essentially everywhere in decision-making contexts. This gives it a high implicit web presence.

4. PROMÉTHÉE: Moderate web presence. Outside academic and professional circles, PROMÉTHÉE is less mentioned, but it has dedicated sites (e.g. for PROMÉTHÉE software and tutorials) and appears in some specialised discussions (especially in environmental decision forums). It also has a dedicated conference, PROMÉTHÉE Days, with notable visibility.

5. ÉLECTRE: Similar to PROMÉTHÉE, ÉLECTRE has a niche web presence. It is well-known among practitioners in Europe, especially in French-speaking areas. Some websites display and discuss ÉLECTRE, but it is not as ubiquitous in general decision-making discussions.

6. VIKOR: Lower general web mentions, mostly found on academic or technical sites. It is less likely to be encountered by non-specialists browsing the web compared to the above methods. Most visible in Eastern Europe.

7. ANP: Low web profile. ANP is typically discussed in conjunction with AHP. It appears mainly on academic pages or dedicated forums like ResearchGate.

8. PAPRIKA: The web presence of PAPRIKA comes through 1000minds' own website and some news articles about its software. It is rather visible due to the 1000minds marketing (e.g. case studies, client testimonials) but is not a well-known name outside those contexts.

9. BWM: Emerging presence. BWM is beginning to appear on webpages aimed at researchers, but it is still largely confined to academic discussions online. Its presence is on the rise, though.

10. MACBETH: It has a minimal general web presence. Usually found only by targeted search or on academic sites.

3.2 Academic Mentions (Presence in Academic Literature)

1. AHP: Absolutely dominant in academic mentions. It appears in titles, abstracts and keywords of thousands of publications, more than any other MCDA method. Essentially every literature review of MCDA notes AHP's prevalence.

2. TOPSIS: Second-most mentioned in academic contexts. TOPSIS is frequently included in comparative studies, used as a baseline, or mentioned in methodology sections across diverse research fields.

3. VIKOR: High academic mention frequency, especially in the last two decades. Many papers, particularly from Asia and Eastern Europe, include VIKOR either as a primary method or in comparisons, giving it a strong presence in academic databases.

4. PROMÉTHÉE: Also frequently mentioned, especially in European journals and OR literature. PROMÉTHÉE often appears in multi-method comparisons and has a long history of being cited in MCDA research.

5. ÉLECTRE: Widely cited in older and theoretical MCDA literature. Almost any discussion of outranking methods in academia mentions ÉLECTRE since it founded the outranking or French school of MCDA in 1966, so it continues to show up a lot in literature, though new applications are fewer than for the methods ranked higher.

6. ANP: Fairly frequently mentioned in academic work, often alongside AHP. Researchers discuss ANP when interdependence is an issue, so it has a solid mention count in fields like supply chain, project selection, etc.

7. SMART/SAW: While not always labelled SMART or SAW, the concept is frequently mentioned as a baseline or in general discussions of MAUT-based MCDA. Academic papers often reference the idea of a simple additive weighting method (SAW) as a point of comparison. This means the method family maintains a consistent, albeit somewhat background, presence.

8. BWM: Rapidly growing academic mentions. Since 2015, BWM has been mentioned in an expanding array of papers. It is not uncommon to read that BWM was used to determine weights in recent decision-making studies, increasing its presence.

9. MACBETH: MACBETH is less frequently mentioned. It might be cited in discussions of value functions.

10. Others (COPRAS, etc.): These are even less frequently mentioned. COPRAS/WASPAS appear in niche engineering decision papers (Zavadskas et al., 2019). PAPRIKA is rather seldom mentioned in journal articles.

3.3 Academic Papers (Publication Count)

The ranking list by publication count aligns closely with the "academic mentions" ranking above. Notably, AHP, TOPSIS, and VIKOR form the top trio in publication volume over past decades. While the VIKOR method has existed since 1980, it was not given its current acronym until 1998, which explains its delayed rise in publication and citation counts. As with all methods, having a clearly recognisable name plays an important role in uptake. Section 3.3 is based on data from Scopus, Google Scholar, publisher websites, and a study by Basílio et al. (2022).

1. AHP: Stands at the top with the largest number of dedicated papers. A recent count found 6835 papers in scholarly databases involving AHP, the highest of any single MCDA method. This includes methodological papers and a vast array of applications over 40+ years.

2. TOPSIS: Over 4900 papers in Web of Science/Scopus involve TOPSIS. This is the second-highest count, confirming TOPSIS as a favourite method in research publications.

3. VIKOR: Around 1500 papers. Notably, VIKOR's count, despite rising to fame later, surpasses many older methods, reflecting its visibility and popularity from 2000 and onwards.

4. PROMÉTHÉE: Approximately 1400 papers. PROMÉTHÉE's publication count has been overtaken by VIKOR's, but still indicating a large volume of research using or studying PROMÉTHÉE (Baykasoglu et al., 2022).

5. ANP: About 1300 papers. ANP has a substantial publication count, underscoring that many studies required network-based decision modelling.

6. ÉLECTRE: Over 1000 papers. A significant count, but given ÉLECTRE's many variants, plus still being a baseline outranking method in many studies, it was expected to place higher.

7. SMART/SAW: Around 400 papers explicitly mention using SMART/SAW. This number is modest since many use them without using their names, making a truer estimate hard to make.

8. TODIM: Around 300 papers.

9. COPRAS: Less than 300 papers.

10. Others: Include **BWM** and **WASPAS**, for example, which have smaller counts.

3.4 Academic Citations (Influence via References)

1. AHP: AHP is the most cited MCDA methodology. Saaty's original works have accumulated an enormous number of citations over time. His 1980 book alone has received almost 60,000 citations, an indisputable record for MCDA (although erroneously inflated to over 100,000 by Google Scholar). Summing across all AHP-related papers, the citation count runs into several hundred thousand. This reflects both AHP's first-mover advantage and its widespread use.

2. TOPSIS: TOPSIS also has a high citation impact. TOPSIS has on the order of 150,000 citations in total across over 7000 publications, which underscores a large influence. The initial book on TOPSIS by Hwang and Yoon (1981) has over 3000 citations.

3. PROMÉTHÉE: PROMÉTHÉE's key publications (Brans and co-authors in 1984/1986) have several thousand citations combined. While an exact total is hard to estimate because citations are spread over multiple variant papers, PROMÉTHÉE is the highest cited in the French outranking category.

4. ÉLECTRE: Although less cited than PROMÉTHÉE, it still has a high count due to its long-standing position in the field and its legacy as the grandparent of all outranking methods as well as an intellectual parent of both TOPSIS and VIKOR.

5. VIKOR: The main VIKOR paper (Opricović & Tzeng, 2004) is well-cited with over 5000 citations. Overall, VIKOR's body of citations has grown quickly in recent years. It may rival or even surpass PROMÉTHÉE in upcoming citation rates, but in total since its inception it is behind due to later fame, being discovered much later by the academic community, even though it is in fact older than PROMÉTHÉE.

6. ANP: Saaty's ANP book (1996) and papers are highly cited (thousands of citations), given it is often referenced alongside AHP. The influence of ANP in citations is strong. Although many fewer people apply it compared to AHP, many still cite it in methodology discussions.

7. SMART/SAW: The citations here are diffuse. The original SMART paper (Edwards, 1977) and related works have been cited much in decision analysis literature, but far from the level of AHP or TOPSIS top papers. Still, because virtually every MCDA textbook or review mentions additive weighting in some form, the cumulative citation footprint is significant but spread across many sources.

8. BWM: Remarkably high impact for a new method. The 2015 BWM main paper has over 4000 citations (Rezaei, 2015). This indicates that in less than a decade, BWM's citation count has exceeded those of many older methods' seminal papers. BWM's overall citations (including follow-up papers) are quickly climbing, making it one of the most influential newer MCDA brands.

9. MACBETH: Has a moderate citation count. Key papers by Bana e Costa in the mid-1990s and early 2000s have a number of hundred citations each. Overall, MACBETH's influence is respectable but not close to the very top tier.

10. Others: The PAPRIKA method paper from 2008 and a health economics paper from 2013 have on the order of a hundred citations each, i.e. a relatively low count. However, some studies using PAPRIKA cite the 1000minds tool. If those are counted, the number would reach several hundred citations in total, which is still modest compared to methods higher up on the list. Other

remaining methods including COPRAS, WASPAS and TODIM have lower citation totals, generally reflecting their niche usage. For instance, COPRAS' introduction paper has been cited on the order of a few hundred times.

3.5 Academic Use Cases (Application Studies in Literature)

1. AHP: AHP has been applied in an unparalleled number of academic case studies. From site selection problems to medical decision making, thousands of academic papers report using AHP as the main technique. Its brand recognition means it appears in case studies across all disciplines. AHP has, by far, the most applications in the literature and has been around almost the longest (46 years in 2023).

2. TOPSIS: TOPSIS is the second-most common choice for applied studies. Hundreds of academic case studies (in engineering, management, environmental science, etc.) utilise TOPSIS to rank alternatives. It is especially prevalent in applied engineering journals due to its computational ease. TOPSIS is for some reason the method seemingly most used in computer science-related MCDA applications.

3. PROMÉTHÉE: This method has a very large number of academic use cases. Reviews of PROMÉTHÉE usage show a large number of papers related to environmental and sustainability topics (Behzadian et al., 2010). PROMÉTHÉE's many variants allow it to be adapted to different contexts, and numerous studies report its use for problems like watershed management, supplier ranking, etc.

4. VIKOR: VIKOR has become a go-to method in many applied papers since the 2000s. Academic use cases include disaster management, supplier selection, and policy evaluation among others. Its share of use in academic case studies in one domain-specific review (COVID-19 decisions) was third after AHP and TOPSIS (Sotoudeh-Anvari, 2022), constituting an example of VIKOR quite frequently featuring in recent case-study papers.

5. ÉLECTRE: Over the decades, many academic case studies, especially in the 1970s–1990s, employed ÉLECTRE for public and urban planning decisions. Although its frequency in recent case studies is lower, it still appears in some modern applications like water resource planning or transportation project ranking.

6. ANP: While significantly fewer in number than AHP case studies, ANP use cases are well-documented in academic literature, often in high-impact areas like supply chain risk where criteria influence each other.

7. BWM: Since 2015, a growing number of academic case studies have reported using BWM for criteria weighting in real problems (e.g. evaluating sustainable suppliers, selecting logistics strategies). The count of distinct use-case papers is rapidly increasing each year, reflecting researchers' enthusiasm for applying BWM. It is becoming common in journals related to operations and sustainability to see BWM in the methodology.

8. MACBETH: Several notable academic case studies use MACBETH (e.g. evaluating infrastructure projects, defining strategic priorities for organisations). The volume is not high compared to AHP or TOPSIS, but the use cases are well-documented and often involve decision-makers in the process, owing to MACBETH's interactive nature.

9. PAPRIKA: Many academic *application* papers (especially in health economics and prioritisation research) use the PAPRIKA method via 1000minds. For example, studies have used it to prioritise healthcare interventions, rank policy options, or in conjoint analysis surveys. The

company claims 370+ research publications using it, which, while being a mere fraction of AHP's total, is still substantial. These use cases are often in specialised journals or conference proceedings.

10. Others (COPRAS, WASPAS, TODIM, etc.): These methods collectively account for a fair number of academic case studies, but each individually has a limited set. COPRAS and WASPAS, for instance, appear in construction engineering case studies; TODIM is used in a handful of Brazilian case examples (like selecting investments with a risk attitude element). SWARA is sometimes reported as the weighting method in case studies alongside another ranking method. Each of these is far less common as the primary method in academic applications than the top methods.

3.6 Industrial Use Cases (Real-World Projects)

1. AHP: AHP is the most widely used MCDA method in real-world decision making. It has been adopted by countless organisations worldwide. Real industrial use cases abound: companies use AHP for vendor selection, resource allocation, strategic planning, etc., and public agencies use it for policy and infrastructure decisions. Its popularity is due to its seemingly logical structure and the availability of user-friendly software. Being ubiquitous, AHP has been used by everything from governments for project prioritisation, over tech companies for product feature decisions, to military and healthcare institutions for complex choices. It is often stated that AHP is used in many fields including business, government, engineering, healthcare and education, which is borne out by practical examples.

2. Weighted Scoring (SMART/SAW): In practice, simple weighted scoring (sometimes without a formal name) is extremely common. Many MCDA-like analyses in industry are done via spreadsheets where criteria are weighted and scored, i.e. essentially the SAW approach. This method is inherent in numerous commercial decision processes (from hiring matrices to product feature prioritisation in tech companies). Because it requires no specialised software or training, it is the default in many organisations. Thus, while one might not hear the acronym SMART in boardroom presentations, the method itself is arguably the second-most practiced in industry (after or perhaps even on par with AHP) in various forms.

3. PAPRIKA: Thanks to the 1000minds software, PAPRIKA has a strong portfolio of industrial use. According to the company, hundreds of organisations have used it for decision making and preference analysis. The ease of an online tool has driven adoption by practitioners who might not be MCDA experts. This gives PAPRIKA a much higher real-world usage than its academic paper count suggests.

4. PROMÉTHÉE: PROMÉTHÉE has been applied in real-world settings, though more concentrated in certain sectors. There are software implementations (Visual PROMÉTHÉE) that have been applied in consulting projects in areas like logistics, environmental management, and finance. Some European government bodies and utility companies have used PROMÉTHÉE for project ranking and policy analysis. Its use is notable in cases where decision or OR (operational research) specialists are involved. Still, compared to AHP, its industry penetration is lower and often regional (French-speaking countries foremost, but also across Europe).

5. TOPSIS: Many industries use techniques akin to TOPSIS without explicitly labelling them. However, there are documented instances of TOPSIS in practice, e.g. manufacturing firms using TOPSIS to rank supplier performance, or telecom companies applying it for site selection. Also, some decision support systems include TOPSIS as an option. Its straightforward nature

means some practitioners implement it ad hoc for multi-criteria rankings (especially in countries where engineers are familiar with it from university). Overall, its direct industrial use is moderate but present.

6. MACBETH: MACBETH has been used in some organisational decision making, particularly facilitated by consultants or academics trained in the method. For example, it has been applied in municipalities for budget decisions and by defence agencies for evaluating policy options (the method's developers have themselves reported such cases in literature). While not mainstream, it has a track record of real decision support, especially in group settings requiring consensus.

7. ÉLECTRE: Historically, ÉLECTRE was used in governmental decision processes in France such as water management or transportation planning in the 1970s–1980s. In modern times, it is less commonly employed in the real world. Those who need outranking often opt for PROMÉTHÉE or other more modern methods instead. Still, some consulting cases in environmental management have used ÉLECTRE, and some defence and aerospace evaluations mention using ÉLECTRE for ranking alternatives when a purely outranking approach is desired. Its current industrial use is limited and mostly confined to expert and fandom circles.

8. ANP: A few specialised cases of ANP in industry exist. For instance, Boeing reportedly used ANP for prioritising engineering design requirements, and some oil and gas companies have used it for project selection. These cases are driven by collaboration with MCDA experts. ANP's complexity has prevented widespread casual use, but in high-stakes, interrelated decisions, some organisations have invested in ANP analyses.

9. BWM: Being new, BWM's use in industry is still emerging. However, early signs show some consulting firms and forward-thinking companies experimenting with BWM because of its ability to elicit weights. As more user-friendly implementations appear, BWM is expected to gain traction. Currently, most real use cases are in pilot projects or decisions guided by researchers (e.g. a company working with a university to apply BWM to a purchasing decision).

10. Others: Most other methods (COPRAS, WASPAS, TODIM, etc.) have virtually no footprint in everyday industry use. They are largely confined to academia or perhaps a small cluster of organisations or the country where the method was developed.

4. Total Visibility Ranking

This section lists the top 15 methods ranked by an aggregated total. The total visibility ranking list is ordered by overall popularity considering all six perspectives. It is based on the rankings for each individual criterion in Section 3, which highlights how the methods compare on various individual metrics. The total list has the same format as the separate topic lists. It presents 15 entries in ranking order with the highest ranked according to the aggregated total visibility by a qualitative averaging method. For each entry, some of the deciding factors are mentioned.

1. AHP (Analytic Hierarchy Process). AHP is by far the most widely used MCDA method across the board. Developed by Saaty (1977), it structures decisions into hierarchies and uses pairwise comparisons to derive priority weights. **Web presence:** AHP has a massive general web footprint, with its well-visited Wikipedia article and innumerable tutorials, tools, and case studies online. **Academic prevalence:** It dominates academic literature with the highest presence of any MCDA method. It is the top method in publication count globally. The seminal AHP book by Saaty (1980) alone has over 60,000 citations, reflecting its enormous influence.

Use cases: AHP appears in virtually every application domain (business, government, engineering, healthcare, education, etc.). In industry, AHP is frequently used for complex decision making and is supported by commercial software (e.g. Expert Choice). It is employed by organisations for project prioritisation, vendor selection, policy planning and much more.

2. TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution). TOPSIS (Hwang & Yoon, 1981) is a popular distance-based ranking technique. **Web presence:** It is well-represented online through examples in engineering and data science communities (e.g. many "how-to" guides on decision matrices). **Academic prevalence:** It consistently ranks just behind AHP. About 4600 publications in Web of Science/Scopus mention TOPSIS. Bibliometric analyses place TOPSIS as the second most-used MCDA method globally. **Use cases:** TOPSIS has broad appeal because of its intuitive concept of an "ideal" solution that somehow has caught on as a USP (unique selling point). It is applied in numerous domains. Industrial uptake exists where a simple computational method is needed for ranking alternatives; TOPSIS is often used in decision-support tools and by analysts (not least in engineering companies) for tasks like supplier selection or project ranking.

3. PROMÉTHÉE (Preference Ranking Organization METHod for Enrichment of Evaluations). PROMÉTHÉE (Brans, 1982) is a family of outranking methods. **Web presence:** It has a moderate web presence, being known in OR/MS circles with dedicated software (Visual PROMÉTHÉE, D-Sight, etc.) and a well-visited Wikipedia entry. **Academic prevalence:** PROMÉTHÉE is the most popular outranking approach. Approximately 1,400 academic publications involve PROMÉTHÉE. In global rankings, it is always one of the top five methods used. **Use cases:** PROMÉTHÉE has been applied in diverse fields including business, finance, hydrology, environmental management, logistics and more. Its strength in handling preference flows makes it popular for environmental and sustainability decision problems. While not as ubiquitous in industry as AHP, it has seen use in practical contexts via consulting projects and decision support systems. The geometrical analysis tool GAIA is not included here.

4. ÉLECTRE (ÉLimination Et Choix Traduisant la REalité). ÉLECTRE (Benayoun & Sussmann, 1966) is a family of outranking methods focusing on "choosing" and "ranking" via pairwise dominance and concordance/discordance tests. **Web presence:** Moderate, less than AHP or TOPSIS. It is very well-known in specialised MCDA contexts, especially in Europe. **Academic prevalence:** Across all ÉLECTRE variants (I, II, III, IV, etc.), it appears in roughly 1000 academic publications. ÉLECTRE is a classical outranking approach, though its usage in recent years has been overtaken in that category by PROMÉTHÉE. **Use cases:** Historically, ÉLECTRE was employed in European government and infrastructure decision projects (e.g. energy, transportation planning) and is well-known in theoretical MCDA literature. Many academic case studies (urban planning, public resource management, etc.) have used ÉLECTRE. In industry, its adoption has been limited; it is more common in public sector or policy analyses than in private companies. Nonetheless, it remains an important academic method taught in decision analysis, and some decision support systems (especially in France) have implemented ÉLECTRE for multi-criteria evaluations.

5. VIKOR (VlseKriterijumska Optimizacija i kompromisno Resenje). VIKOR (Opricović & Tzeng, 2004) is a compromise-ranking method emphasising closeness to an ideal solution. **Web presence:** Primarily discussed in academic and technical sources; modest general web mentions. **Academic prevalence:** VIKOR's academic footprint grew rapidly in the 2000s. It appears in around 1500 publications, making it one of the top three methods in recent decades. In international publications, VIKOR is ranked only after AHP and TOPSIS in use frequency.

Use cases: VIKOR is popular in scholarly research for engineering, manufacturing, and supply chain problems that seek a "compromise" solution. It often appears alongside TOPSIS for comparative studies. Industrial use is much less common. VIKOR tends to be used by researchers and in analytical evaluations rather than as an industry tool. Still, it has been applied to some practical problems (e.g. selecting project sites, evaluating policies) in collaboration with domain experts, especially in Asia and Eastern Europe where it originated. However, it is due to its absence in the industrial use ranking list that it loses fourth place overall to ÉLECTRE.

6. ANP (Analytic Network Process). ANP (Saaty, 1996) generalises AHP to allow a network of relationships (interdependencies) instead of a strict hierarchy. **Web presence:** Moderate, often discussed in the context of AHP (some websites and forums cover it as an advanced Saaty method). **Academic prevalence:** ANP is frequently studied, with over 1300 publications. It often appears just behind the top four methods in bibliometric rankings. Its foundational literature (Saaty's work) is highly cited, though overall usage is much lower than AHP due to its complexity. **Use cases:** Academically, ANP is applied where criteria and alternatives have feedback influences (e.g. policy analysis with interrelated factors). It is one of the cornerstone methods in the American school of MCDA. Industrial adoption is niche: some organisations use ANP for strategic decisions (often via software like SuperDecisions), but the need to perform many pairwise comparisons in a network deters widespread commercial use. It remains primarily an academic teaching object and an expert tool for complex decision problems.

7. Weighted Sum/Rating Techniques: SMART and variants (SMARTS/ER, SAW, WSM). These refer to the family of methods where criteria are weighted (via direct rating or simple procedures) and alternative scores are summed. It includes SMART (Simple Multi-Attribute Rating Technique) by Edwards (1977), its variants like SMARTS or SMARTER, as well as the closely related SAW (Simple Additive Weighting) or WSM (Weighted Sum Model) families. **Web presence:** High in concept, but low under specific names. The approach of weighted scoring is ubiquitous on the web (e.g. countless "decision matrix" or "pros-cons weighting" examples. However, terms like "SMART" or "SAW" are less often explicitly cited online compared to AHP or TOPSIS. **Academic prevalence:** Few papers focus on these as novel methods. Nonetheless, weighted scoring is the de facto baseline in many studies (often used but not always named). For instance, SAW is noted as a "simple, weight-based sum method closest to daily life use", underscoring its practical importance. **Use cases:** This category is extremely common in practice, arguably the most widely applied approach in industry for multi-criteria decisions, due to its simplicity. Many companies and government bodies use weighted scorecards or utility scoring (which is essentially SMART/SAW) for decision making without needing specialised software. Academically, SMART/SAW often appears as a benchmark to compare more complex MCDA methods. In industrial settings, when decisions need to be made transparently, a weighted criteria scoring (sometimes under the guise of "ranked voting" or "point systems") is frequently used.

8. MACBETH (Measuring Attractiveness by a Categorical-Based Evaluation TEchnique). MACBETH (Bana e Costa & Vansnick, 1994) is a pairwise-comparison method that uses qualitative judgements ("difference in attractiveness" categories) to derive numerical scores. **Web presence:** Niche, primarily known through the software M-MACBETH and academic references. **Academic prevalence:** Less than 200 publications explicitly involve MACBETH, reflecting a moderate academic following. It is not as widely cited as the top methods, but it has a dedicated community of practice in decision analysis. **Use cases:** MACBETH is used in academia and some public-sector decisions to derive value functions when decision-makers find

quantitative pairwise ratios difficult. It has been applied in project prioritisation, resource allocation and policy decisions (e.g. urban planning, infrastructure), especially in Europe and South America. Industrial use is limited but not absent. A few consulting cases and government agency decisions have employed MACBETH (often facilitated by its creators or trained analysts). One strength is, for example, in group settings where qualitative consensus is sought before quantification.

9. BWM (Best-Worst Method). BWM (Rezaei, 2015) is a relatively new MCDA method for deriving criteria weights from a limited set of pairwise comparisons (best vs. others, worst vs. others). It is among the fastest growing methods and its ranking is expected to increase. **Web presence:** Emerging, it is discussed in research forums and some online tutorials as a promising alternative to AHP for weighting. **Academic prevalence:** In less than a decade, BWM has gained significant attention. Its foundational paper (Rezaei, 2015) has around 4000 citations, indicating that users have begun to adopt it. Dozens of BWM applications have been published (especially in fields like supply chain, sustainability, etc.). BWM would likely rank among the top five-to-seven methods by academic mentions in recent years (eclipsing some older titans). **Use cases:** BWM is known for requiring slightly fewer comparisons than AHP while maintaining consistency, so academics have applied it to criteria weighting problems in e.g. logistics, supplier selection, risk assessment and more. Industrial use is nascent but growing. Its relative simplicity (compared to AHP which is its main market target) makes it attractive for practitioners to derive weights without the full overhead of AHP. There are very few industry case studies (e.g. in project portfolio selection) using BWM, often guided by academics.

10. PAPRIKA (Potentially All Pairwise Rankings of all possible Alternatives). PAPRIKA is a more recent method that involves pairwise comparisons of hypothetical alternatives to determine criteria weights and scores. It is the engine behind the 1000minds decision software. **Web presence:** Moderate, largely via 1000minds (which extensively markets the method) and some health economics literature. **Academic prevalence:** PAPRIKA does not often appear, only in 12 papers explicitly until 2023, but the method is used implicitly in many studies via the 1000minds tool. According to the developers, 370 peer-reviewed articles and abstracts using PAPRIKA have been published since 2006. **Use cases:** PAPRIKA has strong real-world adoption relative to its academic footprint. It has extensive industrial and organisational use through the 1000minds platform. Academically, it is popular in health and resource allocation studies where stakeholders' preferences are elicited via pairwise rankings. In summary, while traditional publication counts rank PAPRIKA low, its practical impact (especially in multi-criteria decision support and preference learning applications) is significant due to marketing.

11. COPRAS (Complex Proportional Assessment). COPRAS is a method that ranks alternatives by proportional evaluation of criteria significance and utility degree. **Web presence:** Low general awareness outside academic and engineering communities. **Academic prevalence:** COPRAS appears in about 300 papers, mainly in engineering, construction, and sustainability journals. It has a niche following, particularly among Eastern European researchers. **Use cases:** Academically, COPRAS has been applied to construction project selection, supplier evaluation, etc., often in studies from the Eastern Bloc (from where it originated). Industrial use beyond those contexts is limited; it is mostly confined to academic case studies or where researchers collaborate with industry to apply it.

12. WASPAS (Weighted Aggregated Sum Product ASsessment). WASPAS combines the weighted sum and weighted product approaches. **Academic prevalence:** around 200 publications, indicating moderate use in the last decades. **Use cases:** Mostly academic; used in similar

domains as COPRAS (engineering decisions, etc.) with few documented industry adoptions.

13. MOORA (Multi-Objective Optimization by Ratio Analysis). MOORA and its extension MULTIMOORA are ranking methods from the late 2000s. **Academic prevalence:** Approximately 200 publications. **Use cases:** Mainly academic projects in engineering optimisation problems; minimal direct industry usage.

14. TODIM (In Portuguese: **Interactive Multi-Criteria Decision Making)**. TODIM is an outranking method based on prospect theory value functions. **Academic prevalence:** around 300 publications, especially prevalent in Latin America. **Use cases:** Applied in academic case studies (e.g. energy, mining decisions). Limited industrial uptake, though a little bit used in Brazil.

15. Others. SWARA (**Step-wise Weight Assessment Ratio Analysis**) with some 200 papers is a weight elicitation technique occasionally used in more recent studies, often alongside other methods. **DRSA** (**Dominance-based Rough Set Approach**) with approximately 100 papers is a qualitative MCDA approach for sorting problems. **UTA/UTADIS** (**Utility Additive Discriminant)** are methods for multi-attribute preference modelling. Has 40 papers and is used for rating and sorting, mainly in research. These and similar techniques (e.g. **FITradeoff** and **THOR)** with under 30 papers each have not achieved widespread adoption yet. They might be of some importance in specific subdomains, but rank low by general popularity and visibility.

The overall ranking among the top five methods is roughly a reversed list compared to how the methods adhere to established scientific theories such as classic utility theory and Keeney-Raiffa multi-attribute utility theory (Keeney & Raiffa, 1993). The list reversal is partly explained by and attributable to factors like name recognition, academic narratives, and dissemination networks (Danielson, 2023).

5. Conclusions

This article has examined the popularity and visibility of widely known multi-criteria decision analysis (MCDA) methods across academic and industrial domains. Drawing on six evaluative perspectives: web presence, academic mentions, publication volume, citation impact, academic applications and real-world use, a composite ranking of these methods is developed, indicating that their widespread adoption also owes to name recognition and early-market presence.

The results underscore that AHP remains the dominant MCDA method across every dimension assessed. Its perceived simplicity, extensive documentation, software support, and strong first-mover advantage have made it a de facto standard in both academia and industry. TOPSIS and PROMÉTHÉE follow, benefitting from conceptual clarity and effective positioning not least within the engineering and operations research communities. ÉLECTRE is clearly behind, ranking closer to VIKOR which has carved out a niche with its compromise programming logic. It is a prime example of the possibility of reaching close to the top by rebranding and efficient positioning, leading to improved visibility and impact. ANP and weighted scoring (SAW) methods maintain a steady market share. Emerging methods like BWM and tools-based methods like PAPRIKA show how targeted innovation and software-driven outreach can elevate newer approaches into practical relevance. BWM is new in the sense that all top-five methods are at least 40 years old since it takes time to build brand recognition and visibility.

Conflicts of Interest

The author’s own MCDA methods have been excluded from the study. Hence, the author declares no conflicts of interest.

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