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Using SMART Method for Multi-criteria Decision Making: Applications, Advantages, and Limitations

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Abstract: The applications of multi-criteria decision-making (MCDM) techniques are numerous. Simple Multi-Attribute Rating Technique (SMART) is a popular method for addressing MCDM problems with several criteria. The research investigates the SMART approach discussing how it is used and its benefits and drawbacks, in decision-making situations. It looks at how it can be applied in choosing technology, improving healthcare systems, and managing the environment. SMART simplifies decision-making by comparing options based on factors. Yet it also has drawbacks such as biases in assigning weights and may not fully address the intricacies of certain decisions. The goal of the study is to enhance comprehension of SMART advocate for its use and propose combining it with intricate decision frameworks. Even though the SMART method is now widely used there is a lack of a thorough understanding of the method to identify its various applications. This paper aims to provide a comprehensive guide and a thorough overview of the SMART method to aid in decision-making and ranking in multi-attribute scenarios.

Keywords: multi-criteria decision-making (MCDM), simple multi-attribute rating technique (SMART), decision-making, multi-attribute decision-making

1. Introduction

Multiple criteria decision-making (MCDM) can be generally described as the process of selecting one from among a finite set of alternatives or ranking alternatives, based on a set of multiple usually conflicting and different unit criteria. In these cases, we use normalization to transform the various criterion dimensions into nondimensional criteria [1]. MCDM methods have been used recently by researchers in different fields of study such as finance, business, science, and engineering. These methods are utilized to evaluate, sort, rank, and select between different alternatives [2]. Numerous MCDM methods have been developed, and even small variations compared to existing methods have made the application of MCDM in different areas possible [3]. One of the main goals of an MCDM method is to help the decision-maker understand and handle the several criteria that are involved in the decision-making process so that a workable option may be chosen. The calculation of priorities and weights based on a set of criteria is an essential component of MCDM procedures, which mostly rely on subjective judgment. This characteristic has a significant impact on choosing workable substitutes [4]. The general steps in decision-making are as follows:

1) Objective: This describes the objective for which the artifact evaluation is conducted; thus, the outcome should closely align with the predetermined aim.
2) Decision-maker (DM): This is the individual responsible for determining the selection criteria and the evaluation technique for alternatives. Typically, a group of people, rather than an individual, is involved in most cases.
3) Alternatives: The alternatives refer to the range of possible solutions.
4) Criteria: They are the characteristics used to evaluate and assess.
5) Assessment: The assessment process involves calculating a ranked list of options that align with the value judgments of the decision-maker.
6) Solution: A solution is an alternative that effectively achieves the optimal compromise concerning the objective.

Numerous methods have been developed throughout time to deal with MCDM research. Solving challenges involving numerous elements in decision-making may be accomplished effectively with the help of the SMART technique. Edward developed this method of decision-making in 1997 [5]. Multi-criteria analysis is a decision-making approach that is based on the idea that each alternative is made up of several criteria, each of which has a weight and value ascribed to it based on its relative relevance [6]. To identify the best option, each alternative is assessed using weighting, as stated by Kahar and Riki [6]. Moreover, SMART is seen as a reduced version of Multi-Attribute Utility Theory,

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having evolved from it in essence [7]. Using an appropriate numerical scale, the SMART technique provides performance ratings to the alternatives in order of subjective importance. Furthermore, SMART assigns particular grade levels to each function to assess how well it is executed [8]. The method is based on an additive linear model such as Measuring Attractiveness by a Categorical Based Evaluation Technique (MACBETH). It contains direct weighing methods, which are deemed inadequate due to their fundamental characteristics. For these reasons, SMART has been extensively adopted as a suitable MCDM approach in decision-making because of its ease of use, simple calculations, and other features [9].

The use of MCDM plays a role in industries by helping to compare options based on different sometimes conflicting factors. One notable method within MCDM is the SMART, known for its versatility in decision-making situations. Despite being used there is still a lack of knowledge about its practical uses, benefits, and drawbacks. This research aims to address this gap and improve the implementation of techniques in decision-making contexts. To address these challenges, our study sets out with the following key objectives:

1) What is the application of the SMART technique across different fields and focus on challenges and efficacy in problem-solving?
2) What are the advantages and disadvantages of SMART in various situations and what are the solutions?
3) What is the step-by-step process for the SMART technique to be an effective guide for researchers?

The objective of this research is to conduct a thorough examination of the SMART which is a vital instrument in MCDM. Although we acknowledge the wide range of applications of SMART, we do not restrict our analysis to its use in particular domains or case studies, instead, we concentrate on the theoretical underpinnings and overall methodological approach of SMART. To help readers better understand the SMART method and its application in decision-making processes, this extensive guide tries to clarify the method's fundamental benefits and possible drawbacks.

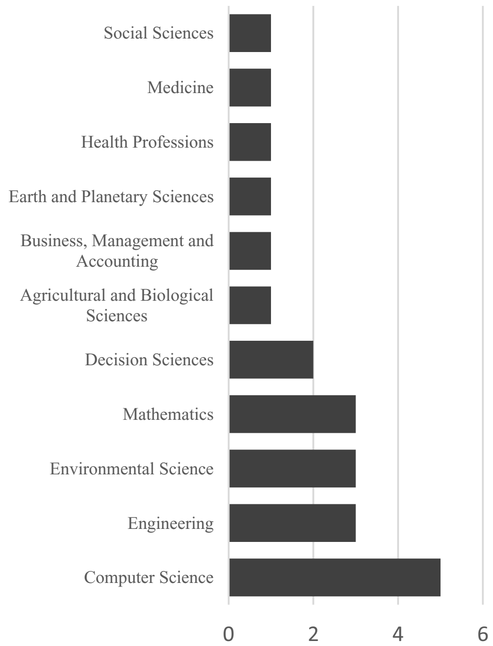
As stated in Section 2, the primary objective of this study is to investigate the use of the SMART method in decision-making challenges in a variety of disciplines. In Section 3, we will examine SMART's merits and demerits as well as methods for minimizing the latter. A thorough explanation of the SMART technique and its phases will be given in Section 4. This study will ultimately offer a result.

2. Application of the SMART Method

A key framework in MCDM, the SMART, demonstrates its applicability and adaptability in several scholarly and real-world domains. This approach is utilized in computer science, social sciences, engineering, and business sectors for both theoretical and practical purposes. It is centered on assessing alternatives according to predetermined criteria. The studies that used the SMART approach, as shown in Figure 1, were found via a thorough search of the Scopus database that 13 articles in English from 2014 to 2024 were found. Using keywords like "SMART", "MCDM", and "Simple Multi-Attribute Rating Technique", this search was done with great care to find that specifically reference these ideas in their title, abstract, or keywords. Based on findings from Scopus, the SMART technique is comprehensively used across several topic areas, demonstrating its importance and adaptability in tackling difficult decision-making issues. The domains of computer science, mathematics, and decision science are where SMART is most frequently used.

A thorough search of the Scopus database produced insightful data on the distribution of research papers that combined the MCDM and SMART approaches. The data in Figure 1. demonstrate that SMART is strongly preferred in several significant academic subjects. The field with the highest percentage of published publications is computer science, highlighting the importance of SMART approaches in this rapidly evolving discipline. Environmental science emphasizes ecological assessments and sustainability. It has a close relationship with SMART and shows how useful it is while making complex environmental choices. Because engineering is a problem-solving and optimization-focused discipline, decision-making procedures often use SMART because of its applicability. Additional fields like agricultural and biological sciences, business, management, accounting earth and planetary sciences, health professions, medicine, and social sciences, although less prominent, also showcase the interdisciplinary scope of the SMART approach. This emphasizes the versatility of the method and its capacity to address a wide range of research inquiries and real-world obstacles.

Figure 1
Distribution of SMART technique in various areas



Following our analysis, this study pinpoints specific articles from the Scopus database that use the SMART approach in a variety of fields. The study will thoroughly review all research papers that are accessible in the Scopus database with a particular focus on the topics covered by the participants and the methods employed. To provide a thorough grasp of the topics addressed by the particular research team and the variety of strategies used in conjunction with the SMART process, each article will go through a thorough analysis. To produce meaningful results, this analysis will examine the various fields in which the SMART approach is employed and how well it complements other research techniques. To enhance scholarly understanding of the flexibility and efficacy of the SMART technique in decision-making research, it is intended to illustrate the wide range of applications of this approach. Especially, SMART has facilitated decision-making in the following areas:

1) Educational Resource Management
2) Healthcare Policy and Drug Procurement
3) Engineering and Public Sector Construction
4) Environmental Decision-Making and Management
5) Architecture, Engineering, and Construction (AEC) for Sustainable Development
6) Retail and Consumer Behavior Analysis
7) Risk Management in Urban Planning
8) Telecommunications Network Services
9) Environmental Science for Microcontaminant Assessment
10) Decision-Making Under Ambiguity with Fuzzy Sets

The following part will discuss the mentioned applications of SMART and will illustrate how the researcher could apply SMART on the decision-making problems.

One practical use of the SMART technique is how it is applied in primary research. By comparing alternatives to a set of criteria MCDM techniques like the Analytic Hierarchy Process (AHP) and MACBETH play a crucial role in supporting comprehensive decision-making processes. Students and university employees participate in Ishizaka and Siraj's [10] study to test the efficacy of these MCDM tools. The effectiveness of these MCDM technologies was assessed by university staff and students through experimental research. AHP, SMART, and MACBETH techniques were evaluated by study participants using vouchers to rate five coffee shops on a college campus. This useful strategy gives insights into the relative efficacy of these techniques in supporting decision-making processes in addition to demonstrating how applicable they are in practical contexts. The assessment is predicated on how the techniques affect the participant's processes of ranking and decision-making. The study recorded participants' initial tool-influenced and final assessments of the coffee shops using a unique incentive-driven methodology. The purpose of this study is to investigate how well MCDM tools work in practical situations with an emphasis on college students.

Implementing MCDM techniques in a support system delivers many advantages. This study has broad applications in support systems. Roszkowska and Wachowicz [11] examine whether the subjective perceptions of decision-makers will influence the future use of MCDM approaches in negotiation support systems. In choosing between three MCDM approaches—Analytic Hierarchy Process (AHP), SMART, and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS)—this study examines the impact of interface preference time constraints efficiency and usability. To analyze the data from online decision-making studies, a multinomial logistic regression model was employed. Students and staff members from the university participated in the studies to determine how well specific MCDM processes performed in decision-making situations. To select MCDM tools that offer insights into the behavioral aspects of decision support system utilization, this study emphasizes the importance of user satisfaction and method efficiency.

Moreover, Abdullah et al. [12] illustrate the collaborative effort to develop a decision-making tool customized for Kuwait's healthcare system to improve the acquisition of off-patent drugs. The workshop which employed a seven-step process for criteria selection scoring ranking and weighting drew participation from nineteen pharmaceutical policy stakeholders. This was done using the MCDM approach. The process was focused on creating a customized MCDM format that prioritized features over the original product such as supplier dependability, product similarity, and cost savings. The objective of this program was to enhance the generic drug procurement procedure thereby improving the sustainability of the given healthcare system.

MCDM approaches have provided multiple knowledgeable and beneficial decisions to address complex problems in various industries of Engineering. Khoso et al. [8] developed a unique two-phase decision support system for the public sector designed to be applied in the given process. Three methodologies are used in this process to evaluate and select contractors based on a variety of criteria: MACBETH, SMART, and Exploratory Factor Analysis (EFA). To enhance decision-making in public sector construction the methodology provides a continuous structured review process that considers both technical and financial aspects. Opinions on contractor assessments and model criteria were given by decision-making representatives from the public sector. A SMART contractor evaluation is conducted at the end of the process after which the original EFA weighting criteria are chosen. An automated framework is combined with these methods.

Marques et al. [13] provide a process for choosing forest management models in a participatory planning environment that blends group decision-making with MCDM. The focus is on joint collaborative management areas in Portugal taking into account the various interests of stakeholders in ecosystem services. The respondents comprise a broad spectrum of individuals engaged in forest management such as forest owners' environmental non-governmental organizations and public administration officials. The following techniques are applied: criteria are identified through cognitive mapping stakeholder preferences are integrated using the Delphi method criteria are weighted using the AHP and SMART. This approach attempts to enhance the quality of decision-making in forest management by integrating a variety of stakeholder preferences and points of view into the planning process.

According to Murphy [14], using the Ecosystem Management Decision Support (EMDS) system MCDM has been tested. Using the Criterium Decision Plus (CDP) tool, this paper describes how to create and apply MCDM models for environmental management decisions. The application of MCDM in geographic decision support systems is also covered. Environmental management analysts and decision-makers make up the majority of the study's target audience. The study first examines several MCDM techniques before concentrating on how environmental management options are evaluated and prioritized in CDP using the AHP and the SMART. To implement MCDM in Environmental Multi-Criteria Decision Support (EMCDS), the paper offers comprehensive instructions that include alternative rating techniques and hierarchy preference procedures.

The efficacy of two survey techniques, SMART and Potentially All Pairwise Rankings of all possible Alternatives, was investigated by Mirzaee et al. [15] to investigate what factors such as sustainability and resilience decision-makers find most interesting when designing buildings. The participants were professionals working in the fields of AEC in North America. The study determines whether a strategy better captures the preferences of DMs while posing a manageable cognitive strain and examining the impact of two approaches on decision-making processes. It especially highlights the development of durable and environmentally friendly buildings.

Kahar and Riki [6] demonstrates how to use the SMART and Fuzzy Multi-Criteria Decision-Making (FMCDM) approaches when selecting a smartphone. This study aims to assist consumers at Maju Jaya Cell Store in Indonesia by assessing smartphones according to several factors including cost screen size battery life and more. Through the use of sensitivity analysis, the study compares the efficacy of the SMART and FMCDM approaches and finds that on average FMCDM works better than SMART. This comparison offers useful information when designing decision support systems for the retail sector, particularly concerning smartphone selection.

Furthermore, SMART approaches might also be applied in the field of Risk Management. Guerra and Abebe [16] formulated a novel decision-making framework for Addis Ababa that integrates paired elicitation multi-criteria decision-making (like SMART and SWING SMART) and cost-effectiveness analysis. Through the use of a charrette design process, the paper incorporates stakeholder involvement to improve decision criteria and alternatives. Graduate students from Virginia Tech Addis Ababa specialists and local professionals verified the methodology in charrette-style meetings and mock sessions. This strategy seeks to improve flood risk management by incorporating stakeholder preferences, budgetary constraints, and local expert knowledge into a structured decision-making process.

In diverse network environments, Vijila and Albert Raj [17] conduct research to improve the processes for handover. Developing and implementing a neural network-powered intelligent multi-criteria decision-making process that facilitates smooth vertical handover is the primary objective of this paper. It is expected that professionals and academics with knowledge of network engineering and telecommunications will be the main participants in this research study. By evaluating different handover scenarios using multi-criteria decision analysis and making decisions using neural networks, this research aims to enhance service quality and user experience in mobile networks.

One of the integrations of SMART is combining three MCDM techniques—the use of ToxPi, TOPSIS, and SMART method that is investigated by Becker et al. [18] such that the environmental risk assessment of microcontaminants in surface water is also examined. It uses SPE-LC-QTOF MS to evaluate and rank 150 microcontaminants including medicines and pesticides found in the Conceição River Brazil. Prioritizing contaminants by addressing the complexities of divergent data the study integrates (Q)SAR models for predicting eight endpoints. Adding to the decision-making process is the ToxPi tool's incorporation of the SMART method which makes it easier to determine criteria weights according to respective importance.

The usage of the SMART Technique in Fuzzy sets is examined by Thilagavathy and Mohanaselvi [19] who present a novel method using T-spherical fuzzy sets for multiple criteria group decision-making under ambiguous conditions. To effectively handle and integrate expert opinions in decision-making processes, it develops several sophisticated aggregation operators such as the T-spherical fuzzy Hamacher Heronian mean geometric operators. To illustrate the use of these operators in practical situations, the study incorporates the SMART for determining criteria weights. It uses the TODIM (the acronym for Interactive and Multi-criteria Decision-Making in Portuguese) method which is Portuguese for Interactive and Multi-criteria Decision-Making.

Numerous fields have adopted the SMART technique demonstrating its adaptability and efficacy in assisting decision-making processes. Based on research decision-making in several industries including construction telecommunications and environmental management is enhanced by the SMART systematic criteria-driven assessment approach. The examples show how SMART can significantly improve decision efficiency and correctness demonstrating its significance as a key tool in multi-criteria decision-making processes.

3. Merits and Demerits of the SMART Approach

The SMART has several benefits and drawbacks and evaluating the tool's suitability and efficacy requires an awareness of each. As mentioned, the main goal of our review is to give a thorough analysis of the SMART method emphasizing its methodological flexibility and robustness in various decision-making scenarios. Here we will go into more detail about the benefits and drawbacks of the SMART method, reaffirming our dedication to a comprehensive analysis. In doing so, we hope to advance a comprehensive knowledge of SMARTs advantages and disadvantages in supporting decision-making procedures. The SMART approach is advantageous because it simplifies the decision-making process for customers by providing answers to simple understandable questions. Transparency is essential because it increases decision-makers' trust in the method's outcomes by making the underlying reasoning easier to understand.

Furthermore, SMARTs' well-defined structure makes it easier to quickly apply and incorporate into a variety of decision-making contexts from designing policies to developing commercial strategies. When there are time or resource constraints, SMART can be very helpful in streamlining complex criteria for a methodical and systematic analysis of potential solutions. The SMART technique has drawbacks in addition to its many benefits. The method may oversimplify complex decisions and fail to account for minute details that could have an impact on the outcome, while the simplicity of the method facilitates understanding if advanced analytical techniques are not applied it may lead to a sketchy analysis.

Moreover, depending on subjective assessments to assign weights and scores might lead to biases, potentially distorting results if not verified by thorough sensitivity analysis. This section seeks to explore these topics by providing Table 1, which lists the main advantages and constraints of the SMART technique. The goal is to create a detailed reference that can educate both practitioners and scholars on the practical uses and limitations of the SMART technique, enabling its effective and knowledgeable application in different decision-making scenarios.

4. SMART Method Step-by-Step

The SMART is a straightforward technique for assigning weights to each criterion following their relative importance during the decision-making process. Beginning with the least favorable levels of the criteria and working up to the most favorable, the weights are established by ranking the significance of the changes in the criteria. Ten points are then awarded to the criterion that has the least weight. After that, the next criterion with the next lowest relevance level is chosen and it is awarded more points. Their relative levels of importance are still accurately portrayed by this process. Due to its features, which include ease of use, this technique can be applied in a variety of fields. It is regarded as one of the compensatory methods.

1) It is regarded as one of the compensatory methods.
2) It is possible to use independent and dependent attributes.
3) The qualitative attributes should be converted into the quantitative attributes.

Table 1
Advantages and disadvantages of SMART technique

Advantages	Disadvantages
Unity: This approach utilizes linear functions, which are the fundamental form of functions.	The procedure of measuring work is inherently challenging and lacks user-friendliness, given the complicated framework involved.
This method allows assignment techniques (absolute, relative, etc.,) for any type of weight.	The SMART method is most effective when there is a substantial amount of readily accessible information that is readily available to the decision-maker.
It requires less effort for users in comparison with the MAUT.	In case of a large number of criteria, the problem turns into a complex problem
The decision model is independent of the alternatives	Insufficiently consider the range of scales while selecting the proper weights for each category.
It is a user-friendly and understandable tool. Also, it is used for most of the Linear Problems.	The lack of consistency is attributed to the subjective character of the technique.
The ratings of alternatives have a small relative impact, meaning that altering the number of alternatives would not inherently modify the decision scores of the initial possibilities.	Some poorly performing alternatives rejected in the screening phase

In this method, a limited number of alternatives are examined based on a limited number of attributes. The matrix of alternatives and attributes is initially constructed in accordance with the information provided by the decision-maker, which is shown in Equation (1).

$$X = \begin{bmatrix} r_{11} & \cdots & r_{1j} & \cdots & r_{1n} \\ \vdots & \ddots & \vdots & \ddots & \vdots \\ r_{m1} & \cdots & r_{nj} & \cdots & r_{mn} \end{bmatrix}_{m \times n};$$

$$i = 1, \ \ldots, \ m, \qquad j = 1, \ \ldots, \ n \tag{1}$$

According to the matrix of Equation (1), r_{ij} is the element of the decision-matrix for ith alternative in jth attribute. In this technique, the qualitative attributes are ranked as shown in Table 2.

Table 2
Seven-point ranking of qualitative attributes

Poor	4
Fairly week	5
Medium	6
Fairly good	7
Good	8
Very good	9
Excellent	10

4.1. Rating the attributes

The minimum value S_{min} and maximum value S_{max} are established for each attribute by the decision-maker in the initial stage. Hence, it is evident that the decision-maker selects within the interval of S_{min} to S_{max}. Equation (2) is utilized to partition the entire decision-making interval into sub-intervals of equal length.

$$S_{min}, \quad S_{min} + e_0, \quad S_{min} + e_1, \ \ldots.. \tag{2}$$

Also, e calculated from Equation (3)

$$e_v - e_{v-1} = \varepsilon e_{v-1} \tag{3}$$

Based on the geometric expression in Equation (3), then Equation (4) is concluded.

$$e_v = (1+\varepsilon)e_{v-1} = \ (1+\varepsilon)^2 e_{v-2} = \ (1+\varepsilon)^v e_0 \tag{4}$$

Finally, we have Equation (5) [20].

$$S_{max} = \ e_v + \ S_{min} \tag{5}$$

4.2. The effective weights of alternatives

g_{ij} represents the effective weight of alternatives and is derived from the decision-maker's evaluation of alternative A_i concerning attribute C_j.

In accordance with Table 1, the qualitative attributes are initially ranked following the attribute situation as conveyed by the decision-maker. Equation (6) is also applied to the quantitative attributes, where S_v denotes the value of the alternative in the attribute under investigation [20].

$$v = \ log_2^{\frac{S_v - S_{min}}{S_{max} - S_{min}} \times 64} \tag{6}$$

g_{ij} is derived for positive attributes in accordance with Equation (6), where a sum of the values of v and the number 4 corresponds to the quantitative and qualitative attributes in Table 2. A greater quantity of attributes is preferable.

Conversely, negative attributes, for which g_{ij} is derived by subtracting the value of v from 10, align with the quantitative and qualitative attributes presented in Table 2.

4.3. The normalized weights

The decision-maker is initially requested to evaluate the attributes from 4 to 10 according to his priorities and Table 2.

Consideration is given to the following definitions when developing the model:

A_i	Alternatives, $i = 1, \ldots, m$
C_j	Attributes, $j = 1, \ldots, n$
h_j	The rank allocated to the attribute C_j by the decision-maker. $j = 1, \ldots, n$
w_j	The denormalized weight obtained from Equation (7) [20]

$$w_j = \left(\sqrt{2}\right)^{h_j}; \qquad j = 1, \ldots, n \tag{7}$$

After normalization, the values of each attribute are computed as illustrated in Equation (8).

$$w_j = \frac{\left(\sqrt{2}\right)^{h_j}}{\sum_{j=1}^{n} \sqrt{2}^{h_j}} \tag{8}$$

4.4. The final rating of alternatives

f_i, shown in Equation (9), is the final weight based on Equation (6).

$$f_i = \sum_{j=1}^{n} w_j \cdot g_{ij}; \qquad i = 1, \ldots, m \tag{9}$$

Finally, the highest amount of f_i is the best alternative, and likewise, others are ranked.

Challenges involving MCDM are approached using an organized and sequential application of the SMART. It consists of the seven essential components shown in Figure 2. The decision-maker(s) and/or agent(s) in charge of the decision-making process are identified at the outset of the procedural hierarchy. The problem and range of feasible solutions are clearly defined, guaranteeing that the decision-making domain is well-defined and that all feasible paths of action are thoroughly examined.

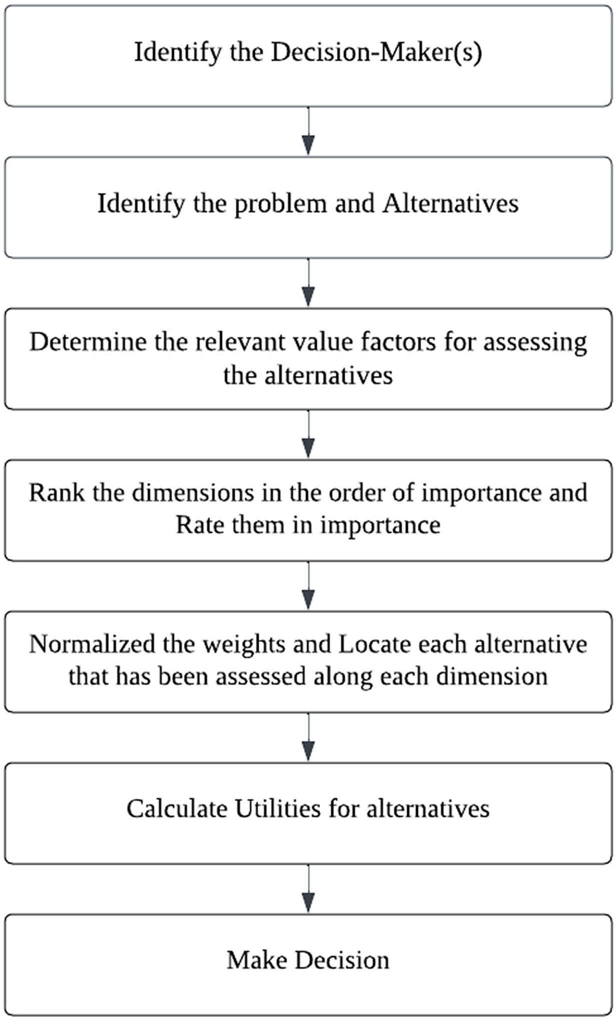
Normalizing the weights and placing each option on each dimension comprise the fifth step. To do this, subjective importance judgments must be transformed into a quantitative format that enables an equitable and uniform comparison of all options. The utilities for each alternative are calculated using the normalized weights from the sixth phase. This process combines all assessment dimensions into a single value that indicates the overall desirability of each option.

Making the decision is what happens in the seventh and final phase of the process. In this step, the options with the highest utility are selected as the best way to solve the problem after the calculated utilities have been analyzed. The SMART technique is effective in addressing MCDM issues, as demonstrated by this methodical approach that ensures the decision is made through a transparent, logical, and clear review process.

4.5. Criteria selection and weighting

A fundamental step in ensuring that decisions are reflective of priorities and the complexities of the decision problem is the careful selection and weighting of criteria when applying the SMART for MCDM. A thorough analysis of all relevant factors that could affect the outcome is used to determine the criteria which are then selected based on how relevant they are to the decision context. This selection process, underscored by studies such as Patel et al. [21], emphasizes the simplicity and directness in querying the decision-maker, enhancing the decision-making process's transparency and effectiveness.

Figure 2
SMART approach process



By using a direct rating or ranking method, weights are assigned to indicate the relative importance of the criteria once they have been identified. This process allows for an organized and quantitative assessment of the alternatives concerning the criteria. Then, alternatives are scored using a uniform scale to indicate how well they performed with each criterion. This process is similar to that used in Taylor and Love [22] SMART for renewable energy deployment decisions (SMART REDD) model which emphasizes the inclusion of mission-specific characteristics in the assessment process. This methodical process of synthesizing multi-criteria evaluations into actionable insights culminates in the aggregation of weighted ratings to derive a decision. The SMART method's adaptability in handling complex decision-making scenarios is further illustrated by the incorporation of mission-related attributes as shown in decisions about the deployment of renewable energy [22]. This highlights the capacity of the method to accommodate a wide range of decision contexts from military operations to urban planning. The SMART method then enables a methodical evaluation of several criteria to guide the selection of the best options or rankings thereby facilitating a thorough and nuanced approach to decision-making.

5. Discussion

5.1. Integration of SMART in various domains

The number of different industries that use the SMART technique is demonstrated by the selection of papers for analysis from the Scopus database. The papers show how flexible and successful the approach is at supporting informed decision-making. Using the SMART approach, the reviewed studies addressed a variety of topics such as the evaluation of software quality healthcare procurement and coffee shop selection in academic settings. The range of uses shows how flexible the SMART approach is and how well it can provide useful solutions in challenging decision-making situations.

5.2. Impact on decision-making processes

The study by Ishizaka and Siraj [10] uses respondents from the university's staff and student body to compare the SMART methodology with alternative MCDM tools. In order to assess the suitability of decision-making tools in practical situations, this study uses a novel data-driven methodology. Roszkowska and Wachowicz [11] indicate the behavioral aspects of decision support system use by demonstrating the methods in which decision-makers' personal beliefs influence the use of MCDM techniques.

5.3. Contribution to healthcare and policy development

Abdullah et al. [12] produced a decision-making tool for the given healthcare system that demonstrates how SMART is utilized in the formulation of policies and strategic planning. This paper focuses on improving the generic medication procurement process by illustrating how SMART may support the more general objectives of healthcare sustainability and cost-efficiency.

5.4. Practical utility and methodological innovation

Research illustrates the applicability of SMART technology in real decision-making situations. The methodology of the current study was purposefully developed to conduct a comprehensive evaluation of the SMART strategy in multiple decision-making contexts. The current results of various applications of SMART provided extensive information on the effectiveness of the method and highlighted both its advantages in supporting decision-making and its disadvantages in managing complex dynamic criteria.

5.5. Future research directions

The success of the SMART approach suggests that to get around some of its drawbacks, it should be investigated as a combination with more complex decision frameworks like hybrid models. To produce more trustworthy and objective decision-making outcomes, future research could concentrate on streamlining the procedure to lessen subjective assessments and biases.

6. Conclusion

The present study investigated the diverse applications of the SMART approach in decision-making across diverse domains. As stated in Section 2, the study examined decision-making challenges and the efficiency and clarity that the SMART technique offers. The study identified several contexts in which SMART is beneficial including streamlining complex decision-making procedures and giving stakeholders a precise and quantifiable instrument for decision-making. The usefulness of the SMART strategy in navigating complex decision-making processes was emphasized in this analysis, underscoring its significance as a flexible and crucial tool in MCDM problems.

Additionally, as discussed in Section 3 the study considered the advantages and disadvantages of the SMART methodology. SMART can simplify the decision-making process making it easier for decision-makers across various industries to use according to the advantages analysis. However, the method's simplicity also brought limitations particularly when dealing with more complex problems that call for a more thorough examination. Approaches to mitigate these shortcomings were explored proposing a well-rounded strategy that highlights the significance of tailoring the implementation of SMART to the particulars of every situation involving decision-making.

In addition to offering a comprehensive analysis of the SMART technique, the paper summarized the procedural steps that were detailed in Section 4. Although the research is comprehensive, it also establishes the foundation for future studies that will refine and expand upon the SMART methodology. More resilient flexible and adaptable tools are constantly sought after as decision-making gets more complex in a world that is changing all the time. Researchers and business professionals are encouraged to explore novel concepts in the field of MCDM and beyond by this work which significantly advances the field. For academics who wish to apply the SMART method to make well-informed decisions, this study is a helpful tool.

Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

Author Contribution Statement

Hamed Taherdoost: Conceptualization, Methodology, Writing – review & editing, Supervision, Project administration; **Atefeh Mohebi:** Formal analysis, Investigation, Writing – original draft, Visualization.

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