

Recommendations for Candidates for KIP-Kuliah Recipients Using AHP and Borda Methods on Group Decision Support Systems

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Abstract

The Smart Indonesia Card (KIP) is a coalition cash assistance program for students whose parents are unable to pay for their education. It is a continuation and expansion of the Poor Student Assistance (BSM) program's aim. There are so many assessment criteria to evaluate for selecting prospective KIP participants that it's tough to know which people fit the criteria to be recommended for KIP-Kuliah recipients. Without having to comb through the collected files one by one, accurately evaluate the eligibility of KIP-Kuliah grantees. As a result, developing a decision-making system is required to address the current issues. The research processes for developing a decision support system also included extracting criteria and sub-criteria from the evaluation and then entering them into the formula or calculating method employed, namely the AHP method. From the results of this study, it was found that the application of the AHP method was very appropriate in the decision-making system because it could collect the percentage value of prospective students receiving KIP scholarships by assessing each criterion and sub-criteria of the candidate multiplied by the KIP acceptance criteria.

Keywords: Decision Support System; AHP; KIP.

INTRODUCTION

The President of the Republic of Indonesia through Presidential Instruction Number 7 of 2014 has instructed Ministers, Heads of State Institutions, and Heads of Regional Governments to implement Productive Family Programs through the Prosperous Family Savings Program (PSKS), Healthy Indonesia Program (PIS), and Smart Indonesia Program (PIP). . The Ministry of Education and Culture following its duties and authorities implements the Smart Indonesia Program with the aim of increasing access for children aged 6 to 21 years to obtain secondary education services and preventing students from dropping out of school (Republik, 2020).

In previous studies, there have been those who have implemented a decision-making system related to the selection of scholarship recipients, such as a decision-making system using the Electre method with multi-criteria comparisons and their characteristics as recommendations (Ningsih et al., 2017). Application of the Promethee Method to Determine Smart Indonesia Card Recipients with a ranking system and sorting KIP recipients with the highest priority value (Cucu Handayani & Haryati, 2018). Decision Support System Determines Underprivileged Scholarship Recipients Using the Profile Matching Method to assess each prospective KIP recipient with the suitability of the candidate criteria against the KIP requirements criteria (Setiyowati et al., 2019). The Student Scholarship Decision Support System has also been carried out using the AHP and TOPSIS methods by combining the assessment of the AHP method as a draw from the criteria and combined with the value of prospective scholarship recipients using the TOPSIS method (Kirana et al., 2018).

From several previous studies, I think all methods are not appropriate because they have determined a fixed percentage for some of the criteria assessed, so I assessed the AHP approach to select KIP-Kuliah recipients at the South Aceh Polytechnic by comparing 4 criteria and several sub-criteria, namely by assessing the criteria Achievement in the education, KIP participants, Family, and status.

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LITERATURE REVIEW

The use of a decision support system for the selection of prospective scholarship applicants has been carried out based on past research, which includes the distribution of smart Indonesian Cards (KIP) (Ratna Indah Cahyaningsih, 2018). DSS using the Electre method in determining PIP recipients through KIP (Case study: Al-Washliyah Moho private elementary school, Simalungun Regency) (Ningsih et al., 2017). Implementation of the Promethee Method to Determine Recipients of the Smart Indonesia Card (KIP) in Vocational High Schools (Cucu Handayani & Haryati, 2018). Decision Support System Determines Underprivileged Scholarship Recipients Using the Profile Matching Method (Setiyowati et al., 2019). Decision Support System for Scholarships for Poor Students at SMP Negeri 22 Tangerang Using AHP and TOPSIS Methods (Kirana et al., 2018). Decision Support System for Social Protection Card Recipients (KPS) with the SAW (Simple Additive Weighting) Method (Eko Riyanto, 2016). The decision support system in determining the recipient of the Indonesian Smart Card (KIP) at SMP Muhammadiyah 1 Kalirejo (Sari, 2019). The decision support system for smart Indonesia card recipients uses the Simple Additive Weighting method (Wulansari, 2017). (Nurjoko, 2015). Many research, including the Decision Support System for Waterfall Tourism Destinations in the City of Bogor Using the AHP Method, have used the AHP method (Arif Setyo Pambudi, 2019). The use of the Analytic Hierarchy Process method in the natural fence technology high school's decision-making system for new student graduation (Aminah, 2020). Determination of KIP Recipients using the Moora method at SD Negeri 124395 Pematang Siantar (Sinaga & Andani, 2018). Application of a recommendation system using the AHP method and sentiment analysis (Prasetyaningrum et al., 2020). Decision Support System for Student PKL Place Selection Groups Using AHP and Borda Methods (Nur Ilham & Mulyana, 2017). The Effective Personnel Selection Via Multi-criteria Decision making Method Analytic Hierarchy Process (AHP): A Web-based Application (Ozbek et al., 2018). The priority decision support system for prospective recipients of the Smart Indonesia Program for junior high school students uses the TOPSIS method (Dedi Kusbianto P, Elok Nur Hamdana, 2018). Personal Computer (PC) Selection System in Elementary Schools Using Analytical Hierarchy Process and Multifactor Evaluation Process Methods (Srisulistiwati & Noe, Achmad Setiawati, 2020).

METHOD

Analyze the System

Using the AHP (Analytical Hierarchy Process) method, this system is designed as a decision-making tool to produce the result of the Recommendation for Candidates for KIP-Lectures. The system's requirements can be broken down into three categories: input, process, and output.

Table 1. Steps in the System

STAGE	DESCRIPTION OF THE STEP
Input	<ul style="list-style-type: none">- Data for Candidates for KIP-Lectures as an alternative.- The criteria and sub-criteria data are used as assessment parameters for prospective KIP-Kuliah recipients.- Candidate criteria value data.
Process	<ul style="list-style-type: none">- The AHP (Analytical Hierarchy Process) method compares criteria and sub-criteria for each prospective student receiving KIP-Culture.- The results of the ranking of each student against the alternative using the AHP (Analytical Hierarchy Process) method are derived by calculating the data from each alternative assessment result by the value of the student criteria.
Output	<ul style="list-style-type: none">- The data on the weight of the criteria and sub-criteria of the alternatives obtained from the pairwise comparison matrix process using the AHP (Analytical Hierarchy Process) method.- The weight of the results of the student score calculation with each weight of alternative criterion and sub-criteria.- Alternative ranking data for each student.

Data source

Data is needed to produce good information because information is the result of processing data entered into the system. In this Decision Support System, data sources come from within the institution to support the Decision Support System that will be designed. Some of the data needed are student data for prospective KIP-Kuliah recipients, criteria data, and sub-criteria data. Four criteria were utilized in this study, each of which has sub-criteria, as indicated in Table 2.

Table 2. Criteria for Selection of Recommendations for Candidates for KIP-Lectures

Number	Criteria	Sub Criteria
1	Achievement in the education	Mathematics
		Indonesian
		English
2	KIP participants	Field Basics
		KIP/ KKS Card
3	Family	Parents' job
		Parents' Income
		Dependent
4	Status	Marry
		Not married yet

Modeling of Processes

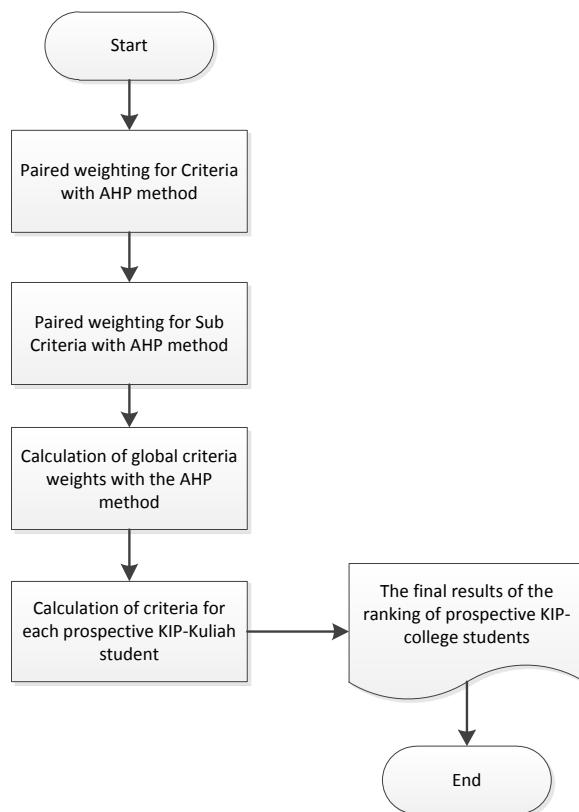


Figure 1. The recommended DSS model for prospective KIP-Kuliah students



The Decision Support System for the recommendation of KIP-Kuliah Prospective Students utilizes the AHP method as a model. The steps taken are:

- Provide an assessment of the calculation of the pairwise comparison matrix of criteria and sub-criteria for alternatives.
- Calculate the alternative value obtained with the value of each student and perform rankings.

By these steps contained in the Decision Support System model for recommendations for prospective KIP-Kuliah students can be seen in Figure 1.

Criteria pairwise comparison matrix

The paired comparison matrix of criteria and sub-criteria for ranking KIP-Kuliah recipients is set as follows. Table 3 shows the paired comparison matrix of criteria, Table 4 shows the paired comparison matrix of educational achievement sub-criteria, Table 5 shows the paired comparison matrix of family sub-criteria, and Table 6 shows the comparison matrix of all criteria. Table 6 lists the paired status subcriteria.

Table 3. Pairwise Comparison Matrix of Criteria

KRITERIA	Prest Akad	Peserta KIP	Keluarga	Status
Prestasi Akademik	1.000	3.000	5.000	7.000
Peserta KIP	0.333	1.000	3.000	5.000
Keluarga	0.200	0.333	1.000	3.000
Status	0.143	0.200	0.333	1.000

Table 4. Pairwise Comparison Matrix of Sub-criteria for Academic Achievement

Prestasi Akademik	Matematika	Bhs Indonesia	Bhs Inggris	Das Bid
Matematika	1.000	3.000	5.000	7.000
Bahasa Indonesia	0.333	1.000	3.000	5.000
Bahasa Inggris	0.200	0.333	1.000	3.000
Dasar Bidang	0.143	0.200	0.333	1.000

Table 5. Pairwise Comparison Matrix of Family Subcriteria

Keluarga	Peker OT	Pengh OT	Tanggungan
Pekerjaan Orang Tua	1.000	0.500	0.500
Penghasilan Orang Tua	2.000	1.000	0.500
Tanggungan	2.000	2.000	1.000

Table 6. Pairwise Comparison Matrix of Status Subcriteria

Status	Menikah	Blm Menikah
Menikah	1.000	3.000
Belum Menikah	0.333	1.000



Global priority weight

Determining the global priority weight of the criteria is to multiply the priority weight of the criteria with the priority weight of the sub-criteria that has been obtained previously. The priority weights of the KIP-Kuliah global criteria are shown in Table 7.

Table 7. Weights of KIP-Kuliah Global Criteria

KRITERIA	Bobot	SUBKRITERIA	Bobot	Bobot Kriteria Global
restasi Akadem	0.558	Matematika	0.558	0.311
		Bahasa Indonesia	0.263	0.147
		Bahasa Inggris	0.122	0.068
		Dasar Bidang	0.057	0.032
Peserta KIP	0.263	Kartu KIP/ KKS	1.000	0.263
Keluarga	0.122	Pekerjaan Orang Tua	0.539	0.066
		Penghasilan Orang Tua	0.297	0.036
		Tanggungan	0.164	0.020
Status	0.057	Menikah	0.667	0.038
		Belum Menikah	0.333	0.019
Bobot Prioritas				1.000

RESULT

For one batch of new students, the decision-making method for recommendations and ranking of prospective KIP-Kuliah students is being validated. The testing method entails multiplying the weight value of the global criteria for KIP-Kuliah recipients obtained using the AHP method by the value of each student who has been registered for the new school year. The calculations performed by the system can be seen in Figure 2.

Bobot Mahasiswa				
AGUS SUPRIADI				
Kriteria	T102	T104	TK01	TM03
K01	0.0738	0.0868	0.0467	0.1009
K02	0.1222	0.1436	0.28	0.1669
K03	0.0449	0.0528	0.0233	0.0613
P01	0.8435	0.8314	0.9064	1.2355
PK01	11.0149	9.7887	12.343	7.3208
PK02	6.4708	5.6416	5.6384	3.127
PK03	4.2952	3.4872	3.4726	1.9216
PK04	17.0158	16.1225	14.3027	9.8256
S01	0.0223	0.0192	0.0153	0.027
S02	0.1338	0.2303	0.1838	0.2429
Total	40.0371	36.4041	37.2122	24.0295

Figure 2. Ranking of students' grades



Figure 2 shows that the student named Agus Supriadi receives the final calculation from each prospective student KIP-Kuliah, namely the highest total weight value is in TI02, namely the code for the Informatics Engineering Study Program with a weight of 40.0371, 36.4041 for the code TIN04, the code for the Industrial Engineering Study Program.

DISCUSSIONS

The AHP method to test the decision-making system, and the test is done on a new batch of students by multiplying the weight value of prospective KIP-college students with the global weight value of the criteria obtained via the AHP method. So as result, the results of the ranking of prospective students receiving KIP-Kuliah scholarships are obtained according to the study program's capacity for KIP scholarships.

CONCLUSION

Good ranking results are obtained based on the ranking process of prospective students receiving KIP-Kuliah with the application of the AHP method, so that the grades of each student before starting school become a benchmark in assessing whether the student is given a KIP-Kuliah scholarship or not.

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