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USING THE BORDA METHOD ON A DECISION SUPPORT SYSTEM TO CHOOSE THE MOST OUTSTANDING STUDENTS

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ABSTRACT

Every year, the computer science faculty of Sriwijaya University selects an outstanding student with the goal of rewarding their accomplishments and providing some inspiration. During the selection process, we consider a wide range of student accomplishments and utilize multiple assessment factors to identify exceptional students. Consequently, a Borda method-based decision-making system can be employed to solve the issue. By multiplying the reference value by the ranking's weight, the Borda method is a technique for bolstering collective decisions. The system's outcomes based on preset criteria can provide each student's assessment..
Keyword : Borda Method, Decision Support System, The Outstanding Students

INTRODUCTION

Faculty of Computer Science is one of the faculty at Sriwijaya University (Unsri) whose the graduates are expected to have the ability to utilize information technology and have the knowledge to analyze and develop the information systems to enrich theories and methods. Faculty of Computer Science Sriwijaya University every year organizes college student achievement selection where the purpose is to give awards and provide motivation to high achievers in order to balance the hard skills and soft skills owned. the selection of achievement college Student is an activity to find and select student achievement that not only achievement in academic field but also in non academic field. And has a myriad of social activities, and the fluency of foreign languages.

The selection of outstanding college students held by Fasilkom Unsri was done by the way the students did the registration by filling out the prepared forms and other supporting files which were then presented to the student department of Sriwijaya University Indralaya campus to check the completeness and authenticity of the file. The students who pass will be grouped and at this stage, the judges will give their assessment to the participants. However, for the assessment and decision-making process it is not easy, as there are several criteria such as, student's cumulative grade point (GPA), foreign language proficiency, scientific writing and other necessary achievements.

Based on the description above, it is expected that there is a solution or how to do a good data collection, good filing and provide appropriate criteria and subcriteria in accordance with the criteria that have been established in choosing outstanding college students. Therefore, it takes a decision support system that can conduct the assessment process against criteria and methods that can bring together or different perceptions about a decision. Decision Support System (DSS) is an approach or tool to support decision-making taken by decision makers. Decision Support Systems are not designed to solve problems but only to support a decision. In Decision Support System there are several methods that can be used, one of which is Borda method (Silva-Risso, Bucklin, & Morrison, 1999).

(Khodashahri & Sarabi, 2013) purposed Decision support systems are computer information systems that during decision making supply information active support for managers and workers. DSSs are a sub-collection of information management systems that help planners, analyzers and managers in decision making process. These systems could provide a different concept from decision making and different decision making status. Main DSS property is their concerning on computer ability to help decision making to introduce problem and increase understanding about decision making environment through access to data and decision making suitable models.

(Costa, 2017) proposed the method De Borda was first introduced to deals with voting problems and its algorithm is addressed to the problematic, once it performs a ranking of alternatives. There are variations of De Borda that uses criteria's weights as input. In such situations, the weights are usually assigned using intuitively scales with five positions, or even score scales with scores varying from 0 to 10 or from 0 to 100 points. In these cases, it is not usual to employ a technique for validating the consistency of the weights.

METHOD

The calculations using the Borda method were first proposed in 1435 by one of the authors and theologians who eventually became the cardinal of Nicholas Cusanus. At first he advised to use these calculations at the time of the Roman emperor's election, but unfortunately his advice was rejected. Then in 1784, Jean Charles de Borda advocated this voting method for I 'Academie des Sciences as the electoral system at the time. It went well, until sixteen years later came a new member who did not like the electoral system using the method. He prefers a simple electoral system, the majority vote eligible to win the election. The person who proposed it, until now known as Napoleon Bonaparte (P, 2007).

Borda is a method used to support a group decision made by multiplication of its reference value to the weight of the ranking. The Borda method determines the winner by counting the most points. Borda gives a certain number of points for each candidate according to the rank or rank set by each decision maker. The winner will be determined by the number of points earned or collected from each candidate.

Based on these studies mentioned that Borda method is one of the methods or techniques of solving a problem of decision making in the group. With the Borda method, different opinions or perceptions about a decision can be put together into a joint decision. That way, the resulting decision is acceptable.

Borda Method Calculation

The steps of Borda method

Before performing the calculation, the results of the assessment of each question on each criterion is done by weighting by using weighting Borda method written with the formula:

$$W_j = \frac{\sum_{i=1}^{r} n_i(r-i)}{\sum_{k=1}[\sum_{i=1}^{r} n_i(r-i)]_k}$$

Where:

W_j = The weight of the question point j
r = largest rank
i = Rank, i (1, 2, ..., 5)
n_i = Number of respondents who gave rank i to point question j
k = Criteria

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With Borda's method voters rank the entire list of candidates or choices in order of preference from the first choice to the last choice. After all votes have been cast, they are tallied as follows:

a. ballot, the lowest ranking candidate is given 1 point, the second lowest is given 2 points, and so on.
b. The top candidate receiving points equal to the number of candidates.
c. The number of points given to each caniddate is summed across all ballots.
d. This is called the Borda Count for the candidate. The winner is the candidate with the highest Borda count.

Example :

1) There are known 3 alternatives to be ranked (let's say types A, B, and C). Then carried out the distribution of questionnaires to determine the basic data that will be used as ranking.
2) From the results of the questionnaire, will be calculated the number of respondents who followed the questionnaire and has stated the ranking for each type. For example, 4 respondents stated that type A was ranked 2nd, and 3 respondents stated that type A was ranked 3rd, and so on. Then write number 4 in the A type column in rank 2 and 3 in the Type A column in rank 3. The same is done for the other type.

Table 1
Example Calculation with Borda Method

Candidates	Rank			Final Score	Bobot	Rank
	1	2	3			
A	0	4	3	4	0.2	3
B	5	1	1	11	0.55	1
C	1	3	3	5	0.25	2
Bobot	2	1	0			

3) Then multiply the number in the rank column with the weight below it, then add the result with the multiplication on the same type, then fill the result in the rank column. For example for type A, where the calculation : (0 x 2) + (4 x 1) + (3 x 0) = 4
4) The number of results ranking. for example 4 + 11 + 5 = 20
5) To find the weight of each type, for the ranking with the number of rankings. Type A = 4/20 = 0.2, and so on.
6) The type with the highest weight is the chosen one.

RESULTS AND DISCUSSION

Assessment Process

The assessment process for each participant is done by each juries in accordance with predetermined criteria such as student's cumulative grade point (GPA), scientific papers, english and achievement. The judges give score scores on each criterion which is then multiplied by the weight that has been set to get a weighted score as in the table below.

Table 2
Assessment of 1st Judges for each criterion against each alternative

Candidates	Criteria					
	Papers		English		Achievement	
Aisyah Nur	647	655	82	80	-	355
Dona Pratiwi	693	695	81	79	-	375
Gustin Saputri	745	730	81	81	10	365
M.Galang S	645	695	76	77	7	340
Yeni Pratiwi	650	615	80	81	6	330

Table 3
Assessment of 2nd Judges for each criterion against each alternative

Candidates	Criteria				
	Papers		English		Achievement
Aisyah Nur	630	630	84	82	380
Dona Pratiwi	670	600	79	82	340
Gustin Saputri	694	595	79	77	350
M.Galang S	662	545	83	83	315
Yeni Pratiwi	642	546	83	82	360

Table 4
Assessment of 3rd Judges for each criterion against each alternative

Candidates	Criteria				
	Papers		English		Achievement
Aisyah Nur	646	640	85	87	380
Dona Pratiwi	642	660	82	84	360
Gustin Saputri	660	685	80	81	330
M.Galang S	655	620	85	82	375
Yeni Pratiwi	653	610	83	83	375

After the results obtained for each criterion of college student alternatives, it will be calculated total assessments obtained by each student alternative by summing the total value of each criterion obtained.

Table 5
Recapitulation

Candidates	Criteria								
	Papers			English			Achievement		
Aisyah Nur	65,18	63	64,24	80,8	82,8	86,2	42,6	39	45,6
Dona Pratiwi	69,42	62,8	65,28	79,8	80,8	83,2	45	40,8	43,2
Gustin Saputri	73,6	63,46	67,5	81	77,8	80,6	47,8	46	43,6
M.Galang S	67,5	59,18	63,4	76,6	83	83,2	43,6	40,6	47,8
Yeni Pratiwi	62,9	58,08	62,72	80,6	82,4	83	42	45,6	47,4

Table 5
Recapitulation Result

Candidates	Judges		
	1	2	3
Aisyah Nur	61,963	60,54	64,304
Dona Pratiwi	63,987	60,5	62,928
Gustin Saputri	66,79	61,651	63,065
M.Galang S	61,865	59,823	63,88
Yeni Pratiwi	60,895	61,008	63,442

Table 6
The Final Result

Candidates	Bobot	Rank
Gustin Saputri	0,66	1
Dona Pratiwi	0,63	2
Gustin Saputri	0,058	3
M.Galang S	0,057	4
Yeni Pratiwi	0,056	5

CONCLUSION

Based on the research undertaken and the results discussed in the previous chapters, it can be concluded that in the selection of outstanding college students is an important thing in improving the quality of a faculty. Decision Support System with the application of Borda Method in accordance with the calculations performed with ms.excel, although there are still differences in terms of rounding numbers. With the Borda method, different opinions or perceptions about a decision can be put together into a joint decision. That way, the resulting decision is acceptable.

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