



A Prioritization Method to Optimize School Operational Assistance Fund by Using AHP Approach

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ARTICLE INFO ABSTRACT

In Indonesia, education funding provided by the central government is made up of personnel costs, investment costs, and operating costs. Since its implementation in 2005, the program has found several obstacles. It's crucial to have an optimization tool to overcome the complications. The main problems that have arisen in allocating these funds so far have been the lack of planning and the lack of participation of the school ecosystem, particularly in determining the planning, planning documents, and the priority scale of the projects—program and activity-plans based on the School Operating Assistance Fund (BOS) platform. The Analytical Hierarchy Process (AHP) model is a prioritization approach based on determining the priority scale by comparing one option. The AHP model is a powerful but simple method that is usually used to make decisions. This approach has been implemented in various sectors, such as business, government, management, and education. In this study, the AHP model was used to determine the priority scale on the criteria of BOS allocated funds in the current year so that it could be absorbed optimally and appropriately utilized in its implementation for Vocational School activities. The results of the study show that the use of AHP makes it easier for school residents to prioritize the use of funds for school activities. Using the AHP model allows managers to record strategic goals using weighted criteria as the basis for prioritizing the use of funds. AHP can also work among different stakeholders in the school (principals, treasurers, teachers, committee, parents/guardians) to participate in decisions about the use of BOS to improve the quality and form of decision support taken to improve school performance.

Keywords: School management, Analytic Hierarchy Process, School Operation Assistance, Vocational School

Introduction

The education budget allocation of 20 percent of the State Revenue and Expenditure Budget (APBN) has not had a significant impact on improving the quality of education in Indonesia (Ningsih et al., 2019). This is evident from Indonesia's Program for International Student Assessment (PISA) score which is still below Vietnam. Indonesia and Vietnam are two countries that both allocate 20 percent of their domestic income for the education sector. Another problem is related to the impact of the allocation of education funds on the increase in Indonesia's Gross Domestic Product (GDP). Based on data (Asian Development Bank, 2017) that in 2012 investment spending in education only had an impact of 3.6% on GDP. According to international standards, the minimum contribution of investment spending in education to GDP is six percent. Some of these problems indicate that the utilization of education funds in Indonesia is less than optimal. School Operational Assistance Fund (BOS) could be explained as that the management of funds in many areas was generally poor (Oebadillah, 2019). Misappropriation and embezzlement of BOS were carried out by school personnel, the education office, or school-working groups. The findings of the Supreme Audit Agency (BPK) in several regions regarding the use of 2019 BOS indicate this, as can be seen in Figure 1, which lists the abuses of BOS.

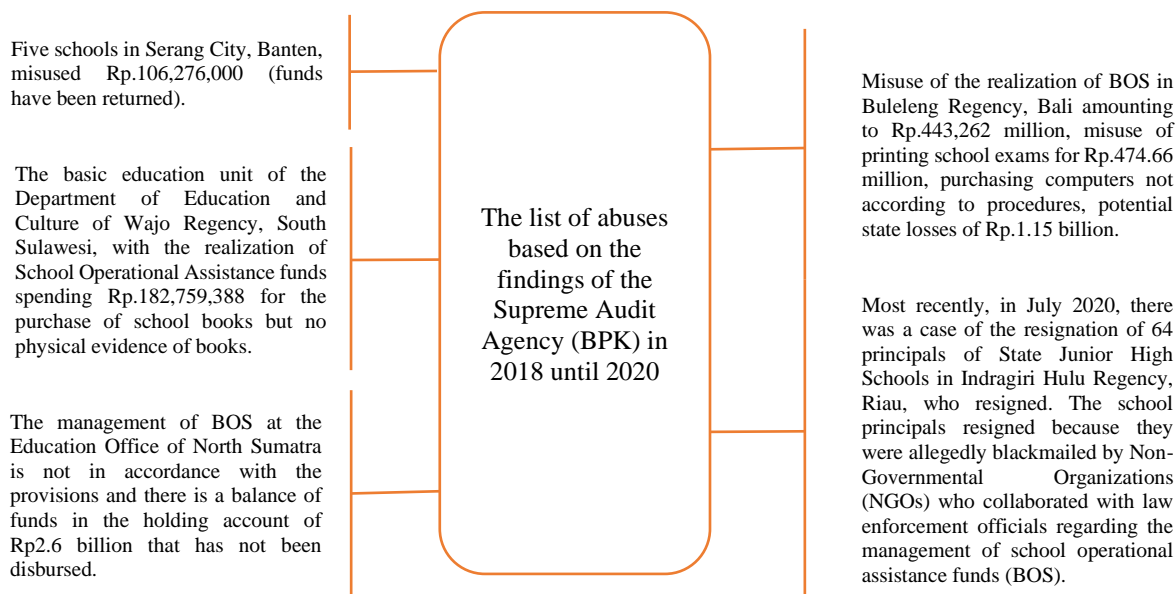


Figure 1. List of School Operational Assistance Abuse

Several results show that School Operational Assistance Program (SOAP) on BOS has been implemented in accordance with provisions are contained in the SOAP handbook (Bahri., Sumaryana, A., Karnaesih., & Karlina, 2019). However, weaknesses must be overcome by the principal as the recipient and manager of SOAP funds, including the incompatibility of the implementation of spending with the regulated targets, the dominance of the principal in determining the planning and spending of SOAP/BOS, the weakness of the planning due to the minimal contribution of committee elements and related parties.

A study conducted by (Martono, T., Baedhowi, B., Wardani, D. K., Triyanto, Totalia, S. A., Octoria, D., & Laksono, 2016) Explains that financing standards, including BOS influence the success of the quality or quality of learning. They explained that BOS provided to schools has a significant impact in improving the quality of student learning in Senior Vocational Schools (SMK); however, on the other hand, inefficiencies in the use of BOS were also found, broadly speaking, schools were oriented to how to achieve budget absorption, this also resulted in the potential for fraud in implementation and accountability. Furthermore, these researchers found that the potential use of BOS in SMK is dominated by the purchase of practicum materials and consumables (Baedhowi, Martono, T., Wardani, D. K., Totalia, S. A., Laksono, P. W., Triyanto, & Octaria, 2017). Potential for the tendency to spend the budget, so the potential for fraud is large.

A study from Totalia, (2020), found that the general problems and difficulties faced by schools in the use of BOS started from the planning process or its funding proposals from the school's internal parties. The main problem is the weakness of planning and the need for more participation of the school ecosystem in determining plans, planning documents and the priority scale of program and activity plans based on the school's BOS platform. Second, the implementation or expenditure of BOS often encounters obstacles related to the governance of the use of state finances, which have very detailed rules. Third, there are various BOS applications that refer to the details of spending, in addition, the system has a different format from one system to another which refers to the 8 National Education Standards - SNP (Ministry of Education and Culture) and refers to the spending format (Ministry of Internal Affairs) which must adjust to 12 targets of BOS to those systems. (Halik, A., Hidayati, N. and Amin, 2018). Fourth, there is a lack of supervision, which is mentoring; the existing supervision is felt by the school to find fault and blame the school.

1. Research Method

This research is a Research and Development (R&D) that aims to develop the Analytical Hierarchy Process (AHP) model to determine the priority scale of BOS for Senior Vocational School (SMK) targets and budget priorities. Sukmadinata, (2013) defines R&D as a research and development method to develop a new product or improve an existing product, which can be accounted for. After that, the researcher entered the second stage, Limited Trial, which tested the product on several expert validators and research samples (principals, treasurers, teachers, committees, parents/guardians) at SMK in Surakarta to determine whether the product could be implemented. To use or not. From the input of expert validators and research samples, research will improve the product so that the product is ready to be carried out in the third stage, namely the testing stage. For needs analysis, the data used is a survey questionnaire given to stakeholders interested in the management of the Regular BOS of SMK, including the Principal, Treasurer, Teachers, Committees, Parents, or Guardians. This questionnaire contains several questions on planning, utilization, evaluation, and reporting. The measurement of the questionnaire to stakeholders is measured by a Likert scale with a value between 1 to 9.

The population in this study were all SMK in Indonesia, which comprised 13,710 schools - Public and Private. The population was clustered based on the 2020 Regular BOS disbursement data, consisting of three clusters. It can be concluded that cluster 1 is a SMK with minimal absorption, cluster 2 has medium absorption and cluster 3 is SMK with maximum absorption. Samples were taken proportionally from Central Java, East Java, South Kalimantan, Bali, Nusa Tenggara Barat (NTB) which represent the western, central and eastern parts of Indonesia based on clusters and their management for each cluster. The data collection techniques used to collect the required data and the data sources of each technique used in this study can be seen Table 1 below.

Table 1. Data Collecting Techniques

Techniques	Description
Interview	This is used in the initial stage of the preliminary study to determine the initial conditions of the planning process for the Regular BOS fund management in SMK. At the development stage, namely (1) in a preliminary field test, interviews were conducted to find out the responses, criticisms, and suggestions given by the validator to the product being developed; (2) in the main field test, interviews were conducted in several SMKs that were the target of the trial. To find out the general response to the use of the Analytical Hierarchy Process (AHP) system while at the testing stage, interviews were carried out after the trial stage took place so that it could be seen how the positive response of SMK related to the Analytical Hierarchy Process (AHP) model was. The type of interview used is free interview, which is an interview technique commonly used in preliminary research where the researcher, as the interviewer, is free to ask the informants anything, but still leads to data collection.
Observation	This is used to record important events and respond to students in the product testing process. In addition, observation techniques are used to collect data directly in accordance with SMK activities using the Analytical Hierarchy Process (AHP) Model, which was developed so that it can strengthen the information that can be obtained, including being able to overcome the obstacles faced. Happens in the field. The type of observation is participatory observation, which means being involved in the learning process as an observer.
Document analysis	This process of extracting data is also required by digging up the documents available at the research site. The data used in this study are the name of the school, the name of the regular BOS fund management team at the school and several documents that can be used as additional information to develop the Analytical Hierarchy Process (AHP) Model.
Questionnaires	A number of written questions that are used to obtain information from respondents about things that are known or about the respondent's personality (Arikunto, 2013). In this study, the type of questionnaire used is a closed questionnaire where respondents choose the answers that have been provided by the researcher.

This research design employed the Analytical Hierarchy Process (AHP) model approach that will investigate all expenditure components, including the target for the use of Regular BOS according to existing regulations which include library development, new student admissions/PPDB activities, learning and extracurricular activities, learning evaluation activities, school management, development teaching profession, industrial practice activities, Field Work Practice, Vocational Competency Test & Certification Activities, Purchase or maintenance of learning multimedia tools, Payment, School Maintenance, Electricity & Service Subscriptions (Pendidikan et al., 2020).

The data obtained from the survey is then managed, processed, and then analyzed. This data management includes descriptive statistical analysis and inferential statistical analysis. After the data is well organized, data processing using SPSS software includes a validity test, a reliability test, and an analysis requirements test. Test requirements analysis includes classical assumption test (normality test, homogeneity test and effectiveness test). Data analysis in this study was used to test the effectiveness of the AHP model, which was used to determine the priority scale of the SMK BOS targets and budget priorities using Expert Choice Software.

2. Result and Discussion

3.1 Model of AHP

The AHP approach is a measuring theory. Nominal, original, interval, and ratio scales are the four measurement scales typically used in that order. A higher scale can be classified as a lower scale, but not vice versa. On a ratio scale, monthly income can be divided into income levels (high, medium, low) or nominal categories (high, medium, poor). However, if the data received at the time of measurement was categorical or

ordinal, data with a higher scale could not be retrieved. Some of these issues are addressed by the AHP (Saaty, 2000).

The ratio scale is derived using the AHP from multiple discrete or continuous pairwise comparisons. Actual or relative measurements of the degree of likes, interests, or feelings can be used to make pairwise comparisons. As a result, this method is extremely effective for obtaining a ratio scale for things that were previously difficult to quantify, such as opinions, sentiments, behaviors, and beliefs (Saaty, 2007). This approach starts with creating a hierarchical structure or network of problems to be investigated. Main objectives, criteria, sub-criteria, and alternatives will all be considered inside the hierarchy. Pairwise comparisons are employed to determine relationships within the structure. The ratio scale is constructed in terms of the principal vector eigenvalues or eigenfunctions resulting from this pairwise comparison, which results in a matrix. The inverse of the matrix, $a_{ij} = 1/a_{ji}$, is both positive and negative (Saaty & Vargas, 2012). Basically, AHP works on a problem by dividing the problem into parts, arranging the parts in a hierarchical format and assigning values to the problem, thereby simplifying and accelerating the decision-making process (Saaty, 2000). A framework for making decisions. Integrate these considerations with the numerical judgment of the subjective judgment of the importance of the variable to determine which variable chooses the highest priority and works to influence the outcome of the situation.

The AHP may solve complex or unframed problems with numerous aspects or criteria as it develops. The ambiguous problem structure, uncertainty in decision-making perceptions, and uncertainty in the availability or even absence of appropriate statistical data all contribute to the complexity (Harker & Vargas, 1987). There are times when there are perceived and observed choice difficulties that must be addressed as soon as possible. Still, the variations are so complicated that the data cannot be recorded numerically, only qualitatively, i.e., based on perception, experience, and intuition. Other models may, however, be incorporated into the decision-making process when employing the AHP approach, particularly when analyzing individual decision-makers. AHP is founded on the following axioms, which can be seen in the following Figure 2 below:

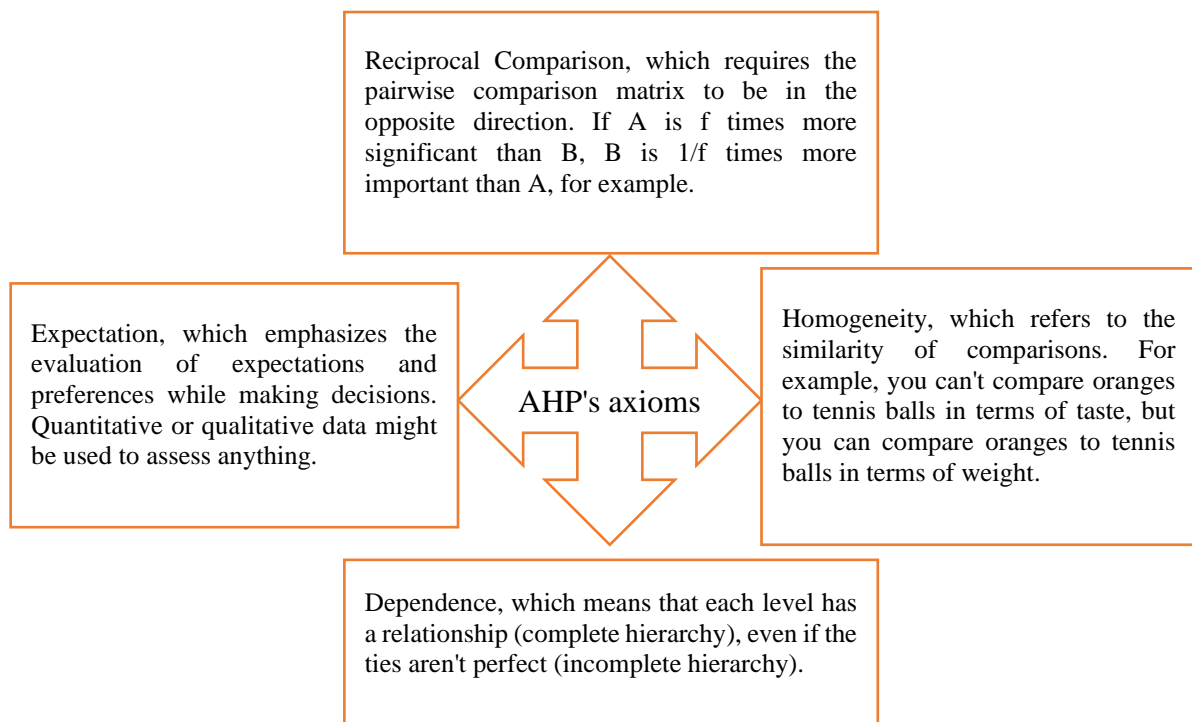


Figure 2. AHP's axioms

Furthermore, Saaty, (2004) gives the AHP steps to generate priorities, it is necessary to break the decision file into the following steps: (a) Define the problem and the sort of expertise required, (b) Arrange the decision hierarchy from top to bottom, with the choice's objective as the broad goal, through the middle level (the criteria on which the next items depend) to the lowest level (which is usually a series of alternatives), (c) Generate a collection of pairwise comparison matrices. Each element above the level is utilized to compare to the components directly below it, and then (d) the comparative priorities are to weigh the priorities at the level directly below them. Repeat for each element. Then, for each element at the level below, its weighting value is added to determine its overall or global priority. Continue the weighing and adding procedure until the ultimate priority of the options is attained at the lowest level. The following are the phases of decision-making in the AHP method (Saaty & Vargas, 2012):

- a.** Identify the problem and the intended outcome.
- b.** Create a hierarchical framework that begins with a broad aim and progresses through the criteria and alternatives you wish to rank.

- c. Create a pairwise comparison matrix describing each element's relative contribution to each objective or criterion at the above level. By analyzing the relevance of one aspect compared to other factors, comparisons are made based on the decision maker's choice or judgment.
- d. Data is normalized by dividing each column's total value by each element's value in the matched matrix.
- e. Calculate the eigenvector value and check for consistency; if not, the data collection (preferred) must be redone. The eigenvector value in question is the highest, acquired manually or with intended software.
- f. Repeat steps c, d, and e for each hierarchy level.
- g. Determine each pair comparison matrix's eigenvectors. The eigenvector value represents the weight of each element. This process involves synthesizing choices and prioritizing aspects at the bottom of the hierarchy until the goal is met.
- h. The hierarchical consistency test is a method of determining the consistency of a hierarchy. The evaluation must be redone if it does not meet the consistency ratio (CR), which is bigger than 0,100.

Based on the explanation in previous section above, we can see that the main advantage of AHP is the ability of AHP to sort options based on their effectiveness in meeting conflicting goals. (Jusoh, Y., Chamili, K., Pa, N., 2014). In addition, AHP is also suitable for people who work with problems involving human perception and judgment that will have long-term impacts later on and allows for some minor inconsistencies in judgment because it must be recognized that human perception is not always consistent (Lai et al., 2002). Furthermore, the application of AHP is based on the experience and knowledge of experts or users to determine the factors that influence the decision-making process (Velmurugan, R., Selvamuthukumar. S., 2001). In this study, after the priority scale criteria were identified based on qualitative data analysis, the weight of each criterion was determined by comparing the two criteria at once. AHP requires decision-makers to perform simple pairwise comparison assessments (Yadav, 2013). Based on the earlier theoretical description, the hypothesis in this study may be summarized as follows: "The Analytical Hierarchy Process (AHP) Model is effective for identifying the priority scale of the BOS on Vocational School objectives and budget priorities", focusing on the consistency ratio obtained from the employed respondents.

3.2 Results

The research on the development of the Analytical Hierarchy Process (AHP) Model to Determine the Priority Scale of Targets and Budget Platforms for BOS Senior Vocational School (SMK) was carried out from August to November 2021. The distribution of respondents can be seen in Table 2 below.

Table 2. Distribution of Respondents

Distribution	Description	Amount
Vocational School	D.I. Yogyakarta	2
	West Nusa Tenggara	2
	Bali	2
	East Java	3
	South Kalimantan	2
	Central Java	20
Principal's Length of Service	>5 years	11
	1 - 5 years	15
	<1 year	5
Principal, Treasurer and Teacher Based on Employment Status	Not a civil servant	2
	Civil servant	29
Vocational High School Committee By Employment Status	Not a civil servant	21
	Civil servant	10
Parent/Guardian Based on Employment Status	Not a civil servant	21
	Civil servant	10

Furthermore, user responses to the use of the AHP model to plan the BOS Regular SMK budget platform can be seen in Figure 4 as follows:

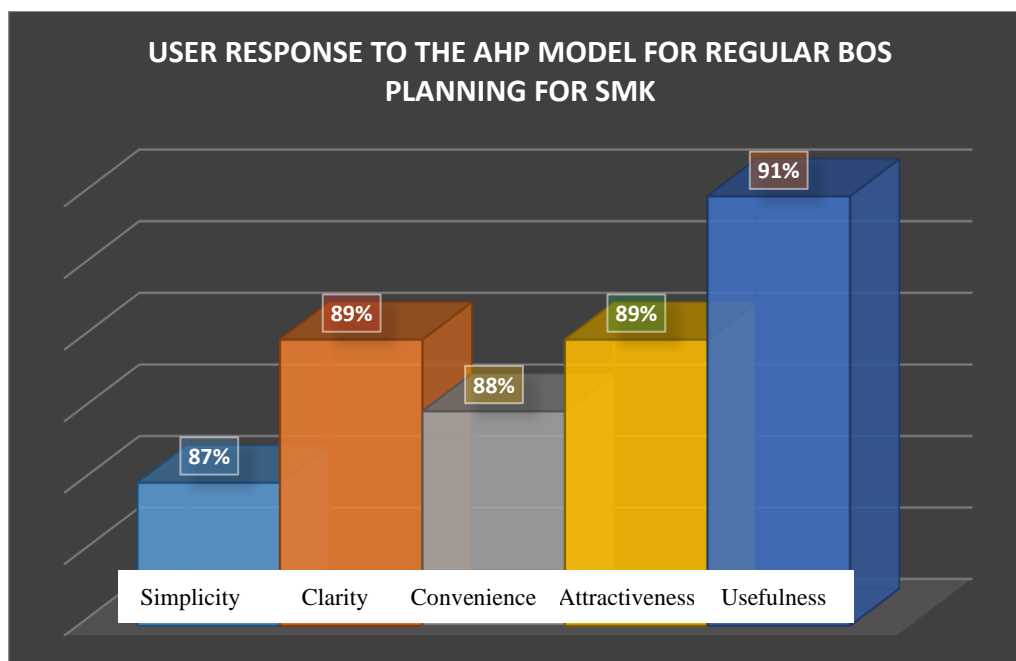


Figure 3. User Response to AHP Model

Based on the picture, it can be seen that the AHP model is utilized in planning the use of Regular BOS to determine the budget platform for each Regular BOS target and make it easier for the BOS Regular SMK Management team. This can be seen from the percentage of responses from users of the AHP model, where the rate of use is 91%. In addition, other factors such as simplicity, clarity, convenience, and attractiveness also received a positive response from the BOS Regular management team as users. The AHP model for planning the use of Regular BOS to determine the budget platform for each Regular BOS target is considered easy by the Regular BOS Management Team, and the model is easy to learn and user-friendly. Based on the research results above, the researcher can conclude that the AHP model for planning the use of Regular BOS is feasible to use and apply in every SMK.

3.3 Discussion

In general, the management of BOS is the same as the management of school finances. The main objectives of managing education funds, especially school finance (Mulyono, 2010) are:

- a. Ensuring that the available funds are used for school daily and the excess funds are reinvested,
- b. Maintain school property (assets)
- c. Ensure that the rules and practices of receiving, recording, and disbursing money are known and implemented.

Furthermore, the objectives mentioned above, in managing several schools and managing School Operational Assistance, several principles must be considered (Hidayat, 2012) including: Fairness, Efficiency; Economic, Accountability and Transparency.

The principle of transparency is carried out by fulfilling the principles of propriety and good governance by the participation of government, local governments, education providers established by the community, and education units so that: 1) Can be audited on the basis of applicable auditing standards and produce an unqualified audit opinion. 2) Can be accounted for in a transparent manner to education stakeholders (Wende, 2000).

This key indicator emphasizes the involvement of the entire school ecosystem from the planning, implementation, monitoring and evaluation processes. The principle of transparency is intended to provide information and data disclosure for the entire school ecosystem. The accountability principle places more emphasis on accountability for the use of public funds so that they can be accessed by the entire school ecosystem that could be derived from the helps of AHP approach.

Users of the AHP method can fill in inconsistent priority values (comparison data between a pair of criteria). If this happens, then the solution produced by the AHP method is not the best. To determine the level of consistency of user input, the AHP method must be equipped with a Consistency Index calculation. After obtaining the consistency index, the results are compared with the Random Consistency Index (RI) for each n objects. Table 3 shows the RI values for each n objects ($2 \leq n \leq 10$). The RI table is obtained from the average Consistency Index of 500 matrices. CR (Consistency Ratio) is the result of a comparison between the Consistency Index (CI) and Random Index (RI). If $CR \leq 0.10$ (10%), the user's answer is consistent so that the resulting solution is optimal.

Table 3. Random Consistency Index

n	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

Formula for CR: $\frac{CI}{RI}$ (1)

If CR <= 0.10 (10%) then the degree of consistency is satisfactory. If CR > 0.10 it means that there is an inconsistency in setting the comparison scale for a pair of criteria. If this happens, it is certain that the solutions generated by the AHP method will be meaningless to the user. To calculate the Consistency Ratio, researchers used expert choice software, and the following results were obtained can be seen figure 4 about principals' consistency ratio, figure 5 about treasurer's consistency rratio, and figure 6 about teachers' consistency ratio.

Based on the results of the Consistency Ratio (CI) calculation using the expert choice application above, it was found that the CI value of each respondent was the principal of 0.04, school treasurer of 0.01, teachers of 0.02, parents of 0, 03 and the committee of 0.02. The results of the CI value of all respondents <0.1, therefore filling the targets carried out by respondents can be said to be consistent because they meet the requirements of <0.1.

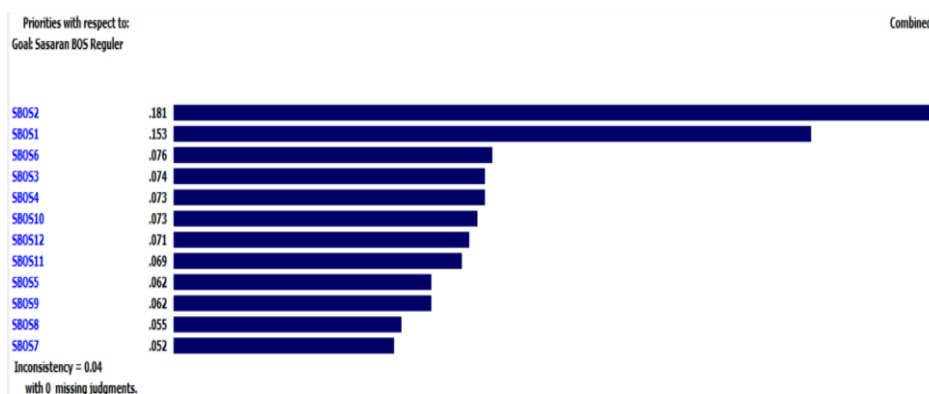


Figure 4. Principals' Consistency Ratio

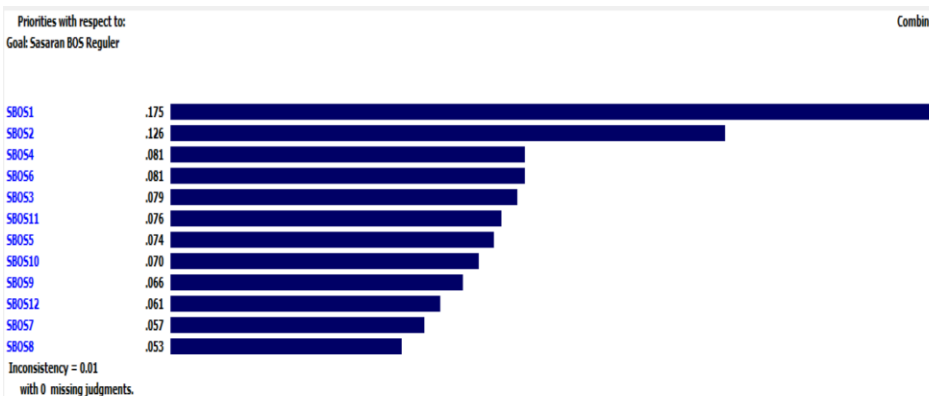


Figure 5. Treasurer's Consistency Ratio

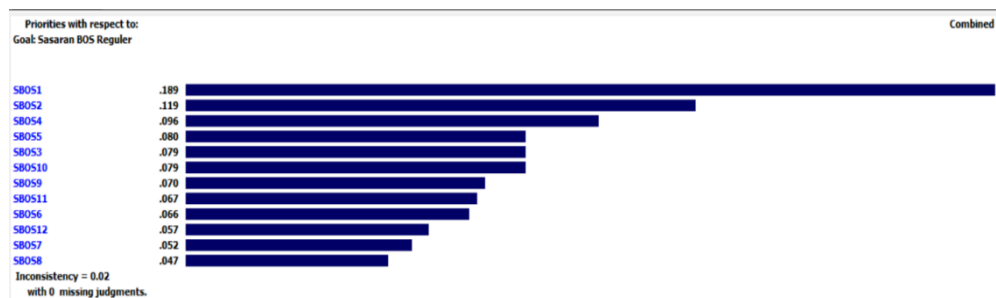


Figure 6. Teachers' Consistency Ratio

3. Conclusions

Based on the discussion above, it can be seen that there is a positive influence from the school ecosystem to understand, manage and implement Regular BOS regulation for SMK. As implementation of Good School

Governance (GSG) which has three principles: participation, transparency, and accountability (Kurniadi W. Nugroho, 2012). Translation ability has a positive and significant effect on Good School Governance of the BOS SMK Management Team in Indonesia. The test results show that the path between the variables of Translation Ability and Good School Governance has a beta coefficient of 0.945 and a t value of 40.16 > 2.04. These results indicate that the variable ability to translate has a positive and significant effect on Good School Governance. Translation ability has a positive and significant impact on the value of money for the BOS SMK management team in Indonesia. The test results show that the path between Translation Ability and Value for Money has a beta coefficient of 0.839 and a t value of 21.55 > 2.04. This value indicates that the variable Translation Ability has a positive and significant effect on the value of money.

Using AHP BOS can increase the effectiveness of determining priority targets and budget platforms for Regular BOS SMKs. Based on the combined Consistency Ratio (CR) test (BOS SMK Management Team) it has a CR value of 0.01 < 0.1. Partially, each BOS Regular Vocational Management Team, consisting of the Principal, has a CR of 0.04 < 0.1; The treasurer has a CR of 0.01 < 0.1; The teacher has a CR of 0.02 < 0.1; The committee has a CR of 0.02 < 0.1; and Parents have a CR of 0.03 < 0.1. This shows that this model is feasible and effective for massive use. Meanwhile, based on the responses of all respondents after using the AHP BOS model, the results were obtained in terms of the usefulness at 91%, clarity at 89%, convenience at 88%, the attractiveness at 89%, and usefulness at 87%.

The direct implication of this study could be suggested that the schools' Principal should increase the participation of the entire Management Team of the Regular BOS Vocational School consisting of the Principal, Treasurer, Teachers, Parents, and Committees in planning the use of Regular BOS. This is based on data in the field, which shows there is still a lack of participation from the BOS Management team, especially teachers, committees, and parents. So far, the planning for the use of Regular BOS has only been dominated by the Principal and the Treasurer, sometimes even copying and pasting from the previous year's plan. Teachers, parents, and Committee members were only given a copy of the plan for the use of Regular BOS without being involved in the planning. Hence, the participation of the BOS management team was minimal. Finally, schools, especially SMKs in Indonesia, are expected to be able to use the AHP model to determine the targets and budget platforms for Regular BOS that have been prepared for the implementation of the planning for the use of Regular BOS by involving the entire Regular BOS management team as regulated in the Regulation of the Minister of Education and Culture regarding Technical Guidelines for Fund Management of Regular BOS. It is expected that all components of the BOS Management Team have a good understanding of the management of Regular BOS.

Translation Ability (understanding) here is expected to be able to overcome errors in the management of Regular BOS. This is currently happening, one of which is in Central Java, due to differences in the budgeting of the Regular BOS platform for each vocational school due to the poor translation ability of the School BOS Management Team. Coupled with the intervention carried out by the Central Java Provincial Government as the person in charge of the Vocational High Schools who made platform rules for each BOS target and called for the use of BOS not to be allowed to pay the honorarium for teachers who were not civil servants. In the Technical Guidelines for Regular BOS, according to Regulation of the Minister of Education and Culture number 6 of 2021, this is prohibited. This makes translation skills (understanding regulations) indispensable in managing the BOS for Regular Vocational High Schools.

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