



Application Of Weight Sum Model (WSM) In Determining Special Allocation Funds Recipients

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Abstract – In the management of education is not uncommon educational institutions sometimes receive sources of funds from outside, one of which comes from the Department of Education in the implementation of its duty to provide one allocation of funds called Special Allocation Fund(DAK). This funding is from APBN revenues to areas devoted to schools to help fund special activities such as the addition or improvement of school facilities and infrastructure. The application of this special allocation grant needs to use a Decision Support System (DSS) to allow decisions to be generated in favor of the Special Allocation Fund beneficiary. In the application of DSS required MCDM method, the Weight Sum Model (WSM), which is a simple method and able to generate ranking from the proposer alternatives in a special allocation fund.

Keywords - Special Allocation Funds, Decision Support System, Weighted Sum Model, WSM

1 INTRODUCTION

Special allocation funds (DAK) are funds sourced from APBN revenues allocated to specific areas with the aim of assisting in funding specific activities that are regional and national priorities. In the field of education desperately needs this special allocation fund to be used in terms of development or in terms of other education-related education. In the determination of the criteria, which are prioritized for primary schools located in 3T areas, still operational and have operational permits, standing on non-problematic and self-owned land, do not have facilities and infrastructure that meet educational standards, have a principal, has a school committee, have bank accounts on behalf of schools, do not receive similar assistance from other sources and have a steady or increasing number of students.

The use of Special Allocation Funds in the education sector is directed to support the implementation of compulsory education with main activities to finance the rehabilitation of school buildings. It was initially focused on the rehabilitation of the building, but also for the construction of new classrooms. Special education allocation fund sector is intended to fund educational activities that become mandatory regional affairs and is a national priority with the aim of fulfilling minimum service standards of basic and secondary education facilities and infrastructure to achieve national education standards. The improvement of educational infrastructure is carried out by the committee established by the head of the recipient of Special Allocation Fund by self-management. The improvement of educational facilities is carried out by the Department of Primary and Secondary Education. Special allocation fund for Basic Education covers primary school and junior high school. While the funding of the Secondary Education Sector covers High School Funding. But starting in 2016, the central government is no longer providing special allocation fund budget for junior and senior high school education. Special education allocation fund sector starting in 2016 is only for elementary school only.

In the event that the determination of the recipient of the special allocation funds of the Dinas Pendidikan is in accordance with the applicable legal basis. According to Law No.20 of 2003 on the national education system, Government Regulation No.48 of 2000 on education funding, as well as the regulation of the Minister of National Education No.5 Year 2010 on technical guidance on the use of Special Allocation Fund of the number of events in the field that the implementation is still far from the standards of feasibility seen from facilities and infrastructure in the school. Therefore, the government always tries to improve the standard and quality with the special allocation fund.

Decision support systems can take account of criteria that help speed up the determination of which schools can accept them. There are many methods in decision support systems such as Weighted Product (WP), Weighted Sum Model (WSM), Elimination and Choice Translation Reality (ELECTRE)[1], Simple Additive Weighting (SAW), TOPSIS[2][3], Extended PROMETHEE II(EXPROM2)[4]. In the previous study comparing WP and WSM methods in the selection of the best private university computer majors with the criteria of the number of computer majors, tuition, campus environment, number of scholarship programs, and BAN-PT accreditation[5]. The result of the research is the choice of the user of the system with the criterion value determined by the users themselves and the result will be sorted from the highest to the lowest value so that the user is easier to make a



decision. In the provision of recommendations with the approach Contextual Model and Multi-Criteria Decision Making can be applied WSM method. WSM is a method that has good results accuracy and has a set of alternative options based on several decision-making criteria. This method is also the easiest method to apply because it has a complicated algorithm[6][7].

2 THEORY

2.1 The Special Allocation Fund (DAK)

The Special Allocation Fund is a fund sourced from the State Budget (APBN) allocated to certain regions to finance the special activities that are the affairs of the Regional Government and in accordance with the scale of national priorities. Specific areas referred to herein are areas with consideration of general criteria, specific criteria and technical criteria. This funding includes the Balancing Fund, in addition to the General Allocation Fund. The purpose of special allocation fund is to assist certain regions to fund the needs of basic community service facilities and infrastructure, and to encourage the acceleration of regional development so as to achieve national priority objectives.

2.2 Decision Support System (DSS)

Decision support system is a computer-based system that can generate information in the form of decisions that can support the decision generated by managerial[8][9][10]. In its application the decision support system uses methods such as ELECTRE, Preference Selection Index, WP, PROMETHEE[11][12].

2.3 Weight Sum Model (WSM)

Weight Sum Model (WSM) is the most recognizable method and decision making Simple multi-criteria for evaluating a number of alternatives in terms of a number of decision criteria [1]. In general, suppose a given MCDA problem is defined on alternative m and decision criteria n . Next, let's assume that all the benefit criteria are, the higher the values, the better. Further, suppose that w_j shows the relative importance of the criterion C_j and a_{ij} is the performance of alternative A_i when evaluated in terms of criterion C_j . Then, total (that is, when all criteria are considered simultaneously) the importance of alternative A_i , denoted as $A_i^{WSM-Score}$, is defined as follows[13][6][5]:

$$A_i^{WSM-score} = \sum_{j=1}^n W_j A_{ij} \quad \text{for } i = 1, 2, 3, \dots, m \dots\dots\dots (1)$$

For the case of maximization, the best alternative is the one that generates the maximum total performance value.

3 RESULT AND DISCUSSION

In the process of selecting the selected school, the Education Office of North Sumatra Province still uses a manual system. From the existing decision-making problem, it has analyzed the problem to make the new system more effective is expected to be able to overcome the problems in decision making to choose a school according to predetermined criteria. This will be easier by using a decision support system method, one of which is the Win Sum Model (WSM) method.

The application of the Weight Sum Model method is a very simple method with only a few steps to be able to give the result of the determination of special allocation fund found in North Sumatra. Decision Support System by applying WSM method is an application is designed to assist the Provincial Education Office of North Sumatra in making decisions to determine the right Special Allocation Fund recipient with several supporting criteria.

Here are some of the list of schools that will receive special allocation funds.



Table 1. List of School

School Name
SDN 060971 (A₁)
SDN 064955 (A₂)
SDN 067257 (A₃)
SDN 060973 (A₄)
SDN 060895 (A₅)
SDN 060849 (A₆)
SDN 060786 (A₇)
SDN 060864 (A₈)

In the process of calculating WSM, we need criteria and weights that will be used as material calculation and consideration.

Table 2. Criteria

Criteria	Information	Weight
C ₁	Located in 3T area	20 %
C ₂	It is still operational and has operational permit	10 %
C ₃	Land/land status	10 %
C ₄	Facilities and infrastructure that meet educational standards	10 %
C ₅	Has a Headmaster	10 %
C ₆	Has a school committee	10 %
C ₇	Have a bank account on behalf of the school	10 %
C ₈	Do not receive similar assistance from other sources	10 %
C ₉	The number of students is stable / increasing	10 %

From table 2 above can be translated in accordance with the weight that has been determined in the table below.

Table 3. Translation of Criteria and Weight

Criteria	Information	Information Weight
C ₁	Located in 3T area	1 = No 2= Yes
C ₂	It is still operational and has operational permit	1= Still operating but not licensed 2= Still operating and licensed
C ₃	Land/land status	1 = Belong to the community 2 = Rent 3 = One's Own
C ₄	Facilities and infrastructure that meet educational standards	1 = Not at all 2= Yes, but not standard 3 = Yes, standard
C ₅	Has a Headmaster	1 = Do not have 2= Yes, but has no Certificate 3 = Yes, have Certificate
C ₆	Has a school committee	1 = Do not have 2= Yes, but has no Certificate 3 = Yes, have Certificate
C ₇	Have a bank account on behalf of the school	1 = No 2= It has, but a personal name 3 = It has, On behalf of the school



Criteria	Information	Information Weight
C ₈	Do not receive similar assistance from other sources	1 = No 2 = Yes
C ₉	The number of students is stable / increasing	1 = No 2 = Yes

From table 2 and table 3, a match rating between alternatives and criteria can be found in Table 4.

Table 4. The alternative match rating on the criteria

Alternative	Criteria								
	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉
A ₁	1	2	1	3	2	3	2	1	1
A ₂	2	2	3	3	3	3	3	2	2
A ₃	2	2	2	1	3	2	3	1	2
A ₄	2	2	3	1	2	1	2	2	1
A ₅	1	1	2	3	3	1	3	2	1
A ₆	2	2	2	2	3	3	1	1	2
A ₇	1	2	3	2	1	3	3	2	2
A ₈	1	1	3	3	3	3	2	1	2

The first step determines the value of $A_i^{WSM-Score}$

$$A_1 = (0.2 \times 1) + (0.1 \times 2) + (0.1 \times 1) + (0.1 \times 3) + (0.1 \times 2) + (0.1 \times 3) + (0.1 \times 2) + (0.1 \times 1) + (0.1 \times 1) = 1.7$$

$$A_2 = (0.2 \times 2) + (0.1 \times 2) + (0.1 \times 3) + (0.1 \times 3) + (0.1 \times 3) + (0.1 \times 3) + (0.1 \times 3) + (0.1 \times 2) + (0.1 \times 2) = 2.5$$

$$A_3 = (0.2 \times 2) + (0.1 \times 2) + (0.1 \times 2) + (0.1 \times 1) + (0.1 \times 3) + (0.1 \times 2) + (0.1 \times 3) + (0.1 \times 1) + (0.1 \times 2) = 2$$

$$A_4 = (0.2 \times 2) + (0.1 \times 2) + (0.1 \times 3) + (0.1 \times 1) + (0.1 \times 2) + (0.1 \times 1) + (0.1 \times 2) + (0.1 \times 2) + (0.1 \times 1) = 1.8$$

$$A_5 = (0.2 \times 1) + (0.1 \times 1) + (0.1 \times 2) + (0.1 \times 3) + (0.1 \times 3) + (0.1 \times 1) + (0.1 \times 3) + (0.1 \times 2) + (0.1 \times 1) = 1.8$$

$$A_6 = (0.2 \times 2) + (0.1 \times 2) + (0.1 \times 2) + (0.1 \times 2) + (0.1 \times 3) + (0.1 \times 3) + (0.1 \times 1) + (0.1 \times 1) + (0.1 \times 2) = 2$$

$$A_7 = (0.2 \times 1) + (0.1 \times 2) + (0.1 \times 3) + (0.1 \times 2) + (0.1 \times 1) + (0.1 \times 3) + (0.1 \times 3) + (0.1 \times 2) + (0.1 \times 2) = 2$$

$$A_8 = (0.2 \times 1) + (0.1 \times 1) + (0.1 \times 3) + (0.1 \times 3) + (0.1 \times 3) + (0.1 \times 3) + (0.1 \times 2) + (0.1 \times 1) + (0.1 \times 2) = 2$$

The second step is the sorting stage of ranking results.

Table 5. Results of WSM Process

Alternative	Results
A ₂	2.5
A ₃	2
A ₆	2
A ₇	2
A ₈	2
A ₄	1.8
A ₅	1.8
A ₁	1.7



From the calculation results, the A2 has a value of 2.5 and higher than other alternatives, so it can be decided that A2 can get a Special Allocation Fund.

4 CONCLUSION

From the results of research conducted, it can be concluded, namely:

1. Implementation using Weight Sum Model can result in ranking from school which becomes alternative of the proposer, so that result can be used as a recommendation in giving special allocation fund.
2. Implementation of WSM method is quite easy and very simple but can result in better decision.

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