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Application of Simple Additive Weighting Method in Student Decision Making in Choosing Study Programs

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ABSTRACT

This study discusses the application of the Simple Additive Weighting (SAW) method in helping students of Santo Thomas Catholic University in choosing the right study program. Choosing the right study program is very important, because it can affect students' careers and future lives. Through the SAW method, this study identifies important criteria such as career prospects, personal interests, and academic achievements, each of which is weighted according to its level of importance. Each study program is evaluated and scored based on these criteria, and the results are summed up to obtain a final score. This study found that SAW is effective in providing objective and structured study program recommendations, but determining the right weighting is very important for the accuracy of the results. In addition, evaluating student satisfaction with the chosen study program also contributes to increasing the relevance of the recommendations given. Thus, the SAW method can be a useful tool to improve student satisfaction and learning outcomes in higher education.

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INTRODUCTION

A study program is a specific field of study or specialization offered by a higher education institution, such as a university or institute. Each study program is designed to provide specific knowledge, skills, and competencies in an academic or professional area. Choosing the right study program is one of the important decisions a student must make. This decision not only affects their study period, but can also affect their future career and life. Therefore, the process of choosing a study program must be carried out carefully and considering various relevant factors.

At St. Thomas Catholic University, the process of selecting a program of study by students is an important step that has a major impact on their academic experience and future professional career. This process focuses not only on students' academic interests, but also on how the skills acquired during their studies can meet the demands of the ever-changing job market. Students are encouraged to consider aspects such as career prospects, personal interests, academic strengths, and advice from alumni and lecturers to make the most appropriate decision.

The university provides a variety of resources and support to assist students in the process, including comprehensive orientation sessions, career counseling, and program selection workshops. Student satisfaction with their program selection is also assessed regularly, gathering feedback to continually improve the resource approach provided. These evaluations help the university ensure that each student feels satisfied and supported throughout their learning experience, and is successful in achieving the academic and professional goals they have set.

Selecting a suitable study program is a significant issue for students, involving careful consideration of their academic interests and needs. This requires determining important criteria in the selection process and carefully weighing the importance of each criterion. Furthermore, it is also important to evaluate students' satisfaction with the study program they have chosen, which can be measured through their learning outcomes and level of participation in academic activities.

To solve the problem of choosing the right study program at St. Thomas Catholic University, several strategies are implemented: The university provides comprehensive information about each study program, including curriculum details and career prospects; offers career counseling services with experienced academic advisors to help students identify their interests and potential; and conducts regular student satisfaction surveys to evaluate and adjust the curriculum and support services according to students' needs and expectations. This approach ensures that students can make informed decisions and remain satisfied and supported throughout their studies.

METHOD

The method used to solve this problem is the simple additive weighting (SAW) method. SAW works by identifying a number of important criteria that influence the decision to choose a study program, such as career prospects, personal interests, and academic achievement. Each criterion is weighted based on its level of importance. Then, each study program is evaluated and given a score for each criterion. This score is multiplied by the weight of the corresponding criterion, and the results are added together to obtain the final score. The study program with the highest final score is considered the best choice. This method provides a systematic and quantitative approach to helping students choose the study program that best suits their needs and interests.

RESULTS AND DISCUSSION

In the Simple Additive Weighting method, there are criteria needed to determine the majors for prospective new students. The criteria that have been determined are: Value (C1) obtained from the committee, Cost (C2) obtained from the committee, Interest (C3) obtained from the questionnaire results, Accreditation (C4) obtained from the committee, and Location (C5) obtained from the committee. The alternatives that will be used are several majors that are in great demand at XYZ University, namely: Information Systems, Accounting, Pharmacy and Medical Records. From each of these criteria, the weight will be determined. The weight consists of five simple additive weighting numbers, namely very low, medium, sufficient, high and very high.

Weight	Mark
Very Low	0
Low	0.5
Enough	0.75
Tall	1

Based on the criteria and suitability of each alternative for each predetermined criteria, the next step is the elaboration of the weight of each criterion that has been converted with the Simple Additive Weighting number. The steps of the calculation process and the expected output in this study are as follows:

1. Determine the criteria that will be used as a reference in decision making. The criteria in this study are:

Code	Criteria Terms
C1	Mark
C2	Parent's Income
C3	Interest
C4	Accreditation

2. Determine the suitability rating of each alternative for each criterion.
   From the above criteria, a level of importance of the criteria is created based on the weighted values that have been determined into fuzzy numbers.
   a. Value Criteria The following are the values determined for each value criteria based on the level of importance in the chosen major. For example:

1. Information Systems Department. The subjects that are important in this department are: Mathematics, Jumper, and English.
2. Accounting Department. The subjects that are important in this department are: Mathematics, Computer, Economics and English.
3. Pharmacy Department. The subjects that are important in this department are: Mathematics, Computer, English, Biology, Indonesian, and Physics.
4. Medical Records Department, Important subjects in this department are: Mathematics, Computers, English, Biology.

Eye Lesson	System Information	Accountancy	Pharmacy	Record Medical
Computer	1	0.75	0.5	0.5
Mathematics	1	1	0.75	0.75
B.Indonesia	0	0	0	0
B.English	1	1	0.75	0.5
Physics	0	0	1	0.5
Biology	0	0	0.5	0.5
Economy	0	0.75	0	0

From table 3. above, it can be seen the fuzzy value obtained based on the level of importance of the subject to the major to be chosen. The value of each subject is different depending on its importance for a major.

b. Parental Income Criteria Parental income criteria (POT) is a requirement needed for decision making in selecting a higher education institution. In determining the POT value, provisions are needed in parental income:
Information Systems Department: Rp. 2,400,000
Accounting Department: Rp. 2,400,000
Pharmacy Department: Rp. 4,500,000
Medical Records Department: Rp. 3,800,000
If the parents' income is sufficient to cover the costs of the chosen major, the value is 1. Meanwhile, if the parents' income is not sufficient to cover the costs of the chosen major, the value is 0.

c. Interest Criteria Interest criteria are the requirements needed to make decisions in choosing a higher education. The membership function of the interest criteria is as follows:

$$(x) \begin{cases} 1, x = \text{minat} \\ 0, x \neq \text{minat} \end{cases}$$

Dimana (x) = fungsi keanggotaan kriteria minat.

If the student has an interest in one of the majors x, then the fuzzy value of major x is 1, while the fuzzy value of the other majors is 0.

d. Accreditation Criteria Accreditation is an External Quality Assurance system as part of the Higher Education Quality Assurance System which is implemented with the aim of determining the eligibility of Study Programs and Higher Education Institutions based on criteria referring to the National Higher Education Standards and guaranteeing the quality of Study Programs and Higher Education Institutions externally in both academic and non-academic fields to protect the interests of students and the community.[7] So that the Accreditation Criteria are the requirements needed to make decisions in choosing a higher education institution. The following are the weights of the accreditation criteria:

Table 4. Accreditation Criteria

Caption	Weight
Not Accredited	0

A	0.5
B	0.75
C	1

e. Weight Determination Each criterion has a different weight, based on its level of importance. Here are the weight values of each criterion:

Table 5. Weight Determination

Criteria	Weight
Mark	1
POT	0.75
Interest	0.5
Accreditation	1

From table 5. It shows that the criteria of value and accreditation have the highest weight of 1, while the income of parents is 0.75, and the interest criteria is 0.5. This is because the value criteria have the greatest influence on a student to choose a major.

5. Create a decision matrix based on the criteria (Ci), then normalize the matrix based on the equation adjusted to the type of attribute (profit or cost) to obtain a normalized matrix R.

A prospective new student, has an interest in entering the information system department, where his parents' income is Rp. 3,500,000, and accreditation status is very important to him, he wants the best. With the following subject scores:

Table 6. New Student Candidate Score Results

Subject Grades	Mark
Computer	80
Mathematics	75
B.Indonesia	77
B.English	75
Biology	72
Physics	71
Economy	68

Based on the value data that has been obtained, a fuzzy matrix will be formed as follows:

a. Information Systems Department Score: (80*1) + (75*1) + (77*0) + (75*1) + (72*0) +(71*0) + (68*0) = 80 + 0+75 + 0 + 0 + 0 = 155
b. Accounting Department Score: (80*0.75) + (75*1) + (77*0) + (75*1) + (72*0) + (71*0) + (68*0.75) = 60 + 75 + 0 + 75 + 0 + 0 + 51 = 261
c. Pharmacy Department Score: (80*0.5) + (75*0.75) + (77*0) + (75*0.75) + (72*0.5) + (71*1) + (68*0) = 40 + 56.25 + 0 + 56.25 + 36 + 71 + 0 = 259.5
d. Medical Records Department Score: (80*0.5) + (75*0.75) + (77*0) + (75*0.5) + (72*0.5) + (71*0.5) + (68*0) = 40 + 56.25 + 0 + 36.7 + 36 + 35.5 + 0 = 204.45

Interest: Information System = 1 POT: 3,500,000, so the fuzzy value is 1 Accreditation: Best = 1

Table 7. Fuzzy Value Results for Each Criteria of Student Y

Major	Value (C1)	POT (C2)	Interest (C3)	Accreditation (C4)
Information Systems	155	1	1	1
Accountancy	261	1	0	0
Pharmacy	259.5	0	0	0
Medical records	204.45	0	0	0
MAX	261	1	1	1
MIN	155	0	0	0

Max = the highest value of the fuzzy results in each column.
Min= the lowest value of the fuzzy results in each column.
After getting the results above, the next stage is to determine the normalization value of each criterion determined by the profit attribute and cost attribute. Based on the level of

importance, the profit attribute is obtained for each criterion. Then the results of the normalization can be seen in the following table:

Table 8. Normalization Results

Major	Value (C1)	POT (C2)	Interest (C3)	Accreditation (C4)
Information Systems	0.597	1	1	1
Accountancy	1	1	0	0
Pharmacy	0.994	0	0	0
Medical records	0.783	0	0	

From the table above, we can see the results of normalization. After the results of this normalization are obtained, they will then be multiplied by the specified weight. The results of the multiplication of normalization and weight can be seen in the following table:

Table 9. Weight Multiplication Result

Major	Value (C1)	POT (C2)	Interest (C3)	credit (C4)
Information Systems	0.597	0.75	0.5	1
Accountancy	1	0.75	0	0
Pharmacy	0.994	0	0	0
Medical records	0.783	0	0	1

From the table above, we can see the results of the multiplication between normalization and the specified weights. After the results are obtained, the values will be added up per row according to their majors. The results of the addition can be seen in the following table:

Table 10. Addition Results

Major	Value (C1)	POT (C2)	Interest (C3)	credit (C4)
Information Systems	0.597	0.75	0.5	1
Accountancy	1	0.75	0	0
Pharmacy	0.994	0	0	0
Medical records	0.783	0	0	1

From the calculation results of the table above, it can be seen that the ranking results show that the majors that student Y is interested in have the highest scores compared to other majors. The following is a table of ranking results:

Table 11. Ranking Determination

Major	Results (V)	Ranking
Information Systems	2,847	1
Medical records	1,783	2
Accountancy	1.75	3
Pharmacy	0.9994	4

CONCLUSION

Based on the results of the calculations that have been done previously, it can be concluded that: The application of the Simple Additive Weighting (SAW) method in student decision making to choose a study program has proven effective in providing objective and structured recommendations. This method involves identifying and giving weights to various important criteria such as career prospects, personal interests, and academic achievements. By normalizing the scores for each criterion and calculating the total weighted value, SAW helps produce a ranking of study programs that can guide students in making the right decisions. However, it should be noted that the accuracy of the results is highly dependent on the determination of the right weights and the validity of the criteria used. The use of student satisfaction surveys also helps ensure the relevance and quality of the recommendations given, so that it can continue to improve student satisfaction and learning outcomes. The application of the SAW (Simple Additive Weighting) method is able to provide recommendations to prospective new students to choose a major in college based on the weight of the assessment criteria that have been determined. The

SAW (Simple Additive Weighting) method can be used to solve the problem of choosing a major in college with the calculation of this method, it is found that the criteria that are prioritized are value and accreditation. Based on the calculations obtained, the Information System gets the first rank with a value of 2.847.

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