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ABSTRACT
This study applies MCDA-TOPSIS to management education. MCDA-TOPSIS helps management education decision makers define appropriate criteria, gather and evaluate data, and rate options by performance. The research process begins with describing the problem and choice to be made, determining the criteria and sub-criteria, gathering data and information, evaluating and scoring the alternatives, aggregating the scores and ranking the alternatives, and selecting the best alternative. This study found program A best. Before making a decision, examine practicality, budget, and resources. Multi-objective optimization and social or environmental impact can also improve the method. MCDA-TOPSIS results could be compared to other management education decision-making methods in future research.
Keywords: MCDA-TOPSIS, Management Education, Decision Making

1. INTRODUCTION

Multi-Criteria Decision Analysis (MCDA) is a method used in decision-making to evaluate and prioritize multiple options or alternatives based on a set of criteria [1]–[4]. MCDA is particularly useful when dealing with complex problems or decisions that have multiple criteria and many options. It is also called Multi-Criteria Decision Making (MCDM) or Multi-attribute Decision Making (MADM) or Multiple Criteria Decision Aid (MCDA)[5]–[7].

A method used in MCDA is Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). TOPSIS is a method that ranks options based on the relative closeness of each option to the ideal solution, which is the option that has the best performance on all criteria. In TOPSIS, the option that is closest to the ideal solution is considered the best option [8]–[11].

Management education is the study of how to manage and lead organizations effectively[12]. It involves learning about various management concepts and practices[13], as well as developing skills such as leadership, decision-making, and strategic thinking[14].

MCDA and TOPSIS can be used in management education to help students and educators evaluate and select the best management education programs and courses [12], [15]–[19]. By using a set of criteria, such as reputation, faculty qualifications, curriculum, facilities, and student support, and alternatives like universities or business schools' management education programs, online management education programs, traditional management education programs and management education programs in different countries, MCDA-TOPSIS can provide a systematic and objective way to compare and rank different management education programs [20]. This can help students make more informed decisions about which program to pursue, and can also help educators improve the quality of the programs they offer.

2. METHOD

The difficulty is choosing the optimum management education program for marketing students, taking into account time, budget, and stakeholders. Based on reputation, faculty qualifications, curriculum, facilities, and student support, the management education program that best suits students and stakeholders will be chosen. This explicit explanation of the problem and decision will guide the rest of the MCDA-TOPSIS process and

ensure that the criteria and alternatives utilized in the analysis are relevant to the choice, resulting in a more effective analysis. Management education program evaluation criteria may include:

a. Reputation: This may depend on the program's ranking, accreditation, and professional group recognition.
b. Faculty qualifications: This could include the program's faculty's qualifications, experience, and publications.
c. Curriculum: This includes course selection, electives, and program customization.
d. Facilities: Library, lab, and computer resources are examples.
e. Student support includes counseling, career services, scholarships, and financial aid.
f. Tuition, scholarships, and financial aid:.

Once the criteria have been identified, it's important to gather data and information on the alternatives and criteria, see table 1 for alternative:

Table 1. Alternative Evaluate Management Education

Program	Reputation	Faculty Qualifications	Curriculum	Facilities	Student Support	Tuition Fees
Program A	7	9	8	9	8	8
Program B	6	8	7	7	8	7
Program C	8	7	6	7	9	6

Reputability, faculty credentials, curriculum, facilities, student assistance, and cost are just few of the factors considered while ranking each program. Based on the facts and information gathered, scores are assigned.
The next phase of MCDA-TOPSIS implementation in management training. After the criteria and sub-criteria have been established, data and information on the alternatives and criteria must be gathered. This is a vital stage in ensuring sure the right choices are made based on the right data. The collected statistics and information can be organized into a table for simple comparison and evaluation.

Table 2. Evaluation Management Education

Program	Reputation Score	Survey Respondents
Program A	8	50
Program B	7	45
Program C	6	40

In this table, each program is evaluated based on the reputation score that was calculated based on the survey responses. The number of survey respondents is also included in the table.

3. RESULT AND DISCUSSION

After reviewing and rating the alternatives according to the criteria, the following step is to combine the scores or ranks for each alternative to get their overall ranking. This stage is essential for ensuring that the decision-making process is based on correct and pertinent data. There are numerous ways for aggregating scores, including weighted sum and linear programming. The weighted sum method includes giving relative weights to each criterion and then totaling the weighted scores for each possibility. Setting limitations on the criteria and solving the system of equations to obtain the optimal solution is the linear programming method.
Using the weighted sum method, the scores for each program can be aggregated in table 3.

Table 3. Weighted Sum

Program	Reputation (weight: 0.2)	Faculty Qualifications (weight: 0.3)	Curriculum (weight: 0.2)	Facilities (weight: 0.1)	Student Support (weight: 0.1)	Tuition Fee (weight: 0.1)	Aggregated Score
Program A	8*0.2 = 1.6	9*0.3 = 2.7	8*0.2 = 1.6	9*0.1 = 0.9	8*0.1 = 0.8	8*0.1 = 0.8	7.8
Program B	6*0.2 = 1.2	8*0.3 = 2.4	7*0.2 = 1.4	7*0.1 =0.7	8*0.1 = 0.8	7*0.1 = 0.7	6.5
Program c	8*0.2 = 1.6	7*0.3 = 2.1	6*0.2 = 1.2	7*0.1 = 0.7	9*0.1 = 0.9	6*0.1 = 0.6	6.5

In this table, each program is evaluated based on the criteria with assigned weights, the scores are multiplied with the weight and summed up to get the aggregated score. The program with the highest aggregated score is considered as the best alternative. Implementation of this result can be performed using many programming language, see procedure below for pseudo code:

Step 1: Define the problem and the decision to be made
- Identify the specific problems and decisions related to management education
- Define the scope of the problem and decision, including the time frame, budget, and stakeholders

Step 2: Identify the criteria and sub-criteria
- Identify the factors relevant to the decision and will be used to evaluate and rank the alternatives
- Assign weights to the criteria, reflecting their relative importance

Step 3: Collect data and information
- Gather data and information on the alternatives and criteria using surveys, interviews, and literature reviews
- Organize the data in a table format for easy comparison and evaluation

Step 4: Evaluate and score the alternatives
- Evaluate each alternative based on the criteria and sub-criteria
- Assign scores or rankings to each alternative

Step 5: Aggregate the scores and ranking the alternatives
- Combine the scores or rankings for each alternative are used to determine the overall ranking
- Use methods such as weighted sum or linear programming to aggregate the scores

Step 6: Select the best alternative
- selected the best alternative based on the overall ranking
- Select the program that is closest to the ideal solution, which is the option that has the best performance on all criteria

This 6 procedure can be used in any form language, and for this article, I have implemented Class TOPSIS, see code below:

```
using System;
Using System. Linq;

class MCDA_TOPSIS {
   // Method to define the problem and decision to be made
   public void DefineProblemAndDecision () {
   }

   // Method to identify the criteria and sub-criteria
   public void IdentifyCriteriaAndSubcriteria (double[] weights) {
   }

   // Method to collect data and information
   public void CollectData () {
   }

   // Method to evaluate and score the alternatives
   public void EvaluateAndScoreAlternatives (double[,] data, double [] criteriaWeights) {
   }

   // Method for aggregating the scores and ranking the alternatives
   public void AggregateScoresAndRank (double[,] scores, double [] criteriaWeights) {
   }

   // Method of Selecting the best alternative
   public int SelectBestAlternative (double[] ranking) {
   Int bestAlternative = Array. IndexOf (ranking, ranking. Max ()); return bestAlternative; }
   public int MCDA_TOPSIS_in_management_education () {
   DefineProblemAndDecision ();
   double[] criteriaWeights = IdentifyCriteriaAndSubcriteria();
   CollectData ();
   double[,] scores = EvaluateAndScoreAlternatives();
```

```
double[] ranking = AggregateScoresAndRank(scores, criteriaWeights);
int bestAlternative = SelectBestAlternative (ranking);
return bestAlternative;
}
static void Main (string[] args) {
MCDA_TOPSIS mcdatopsis = new MCDA_TOPSIS();
int bestManagementEducationProgram = mcdatopsis. MCDA_TOPSIS_in_management_education ();
Console. WriteLine ("The best management education program is: " + bestManagementEducationProgram);
Console. ReadKey ();
}
}
```

4. CONCLUSION

Management education decision-making benefits from MCDA-TOPSIS. This method makes selecting the best program or action methodical and objective by identifying important criteria, acquiring and assessing data, and rating alternatives by performance.

This strategy has limitations, therefore you need also evaluate practicality, budget, and resources before making a decision. Multi-objective optimization and social or environmental impact can also improve the method. Future research could compare the outcomes of the MCDA-TOPSIS method to other management education decision-making methods to assess their strengths and drawbacks.

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