DECISION SUPPORT SYSTEM IN THE PROVISION OF SCHOLARSHIPS PT.INDOMARCO PRISMATAMA BRANCH BANDUNG

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ABSTRACT

PT. Indomarco Prismatama is a company engaged in the retail franchise that seeks to provide daily consumption needs for the community. Being an active role against the development of education Indomaret one of them is by providing scholarships to high school student elementary school. Basis of consideration because the number of students in elementary school level is still very much in number when compared with junior high or high school level that need to be given special attention. The scholarship is to h elp someone who is less capable or accomplished during the covered studies. To assist in determining in determining a person eligible to receive scholarships will take a decision support system.

In a decision support system development process to determi ne the scholarship recipients at PT. Indomarco Prismatama Bandung branch used method Decission Making Fuzzy Multiple Attribute (FMADM) Simple Additive weighting method (SAW). This method was chosen because it is able to select the best alternative from a n umber of alternatives, in this case meant that alternative students are eligible to receive scholarships based on certain criteria. Research done by searching for weight value for each attribute, then ranking process that will determine the optimal alterna tive, namely the best students.

Keywords: FMADM, SAW, Criteria, Scholarships.

1. INTRODUCTION

PT. Indomarco Prismatama (Indomaret) is a company engaged in the retail franchise that seeks to provide daily consumption needs for the community. Indomaret business situation and progress in the midst of society is closely connected with the economic condition of the surrounding community. As a form of devotion and social responsibility to the community one of which is diadakanya fundraiser for the charity by providing scholarships to the schools affected. The model used in this decision support system is Fuzzy Multiple Attribute Decision Making (FMADM) Simple Additive weighting method (SAW), even with a simple plot but the algorithm can be material in determining the solution to the problems of scholarship. Chronology of a simple algorithm into consideration in applying the software in acco rdance with the time of final project. When compared with the AHP method or methods of approach Subjective - Objective FMADM with the SAW method in the ranking of criteria and relative weights are determined as though each method has advantages and disadvantages of each.

1.2 Identification of Problems

How to build a decision support system applications using Fuzzy Multiple Attribute Decision Making (FMADM) Simple Additive weighting method (SAW) to determine the scholarship recipients at PT. Prismatama Indomarco Branch Bandung according to the weight of a pre-determined criteria. By using a program to help resolve the problems so that relatively much easier and efficient.

1.3 Objectives

Based on the problems studied, the purpose of this thesis is to build a decision support system applications using models, Fuzzy Multiple Attribute Decision Making (FMADM) Simple Additive weighting method (SAW) to determine the scholarship recipients at PT. Prismatama Indomarco Branch Bandung.

The aim is achieved in this research are:

1. *For relatively easy-Indomaret Realgood scholarship committee in the selection of awardees.*
2. *To get more accurate results of who will receive scholarships.*
3. *Applying Fuzzy Multiple Attribute Decision Making (FMADM) Simple Additive weighting method (SAW) to determine the scholarship recipients.*

1.4 Limitation Problem

Basically the problem is quite widespread in scholarship, but to fit a pre-planned restrictions necessary to achieve the research objectives. The limitations in this study are as follows:

1. *The analyzed data to data from PT. Indomarco Prismatama Bandung branch.*
2. *The data collection method obtained by using the form of scholarships and visits from the students.*
3. *Type of scholarship can be distinguished among the species less capable of scholarship and achievement.*
4. *The system built is still stand alone.*
5. *The model used for the model of decision making, Fuzzy Multiple Attribute Decision Making (FMADM) Simple Additive weighting method (SAW).*
6. *This application was built using Borland Delphi programming language and database using SQL Server 2000.*

2. Theory basis

2.1 Definition of Scholarship

Basically, the scholarship is the income for those who receive it. This scholarship is in accordance with the provisions of Article 4 paragraph (1) of the Act PPh/2000. Stated income is an additional understanding of the economic ability to name and in whatever form received or obtained from sources outside Indonesia or Indonesia that may be used for consumption or increase the wealth of the taxpayer (WP), because it can mean scholarships for recipients to increase economic capability, means scholarship represents income (Java Post, 2009).

2.2 FMADM

Fuzzy Multiple Attribute Decision Making (FMADM) is a method used to

find the optimal alternative from a number of alternatives to certain criteria. The core of FMADM is to determine the weight value for each attribute, then continue with the process of selecting an alternative ranking that would have given. Basically, there are 3 (three) approach to find the value of attribute weights, namely the subjective approach, the approach of an integrated approach between the objective and subjective and objective. Each approach has advantages and disadvantages. In the subjective approach, the weight value is determined based on the subjectivity of the decision makers, so that some factors in the process of ranking alternatives can be determined freely. In the objective approach, mathematically calculated weight value so ignore the subjectivity of decision makers.

There are several methods that can be used to solve the problem FMADM namely:

1) *Weighting Simple Additive Method (SAW).*
2) *Weighted Product (WP).*
3) *ELECTRE.*
4) *TOPSIS (Technique for Order Preference by Similarity to Ideal Solution).*
5) *Analytic Hierarchy Process (AHP).*

2.3 SAW

SAW method also known as the term is often a weighted sum method. The basic concept SAW method is to find a weighted sum of rating the performance of each alternative on all attributes. SAW method requires the decision matrix normalization process (X) to a scale that can be compared with all the ratings of existing alternatives.

$$r_{ij} = \begin{cases} \dfrac{X_{ij}}{\underset{i}{Max}\, X_{ij}} & \text{Jika j adalah atribut keuntungan (}benefit\text{)} \\ \dfrac{\underset{i}{Min}\, X_{ij}}{X_{ij}} & \text{Jika j adalah atribut biaya (}cost\text{)} \end{cases} \quad (1)$$

where rij is the normalized performance ratings of alternatives on attribute Ai Cj, i = 1,2 ,..., m and j = 1,2 ,..., n. Preference value for each alternative (Vi) is given as:

$$V_i = \sum_{j=1}^{n} w_j r_{ij} \quad (2)$$

Description:
Vi = ranking for each alternative
WJ = value weighting of each criterion
rij = value normalized performance rating
Vi a larger value indicates that more elected alternative Ai.

2.4 Completion Algorithm

In this study FMADM using SAW method. The steps are:

1) *Gives the value of each alternative (Ai) on each criterion (Cj) is already determined, where the value of i = 1,2, ... m and j = 1,2, ... n.*
2) *Giving weight value (W) are also obtained based on crisp values.*
3) *Perform normalization matrix to calculate the value of normalized performance rating (rij) of the alternative Ai Cj attributes based on equality, adjusted for the type attribute (attribute profits / benefits = Maximum or attribute*

costs / cost = MINIMUM). If the value of benefits in the form of crisp artibut (Xij) of each column attribute divided by the crisp value MAX (MAX Xij) of each column, whereas for the cost attribute, crisp value MIN (MIN Xij) of each column attribute divided by crisp values (Xij) each column.

4) *Ranking process for each alternative (vi) by multiplying the weight value (Wi) with the normalized value of performance ratings (rij).*

3. Analysis and Design System

3.1 System Analysis

Experiences that arise during the holding of the event giving scholarships are made in prior periods provide useful lessons for improving the state of implementation of the next event with a better service. Criticisms and suggestions received scholarship selection committee can be used as material to make an analysis of problem solving reference problems. Problems that arise can be categorized into the problem of supporting facilities and human error (human error).

3.1.1 Model Analysis Method FMADM with SAW

In the scholarship selection using fuzzy model of Multiple Attribute Decision Making (FMADM) Simple Additive weighting method (SAW) is required criteria and weights to perform the calculations so that we can extract the best alternative, in this case is that the alternative is eligible to receive scholarships based on criteria.

3.1.1.1 Weight

FMADM and SAW models in the process requires criteria that will be used as an accounting of the ranking process. The criteria that a committee of selectors scholarship consideration is shown in table 3.1.

Kriteria	***Keterangan***
C_1	*Usia*
C_2	*Jumlah penghasilan orangtua*
C_3	*Kelas*
C_4	*Jumlah tanggungan orangtua*
C_5	*Jumlah saudara kandung*
C_6	*Nilai rata-rata raport*

3.1.1.2 Age

Age variables are converted into fuzzy numbers in Table 3.2

Table 3.2 Age

Usia (C_1)	***Bilangan Fuzzy***	***Nilai***
Usia <= 9 Tahun	*Sangat Muda (SM)*	*0,25*
Usia = 10 Tahun	*Muda (M)*	*0,5*
Usia = 11 Tahun	*Sedang (S)*	*0,75*
Usia>= 12 Tahun	*Tua (T)*	*1*

3.1.1.3 Criteria Total Income Parents

Variable amount of parental income is converted into fuzzy numbers in Table 3.3

Table 3.3 Total income parents

Jumlah Penghasilan Orang Tua (C_2)	***Bilangan fuzzy***	***Nilai***
C_2 *<= Rp. 500.000*	*Rendah (R)*	*0.25*
C_2 *> Rp. 500 ribu – Rp. 1,5 juta*	*Cukup (C)*	*0.5*
C_2 *> Rp. 1,5 juta – Rp. 3 juta*	*Tinggi (T)*	*0.75*
C_2 *>Rp. 3 juta*	*Sangat Tinggi (ST)*	*1*

3.1.1.4 Criteria Class

Variable amount of parental income is converted into fuzzy numbers in Table 3.4

Table 3.4 class

Kelas (C_3)	***Bilangan Fuzzy***	***Nilai***
1	*Sangat Rendah (SR)*	*0*
2	*Rendah (R)*	*0,2*
3	*Sedang (S)*	*0,4*
4	*Tengah (T1)*	*0,6*
5	*Tinggi (T2)*	*0,8*
6	*Sangat Tinggi (ST)*	*1*

3.1.1.5 Number of Dependant Parents

Variable amount of parental income is converted into fuzzy numbers in Table 3.5

Table 3.5 the number of parents

Jumlah Tanggungan Orangtua (C_4)	***Bilangan Fuzzy***	***Nilai***
C_4 = 1 anak	*Sangat Sedikit (SS)*	*0*
C_4 = 2 anak	*Sedikit (S)*	*0,25*
C_4 = 3 anak	*Sedang (SD)*	*0,5*
C_4 = 4 anak	*Banyak (B)*	*0,75*
C_4 >= 5 anak	*Sangat Banyak (SB)*	*1*

3.1.1.6 Number of Siblings

Variable amount of parental income is converted into fuzzy numbers in Table 3.6

Table 3.6 the number of siblings

Jumlah Saudara Kandung (C_5)	***Bilangan fuzzy***	***Nilai***
C_5 = 1 Orang	*Sangat Sedikit (SS)*	*0*
C_5 = 2 Orang	*Sedikit (S)*	*0.25*
C_5 = 3 Orang	*Sedang(SD)*	*0.5*
C_5 = 4 Orang	*Banyak (B)*	*0.75*
C_5 >= 5 Orang	*Sangat Banyak (SB)*	*1*

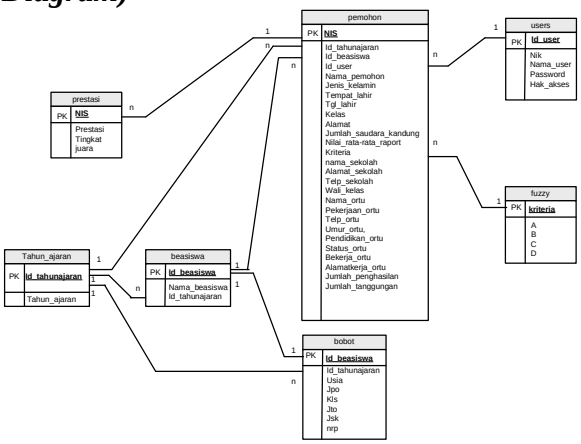
3.1.1.7 Average Value Raport

Variable amount of parental income is converted into fuzzy numbers in table 3.7

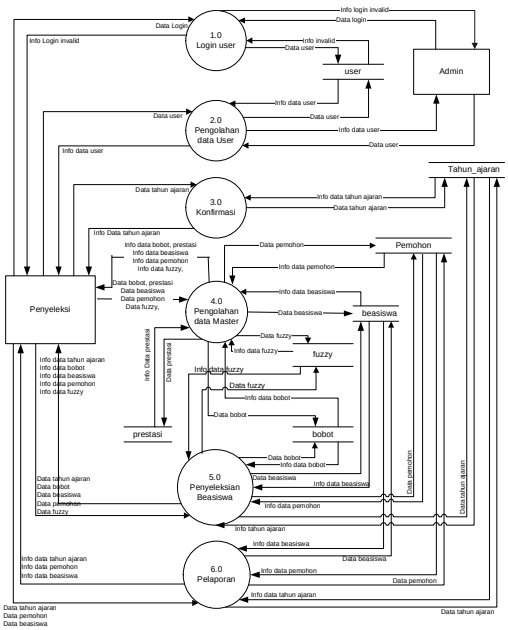
Table 3.7 Average value of report cards

Nilai rata-rata	*Bilangan fuzzy*	*Nilai*
C_6 <= 60	*Sangat Rendah (SR)*	*0*
C_6 > 60 – 70	*Rendah (R)*	*0.25*
C_6 > 70 – 80	*Cukup (C)*	*0.5*
C_6 > 80 – 90	*Tinggi (T)*	*0.75*
C_6 > 90	*Sangat Tinggi (ST)*	*1*

3.1.2.1 ERD (Entity Relationship Diagram)

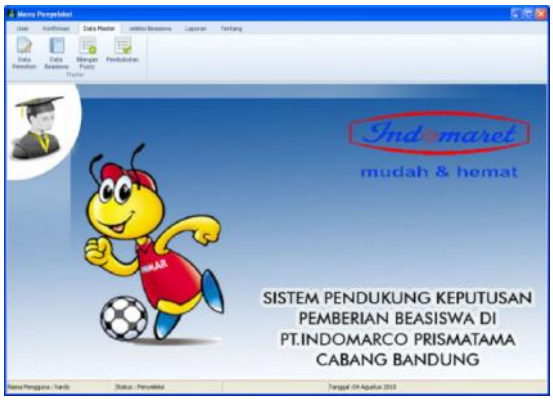


3.1.2.2 DFD level 0

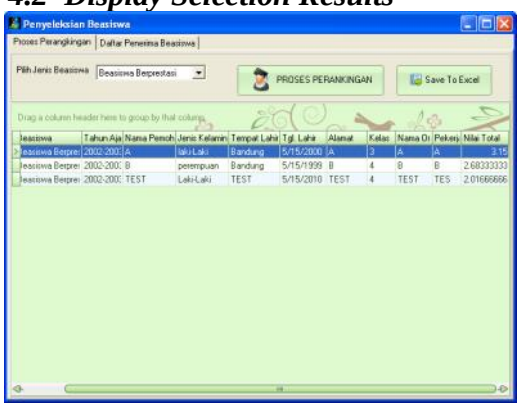


4. Implementation

4.1 Display Program



4.2 Display Selection Results



5. Conclusions and Suggestions

5.1 Conclusion

After doing the analysis, design, implementation and testing, it can be concluded as follows:

1. *The system built to help the working team selectors scholarship committee PT. Indomarco Prismatama in doing scholarship selection.*
2. *The system can be built relatively expedite the scholarship selection process.*
3. *The system built is expected to increase employee productivity and achieve cost efficiency.*
4. *The system can be built relatively easier team selectors in determining scholarship recipients.*
5. *Fuzzy Multiple Attribute Decision Making (FMADM) Simple Additive weighting method (SAW) can be applied to determine the scholarship recipients.*
6. *So the development of decision support systems scholarships at. Indomarco Prismatama Bandung branch has appropriate procedures to be expected.*

5.2 Suggestions

As for suggestions for the scholarship selectors, admin and IT staff so that these applications can be useful to both is as follows:

1. *Management of fuzzy numbers is made even more dynamic.*
2. *If the end result of summing the same data, then needed the relevant policies of the manager to determine the scholarship recipients.*
3. *Data is entered into the program are expected to use the correct data.*
4. *Admin expected to continue to perform regular system maintenance.*
5. *Permanent preservation of coordination between user in selecting the scholarship.*
6. *Developing applications that can be accessed online from the store Indomaret branches in Bandung and in terms of distribution of data in realtime.*

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