

Performance Evaluation of Asian Development Bank Loan Project in Indonesia

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Abstract—The Asian Development Bank is an international development financial institution initiated and established by developed countries, and its development experience does not necessarily suit the history and reality of developing countries. As a developing member country (DMC), Indonesia, as a beneficiary country, needs to study the specific performance of the loan projects financed by the Asian Development Bank by itself. This study adjusts the performance evaluation system of the Asian Development Bank from the perspective of the projects funded by ADB. Specifically, 20 experts are invited to give weight to the evaluation indicators by using the Analytic Hierarchy Process (AHP) and the Fuzzy Analytic Hierarchy Process (FAHP). And at the same time, changed rating value and rating number in the assessment scale, allowing a new assessment system to be constructed. Then, 102 respondents (project users) from Indonesia were asked to use this adjusted evaluation system to rate Project A and Project B from different industries respectively, and the comprehensive evaluation score of the two projects was calculated by the Fuzzy Comprehensive Evaluation method. Finally, this study compares and discusses the similarities and differences of the two evaluation processes of AHP and FAHP and compares the different results of the two projects in the evaluation process and summarizes the significance of the above results to the project (company) and the industry development of the beneficiary country. The evaluation process in this study is described by qualitative methods and quantitative methods as results, based on the percentage of Asian Development Bank's evaluation options, to provide more specific and richer research results for the project evaluations conducted.

Keywords—performance evaluation, Asian Development Bank, analytic hierarchy process, FAHP, fuzzy comprehensive evaluation, Indonesia

I. INTRODUCTION

Development institution, ADB distributes funds, supports investments, and provides technical assistance to developing member countries. ADB is a state institution that has a total membership of 67 countries, whose members are governments, mainly from Asia, also from non-Asia countries. In improving the economy and development of a country, the role of banking institutions is extremely helpful in this regard. ADB has a loan system, namely Result Based Lending or results-based loans where funding is carried out by ADB. It means, by of financing whose disbursement is linked to the results that have been achieved. So, there will be achievement of results and institutional development. This system is believed to be able to strengthen existing programs or projects in a country, Nakamitsu [1]. As Indonesia's systems and capacities strengthen, ADB is now providing results-based financing, enabling Indonesia to leverage existing internal systems and principles.

In recent years, due to the shortcomings of the

international development financing system, including insufficient funds and poor development effects, complaints from developing countries against institutions such as ADB have increased. ADB is an international development financing institutions initiated and established by developed countries (Japan). The development experience of developed countries is not necessarily suitable for the history and reality of developing countries. For example, the development effectiveness of the ADB loan project needs to be improved according to ADB [2]. (1) Lower success rates. The share of completed sovereign operations rated successful fell to 71% in 2017-2019, a decline of 6 percentage points compared with 2016-2018. The success rate of operations financed by concessional assistance was also off track, declining to 70% from 77% in 2016-2018. (2) On-time completion is a challenge. Only 36% of projects in 2017-2019 closed on time, a drop of 4 percentage points compared with 2016-2018, putting ADB's performance off track to achieve the 2024 target. Concessional assistance projects recorded an even steeper decline (10 percentage points). They were also rated off track, with only 30% closing on time in calendar years 2017-2019. (3) Decline in effectiveness ratings. Only 68% of completed sovereign operations were rated *effective* in 2017-2019, down from 74% in 2016-2018 and making effectiveness the second-lowest ranking criterion. The biggest sector declines were in education (from 83% to 60%) and water and other urban infrastructure and services (from 76% to 67%), but the lowest-performing sectors were ICT at 0% and finance at 57%. Overambitious targets that led to underachievement was a principal factor found in education projects.

It is particularly important for beneficiaries to see the project from different perspectives on a regular basis. Many beneficiaries are not aware of the problems they are facing until it is too late. Most of them do not realize the small mistakes they make consistently. The problem then turned into something serious enough to cause failure in project work and effect the project fund. One of the hardest things to do is look at own mistakes. What is more if it has been on the project for a long time. So, if there is a problem that occurs in the project, it may be difficult to beneficiaries to see without the self-assessment. As a developing member country (DMCs), it is necessary for Indonesia (beneficiary or recipient) to study by itself the performance of loan projects funded by ADB, an institution led by developed countries.

Purpose of the research is to evaluate the performance of ADB's loan projects in Indonesia based on the ADB evaluation method, which then develops ADB loan projects in Indonesia using the performance evaluation method as a

beneficiary country. This article examines whether the evaluation of ADB's performance in Indonesia will make the evaluation results different. This adjustment only modifies ADB methods and does not create a completely new evaluation model. By selecting 2 projects from 2 different sectors, evaluating them with different indicators or weights and comparing the results. Based on this, this paper attempts to study the differences in methods or evaluation of certain parameters in project settings from different sectors. And it involves the AHP Fuzzy comprehensive evaluation method and FAHP-Fuzzy comprehensive evaluation as a measuring tool to assign different weights indicators.

When grouped by development sector, foreign loans are divided into 5 (five) main sectors, namely infrastructure, energy, education, defense, and security, and other. Other sectors include health, technology (IT) improvement, community empowerment etc. Foreign loans are mostly allocated for the provision of infrastructure and energy, namely by 64.2 percent. This is in accordance with the government's policy in the 2015-2019 RPJMN which focuses on infrastructure development, including for the development of transportation and rail facilities to support national connectivity, and to achieve clean water and sanitation targets. Meanwhile, foreign loans in the energy sector directed at meeting electricity needs evenly in all regions in Indonesia and support the achievement of the 35,000 MW electricity target in 2019, through the construction of power plants electricity and transmission network construction. The defense and security sector occupies the allocation next biggest in Bappenas report [2]. This study chose project A from Public Sector Management sector and project B from Energy sector.

II. LITERATURE REVIEW

Research related to performance evaluation of development projects has mainly focused on two areas: **Some literature focus on Performance Evaluation Indicators.** In assessing "Relevance," the project impact and outcome are considered considering ADB's country strategy and program and annual updates; the country's governance, macroeconomic, and sector policy framework; priorities identified in the country's development plans; and sociocultural conditions. Evaluations should recognize that a good project design has a certain degree of flexibility. "Efficiency" is a relative measure, meaning that performance is measured in relation to other comparable units. There are several related definitions that are commonly used in the area. Efficiency is a condition or condition, according to Raharjo [3], where the completion of a job is carried out correctly and with full capabilities. "Effectiveness" is generally related to a measure of the ability to achieve certain goals or objectives. Effectiveness is the level of achievement of program results with the set targets. Effectiveness measures provide decision makers feedback on the impact of deliberate actions and affect critical issues such as allocation of scarce resources, as well as whether to maintain or change existing strategy, Bullock [4]. The views on "Sustainability" seem to have a stronger focus on the present moment and on keeping things above a certain level. Sustainable development has a universally

agreed definition that was first written in the Brundtland Report (*Our Common Future*), written in WCED 1987 [5]. Sustainability describes a form of economy and society that is lasting and can be lived on a global scale.

The other Literature focus on performance evaluation method. Firstly, Analytic Hierarchy Process (AHP) is a difficult multi-objective decision issue and associated objective decomposition technique established by Saaty in 1980. AHP is commonly used when dealing with qualitative and quantitative criteria. AHP technique is based on a mathematical theory of eigenvalues and eigenvectors, Padzeko [6]. Several theoretical and practical methods of determining the significance (weight) of criteria by experts are known. The second one is the Fuzzy Set Theory. The concept of fuzzy sets was first introduced by Zadeh and Zeydan [7, 8]. A fuzzy set is a class of objects with a continuum of members. Such a set is characterized by a membership function that assigns each object a degree of membership from 0 to 1. Fuzzy logic is used to determine human judgment values and convert them to usable values under uncertain conditions and dynamic system models. The third one is the Fuzzy Analytic Hierarchy Process (FAHP). The FAHP is an analytical method developed by AHP. Fuzzy AHP is considered superior to AHP to describe ambiguous decisions, Buckley [9]. Determining the degree of membership of the AHP method extent by Chang [10] used a triangular membership function Triangular Fuzzy Number or TFN. The fourth one is the Fuzzy Comprehensive Evaluation Method. According to P. Zhang [11], Fuzzy comprehensive evaluation is a *comprehensive evaluation method* based on *fuzzy* mathematics. Quantitative evaluation is converted to qualitative evaluation. There are also many studies involving various other methods. In S. Li "Research on performance evaluation of ADB Loan Project" in urban flood control projects and urban development [12]. In the research, grey level Analysis by using AHP and the comprehensive evaluation grey system with multi layers found that with ADB Loan in city flood control project as evaluation object to carry on the empirical analysis and draws the conclusion the performance evaluation system is effective, and the grey analytic hierarchy process is feasible. In Zahara Firda's [13] research, a recent study that discusses the "Cooperation of Asian Development Bank (ADB) with Indonesia in Country Partnership Strategy (CPS) Framework Period 2012-2014" as this cooperation is conducted to assist Indonesia in resolving its economic development issues. The author uses the framework of the theory of Regional Cooperation, the concept of International Financial Institutions, and the concept of Country Partnership Strategy (CPS). The results of this study show that this collaboration between ADB and Indonesia has had a considerable impact on the development economy in Indonesia through the CPS framework 2012-2014 where ADB aids in the form of programs or projects contained in the framework in six priority sectors. To find out what the cooperation between ADB and Indonesia is understand the framework provided by ADB to Indonesia and its impact on Indonesia, analyze the cooperation between ADB and Indonesia through the Country Partnership Strategy for the period 2012-2014 and its evaluation of CPS performance. In Che [14], the article has studied small and medium enterprises, used fuzzy analytical hierarchical process

(FAHP) to select important indicators in loan appraisal, set up a comprehensive and effective loan decision-making module. Effective with weights and data packaging analysis (DEA) and ensures effective protection, high rate of overdue loans. A real case study demonstrates the effectiveness of the proposed method. Thus, the geometric average used to calculate the fuzzy weights in matrix, in Buckley [9]. In research Roscoe [15] Also used fuzzy AHP and Data Envelopment Analysis (DEA) approach for making decisions on small and medium-sized company's lending from banks that used FAHP to choose important criteria in assessing each lending.

According to the relationship from the findings above, that the analytic hierarchical process and the fuzzy analytic hierarchical process as multi criteria decision makers in the performance evaluation model process. The effects or results of loan project performance evaluation are applied in this study. Performance evaluation of project loan is affects economic growth and provides a basis for developing policies on project sustainability. In other words, it can offer a reference to formulate potential and evaluate loan projects for beneficiaries. To compared to ADB's own evaluation results which tend to only display evaluation percentages to public knowledge, this will provide a numerical basis for the results with the fuzzy comprehensive evaluation method as the overall evaluation score. In this study, its focus to use the AHP-fuzzy comprehensive evaluation method, and the FAHP-fuzzy comprehensive evaluation method to obtain scores and projects loan.

III. STRUCTURE OF ADB'S PERFORMANCE EVALUATION PROCESS

A. ADB Projects in Indonesia

ADB investments will advance gender equity and social inclusion, strengthen governance and institutions, promote digitalization and technological transformation, enhance local and regional economic development, extend regional cooperation and integration, and support attainment of the SDGs. Based on PCRs, PVRs, and PPERs containing a

rating circulated on 31 December 2013. Increasingly defined by the complex development needs of a rapidly evolving middle-income country. The focus of ADB assistance has responded to Indonesia's changing development priorities, from an early emphasis on agriculture in the 1970s; energy, urban infrastructure, and education in the 1980s; to finance sector reform and resilience in the late 1990s. ADB is allocating \$1.66 billion for public sector lending during 2013–2014 to support the government's key reform agendas, including improved connectivity and investment climate, as well as project loans for water resources management, the environment and natural resources, energy, community infrastructure, water and sanitation, irrigation, and regional road investments. Indicative technical assistance resources in 2013–2014 total \$86 million, of which \$76 million is anticipated to be co-financing. ADB approved the \$400 million Inclusive Growth through Improved Connectivity Program in 2013. Time by time, here is the second phase of policy-based loans aims to reduce transport and logistics costs, a key requirement for achieving higher and more inclusive economic growth that is sustainable over the medium term.

At the project loan on wards from 2005-2020 in ADB's that Indonesia has loan projects about 196 total projects number and 9 sectors. The 9 sectors including public sector management, energy, agriculture and natural resources and rural development, finance, industry and trade, education, transport, health, water and other urban infrastructure and service. Each of these sectors has project or program to achieve successful development and helping the Indonesian government in carrying out RPJM (medium-term development plan) or RPJP (long-term development plan) program [16].

B. Assessment rating of ADB Evaluation

The overall rating is determined by separately evaluating and ranking the four core criteria. Each core criterion is assigned a whole-number rating or scale point between 0 to 3 (see Table 1).

Table 1. ADB assessment rating

Criterion	Weight (%)	Definition	Rating Description	Rating Value
1. Relevance	25	Relevance is the consistency of a project's impact and outcome with the government's development strategy, the ADB's lending strategy for the country, and the ADB's strategic objectives at the time of approval and evaluation and the adequacy of the design.	Highly relevant	3
			Relevant	2
			Less than relevant	1
			Irrelevant	0
2. Effectiveness	25	Effectiveness describes the extent to which the outcome, as specified in the design and monitoring framework, either as agreed at approval or as subsequently modified, has been achieved.	Highly effective	3
			Effective	2
			Less than effective	1
			Ineffective	0
3. Efficiency	25	Efficiency describes, ex post, how economically resources have been converted to result, using the economic internal rate of return, or cost-effectiveness, of the investment or other indicators as a measure and the resilience to risk of the net benefit flows over time.	Highly efficient	3
			Efficient	2
			Less than efficient	1
			Inefficient	0
4. Sustainability	25	Sustainability considers the likelihood that human, institutional, financial, and other resources are sufficient to maintain the outcome over its economic life.	Most likely	3
			Likely	2
			Less than likely	1
			Unlikely	0
Overall Assessment (weighted average of above criteria)	Highly successful: Overall weighted average is greater than or equal to 2.7. Successful: Overall weighted average is greater than or equal to 1.6 and less than 2.7. Less than Successful: Overall weighted average is greater than or equal to 0.8 and less than 1.6. Unsuccessful: overall weighted average is less than 0.8.			

Source: ADB guidelines 2006-present [17]

C. Evaluation Model Indicators of Performance Evaluation

The target level is in the Performance Evaluation, 4 criteria as first level indicators, 14 sub criteria as secondary level indicators. The project performance evaluation refers to the system situation as shown in the Table 2:

Table 2. Evaluation indicator system set

Content	First-Level Indicator	Second-Level Indicator
The Evaluation Indicator System of Projects (C)	Relevance (C1)	Policy (c11)
		Strategy (c12)
		Regulation (c13)
	Efficiency (C2)	Time (c21)
		Cost (c22)
		Management effective (c23)
	Effectiveness (C3)	Effective in Project (c24)
		Target Achievement (c31)
		Benefits (c32)
		Impact (c33)
	Sustainability (C4)	Satisfy (c34)
		Sustainable Cost (c41)
		Operation Maintenance (c42)
		Promoting Sustainable Project in Continues (c43)

IV. IMPROVEMENTS TO ADB'S EVALUATION PROCESS AT THE RECIPIENT COUNTRY'S STANDPOINT

In the selection of indicators that affect performance evaluation, based on Indonesia as the beneficiary evaluation is improvement selecting indicator system to make convenient in evaluation, sorting out of Indonesia index systems by experts confirmed. The basis of the assessment or independent evaluation department itself only includes the overall calculation or weights based on ADB's assessment guidelines using percentages (25%) for each criterion or first-level indicators. The indicators which been adjusted and established in evaluation are not only in the form of percentages but provide more specific numerical evaluations results carried out to knowledge the beneficiary which affect the results and success in the sustainability and continuing of the project, to know in detail for evaluation of the project performance either in terms of state profits or private companies [17].

A. Technique Sample

The questionnaire is a data technique that is carried out by giving a set questions or written statements to respondents. In this study, the questionnaire using measurement a Likert scale 1 to 5 and participant were required to indicate their level agreement. The researcher had tried to use the ADB scale for the situation and conditions according to the beneficiaries, but the figures obtained were sufficient to present and use it for the beneficiaries as a self-assessment. The purpose of the adjustment is to be used as a model for self-assessment of the company itself or beneficiaries. In selecting the scale using a Likert-scale 1-5, and not using the ADBs scale option because the model and scale used is a model that has been specifically adapted to the beneficiaries as an evaluation of performance, actual situations, and conditions, as well as indicators used based on ADB. Directly and in accordance with the field, sampling, data,

and respondents. Therefore, the scale used is 1-5 is to get an absolute final score using AHP and FAHP scales option. That is why, the scale being changed is reasonable. The number of samples taken was 140 people according to Roscoe [15], to determine the number of samples are calculated from the number of variables studied x 10 [18] in this study. The total returned questionnaire was 120, the unqualified and unused questionnaire was 18, the valid questionnaire was counted 102. The respondents concerned in the research field, specifically users related to the project or who understand at least about performance evaluation in the field in and surrounding areas that are relevant as research subjects. Samples were taken randomly from is carried out from August 2021 to May 2022, as the Table 3 demographic respondents.

Table 3. Demographic respondents'

Variable	Classification	Frequencies	Percentage (%)
Gender	Male	54	52.9
	Female	48	47.1
Age	< 25 years	4	3.9
	25-30 years	34	33.3
	31-41 years	38	37.3
	42-52 years	24	23.5
	> 52 years	2	2.0
Education	High School	15	14.7
	Bachelor's degree	51	50.0
	Master's degree	32	31.4
	PhD	4	3.9
	Department Tittle	Head of planning	2
Department Tittle	Financial management	3	2.9
	Management project	17	16.7
	Functional staff	15	14.7
	Field staff	32	31.4
Length of Work	Other	33	32.4
	< 2 years	10	9.8
	< 6 years	36	35.3
	> 8 years	56	54.9

B. Data Analysis Technique

The data obtained from the research instruments will be analyzed descriptively qualitatively. The data analyzed include the criteria of relevance, efficiency, effectiveness, and sustainability. The way of analysis is as follows:

- a) MATLAB-GNUoctave6.4.0, Excel2019, SPSS23.0, reliability and validity test, and calculation of related problems.
- b) AHP and FAHP consistency check is used for data to gain the experts' weight and process to fuzzy comprehensive evaluation method.
- c) Fuzzy comprehensive evaluation is to analyze the combines analytic hierarchy process with fuzzy method to gain scores.

C. Evaluation Model

The project evaluation used by ADB in Indonesia certainly uses the percentage of success that has been set based on the ADB guidelines assessment, but as a recipient country it is necessary to have its own assessment as an evaluation material for the country's development and interests of the country itself. The evaluation model used does not change the model to be new but forms a model that

is convenient to use when evaluating in detail and at a scale that adapts to the conditions of the borrowing country. The method used is still based on ADB suggestion with beneficiary adjustment.

The data of this research have the collection of relevant literature, which is mainly obtained through domestic and foreign journal databases such as journal relate, documents sources from ADB-projects, document from companies. The data used for pre-investigation, then compiling the relevant questionnaires. The selection of the analytical method which is suitable to get the weight according to the experts is AHP. After getting the value of validity and reliability as a preliminary test to be developed again to a follow-up questionnaire to get an evaluation score of the loan project.

Analytic Hierarchy Process is a decision support method developed to complete problem this method also considers data validity with inconsistency limits in Saaty and Kearns [19]. AHP is used to determine the consistency of the first checking weight indicator for first-level and secondary level, then entered Fuzzy comprehensive as a measurement tool to get the score and find out the decision making on the project being undertaken. FAHP-Fuzzy comprehensive evaluation method is using as one process method to compare the result with AHP-Fuzzy comprehensive evaluation method of models.

The ADB results has its own value, then Indonesia as a beneficiary based on the indicator and the weight calculation also has different results. The different evaluation methods that already exist and the comprehensive evaluation method from the AHP-Fuzzy comprehensive evaluation and FAHP-Fuzzy comprehensive evaluation have different weights. Where basically the ADB evaluation has 4 main criteria with explanations for each criterion and indicators that are made with explanations. In the adjustment model, sub-criteria or indicators are taken from the explanation and elaboration in the explanation of the criteria and objectives of the criteria and form 14 indicator points that are used. Using the method has modified to establish new evaluation model to suit the study and evaluated the two projects from different sectors as Fuzzy comprehensive to collect the subjective data. After conducting the analysis there is relevant resources obtained 4 main criteria with 14 sub-criteria to be used to determine the weight of priority to calculation. These two methods are not much different but provide significant score results to be used as reference material in the development of further projects, especially in the adjustment of evaluation models and indicators for donor recipients. Which in decision-making shows that the specification between the highest to lowest weights in the knowledge of the importance of the factors of the success of a project, the factors that affect the success of the project and other factors to be involved in influencing the project objectives for its importance. Therefore, this model is quite helpful to assist and determine the decision-making results, and the evaluation system can be seen on the Table 2.

V. RESULTS AND DISCUSSION

A. Determine Weight

The scoring matrix construction using Saaty's scale 1-9 point. After compiling the indicator scoring matrix at all

levels, enter the appropriate data into the SPSS and MATLAB to get weight, 20 experts were selected who knew and understood the performance evaluation in project loans. The inclusion criteria are position or degree in the focus of work, work experience above 8 years. The research route of the selected experts includes the Head of planning, financial management, project management, project functional staff and field staff and the respondent concerned to fill the questionnaire. **The indicators weight is calculated. See the calculation in Supplementary materials.**

1) AHP - combination weights of indicators at all levels and weight calculation results

Combined with expert scoring method and analytic hierarchy process, the weights and combination weights of each indicator in the performance evaluation indicator system of second-level general loan project were determined.

Table 4. Combination weights of indicators at all levels and weight calculation results

First level Indicator	Weights	Secondary level Indicator	Weights	Combined Weights
Relevance (C1)	0.378	(c11)	0.387	0.146
		(c12)	0.443	0.167
		(c13)	0.170	0.064
Efficiency (C2)	0.312	(c21)	0.357	0.111
		(c22)	0.307	0.096
		(c23)	0.200	0.062
		(c24)	0.136	0.042
Effectiveness (C3)	0.196	(c31)	0.293	0.057
		(c32)	0.270	0.053
		(c33)	0.338	0.066
		(c34)	0.100	0.020
Sustainability (C4)	0.114	(c41)	0.411	0.047
		(c42)	0.328	0.037
		(c43)	0.261	0.030

2) FAHP - combination weights of indicators at all levels and weight calculation results

Table 5. Fuzzy AHP - combination weights of indicators at all levels and weight calculation results

First level Indicator	Weights	Secondary level Indicator	Weights	Combined Weights
Relevance (C1)	0.481	(c11)	0.392	0.189
		(c12)	0.340	0.164
		(c13)	0.268	0.129
Efficiency (C2)	0.299	(c21)	0.311	0.093
		(c22)	0.229	0.068
		(c23)	0.200	0.060
		(c24)	0.260	0.078
Effectiveness (C3)	0.119	(c31)	0.310	0.037
		(c32)	0.330	0.039
		(c33)	0.230	0.027
		(c34)	0.130	0.015
Sustainability (C4)	0.101	(c41)	0.400	0.040
		(c42)	0.346	0.035
		(c43)	0.254	0.026

B. Fuzzy Comprehensive Evaluation Model

Determine evaluation index system or factor set U , factor set refers to the set of various factors that can affect the evaluated object.

$$U = \{U_1, U_2, U_3, U_4\} \quad (1)$$

The second level factor set from subfactor set $U_i = U_{i1}, U_{i2}, U_{i3}, U_{i4}$, as show on Table 2. Then, determine set the weight as $W = W_1, W_2, W_3 \dots W_n$, to $W_i (i = 1, 2, 3, 4 \dots n)$ as main weight to subset weight.

3) *Indicator comment set or V-set*

V is determine to grade set or grade weight. According to Likert-scale point that using ADB’s scale are Highly successful, Successful, less than successful, unsuccessful, or not important, quite important, more important, particularly important.

$$V = \{ V_1, V_2, V_3 \dots V_n \} \tag{2}$$

The comment of level k relative to the affiliation degree of V . To establish a fuzzy evaluation matrix is use the questionnaire method to obtain the ratio the third level of index or the final comprehensive evaluation value. $V_k (k=1, 2, 3, 4, 5)$ to the total number of respondents in the questionnaire to obtain fuzzy evaluation matrix.

a) *Establish fuzzy evaluation matrix*

Carry out the single factor fuzzy evaluation after constructing fuzzy grade subsets, quantify each factor set U_i as secondary factor set of evaluation object. With single factor grade, then get the fuzzy vector R_i .

$$R_i = \begin{pmatrix} r_{i11} & r_{i12} & \dots & r_{i1p} \\ r_{i21} & r_{i22} & \dots & r_{i2p} \\ r_{i31} & r_{i32} & \dots & r_{i3p} \end{pmatrix} \tag{3}$$

b) *Evaluation single factor*

For the evaluation value of the ultimate single factor with mutual exclusion comment grades, it is obtained by vector and matrix, with the expected formula $C_i = W_i * R_i$.

$$c_1 c_2 c_3 \dots c_m = w_1 w_2 \dots w_n * \begin{pmatrix} r_{11} & r_{12} \dots & r_{1m} \\ r_{21} & r_{22} \dots & r_{2m} \\ r_{n1} & r_{n2} \dots & r_{nm} \end{pmatrix} \tag{4}$$

c) *Fuzzy comprehensive evaluation of secondary indicator*

To get a secondary level calculation, the W1 value from the combined weight and R1 matrix questionnaire or secondary level indicator extent that has been calculated.

$$C_2 = W_2 * R_2 = (W_{21}, W_{22}, W_{23}, \dots, W_n) * \begin{pmatrix} r_{211} & r_{212} & r_{213} \\ r_{221} & r_{222} & r_{223} \\ r_{231} & r_{232} & r_{233} \end{pmatrix} = (c_{21}, c_{22}, c_{23}) \tag{5}$$

Then, carry out the secondary scores that get by multiply from Likert scale and Weight Combined. And sum up the overall score of secondary scores comprehensive to get the total project score.

d) *Fuzzy comprehensive evaluation of first-level indicator*

The combination sums up of the results of a comprehensive evaluation of each index of the second level is the index of the first level as a matrix of membership. $W_{21}, W_{22}, W_{23}, W_{24}$ is represented to secondary level indicators and multiply with Weight to get First level comprehensive score. The evaluation results are obtained is represented to first level indicators comprehensive score.

$$C_2 = W_2 * R_2 = (W_{21}, W_{22}, W_{23}, \dots, W_n) * \begin{pmatrix} c_{11} & c_{12} & c_{12} \\ c_{21} & c_{22} & c_{23} \\ c_{31} & c_{32} & c_{33} \end{pmatrix} = (c_1, c_2, c_3) \tag{6}$$

e) *Validity and reliability test*

Table 6. Validity test and reliability test

Secondary level indicators	Validity Test		Reliability Test		
	r-count	r-table	Description	Correlation Reliability	Description
(c11)	0.839	0.165	Valid	0.806	Valid
(c12)	0.841	0.165	Valid	0.810	Valid
(c13)	0.668	0.165	Valid	0.613	Valid
(c21)	0.776	0.165	Valid	0.738	Valid
(c22)	0.736	0.165	Valid	0.692	Valid
(c23)	0.846	0.165	Valid	0.819	Valid
(c24)	0.775	0.165	Valid	0.737	Valid
(c31)	0.850	0.165	Valid	0.824	Valid
(c32)	0.850	0.165	Valid	0.824	Valid
(c33)	0.867	0.165	Valid	0.843	Valid
(c34)	0.830	0.165	Valid	0.794	Valid
(c41)	0.808	0.165	Valid	0.769	Valid
(c42)	0.673	0.165	Valid	0.616	Valid
(c43)	0.816	0.165	Valid	0.786	Valid

The “reliability test” of this study was carried out using Cronbach’s Alpha analysis. Where if a variable shows Cronbach’s Alpha value > 0.60, it can be concluded that the variable can be said to be reliable or consistent. The Validation and Reliability of the received questionnaires are tested. And the preliminary work of the fuzzy comprehensive evaluation method is established.

C. *Analysis on the Fuzzy Comprehensive Outcome*

In this point, the evaluation is divided in two projects separately. After the factor set U constructed and W determined. Table 2 it represented as determine evaluation index system or factor set U in fuzzy comprehensive evaluation method. Factor set U in criteria is represented to C , $U1$ represented to $C1$, $U11$ in sub-criteria is represented to $C11$ and so on.

Then the V set is established according to the respondent questionnaire 1 to 5 Likert-scale, V set is represented to Secondary-level indicator Fuzzy evaluation matrix R . Fuzzy evaluation matrix R represent to extent Secondary Fuzzy evaluation matrix, and calculation is obtained with Likert-scale. Then, to get the scores of Projects that multiply Combined Weight and Secondary extent to get Secondary level scores, and sump up to get the overall Project Score. First level comprehensive is multiplied by Secondary Scores is sum up to represented to each criterion, by that multiply with the Weight.

1) *AHP – Fuzzy Comprehensive Evaluation Method Results*

The calculation in Fuzzy comprehensive evaluation, Secondary level indicator is obtained from the questionnaire represent. Get the overall score of the project is multiply by Sum up secondary scores (secondary extent) in represented each criterion to Weight. From all the final scores as below

table. The projects level fuzzy comprehensive evaluation results are:

Table 7. Scores of Project A

AHP Weight Combined	Secondary Extent	Secondary Level Scores	First Indicator	Weight	First Level Scores	Overall Scores PA
0.146	4.32	0.6307				
0.167	2.77	0.4626				
0.064	5.46	0.3494	1.4428	0.378	3.8169	
0.111	4.30	0.4773				
0.096	4.98	0.4781				
0.062	4.55	0.2821				
0.042	4.28	0.1798	1.4172	0.312	4.5423	4.19624
0.057	4.24	0.2417				
0.053	4.33	0.2295				
0.066	4.21	0.2779				
0.020	4.28	0.0856	0.8346	0.196	4.2582	
0.047	4.37	0.2054				
0.037	4.39	0.1624				
0.030	4.46	0.1338	0.5016	0.114	4.4000	

And the rest calculation can be like at the Tables 8-10 below.

Table 8. Scores of Project B

AHP Weight Combined	Secondary Extent	Secondary Level Scores	First Indicator	Weight	First Level Scores	Overall Scores PB
0.146	4.25	0.6205				
0.167	4.50	0.7515				
0.064	3.99	0.2554	1.6274	0.378	4.3053	
0.111	4.40	0.4884				
0.096	4.32	0.4147				
0.062	4.22	0.2616				
0.042	4.50	0.1890	1.3538	0.312	4.3391	4.34448
0.057	4.32	0.2462				
0.053	4.34	0.2300				
0.066	4.32	0.2851				
0.020	4.52	0.0904	0.8517	0.196	4.3454	
0.047	4.63	0.2176				
0.037	4.41	0.1632				
0.030	4.36	0.1308	0.5116	0.114	4.4877	

1) FAHP – Fuzzy Comprehensive Evaluation Result

Table 9. Scores of Project A

FAHP Weight Combined	Secondary Extent	Secondary Level Scores	First Indicator	Weight	First Level Scores	Overall Scores PA
0.189	4.32	0.8165				
0.164	4.26	0.6986				
0.129	5.46	0.7043	2.2195	0.481	4.6143	
0.093	4.30	0.3999				
0.068	4.98	0.3386				
0.060	4.55	0.2730				
0.078	4.28	0.3338	1.3454	0.299	4.4997	4.51287
0.037	4.24	0.1569				
0.039	4.33	0.1689				
0.027	4.21	0.1137				
0.015	4.28	0.0642	0.5036	0.119	4.2319	
0.040	4.37	0.1748				
0.035	4.39	0.1537				
0.026	4.46	0.1160	0.4444	0.101	4.4000	

Table 10. Scores of Project B

FAHP Weight Combined	Secondary Extent	Secondary Level Scores	First Indicator	Weight	First Level Scores	Overall Scores PB
0.189	4.25	0.8033				
0.164	4.50	0.7380				
0.129	3.99	0.5147	2.0560	0.481	4.2744	
0.093	4.40	0.4092				
0.068	4.32	0.2938				
0.060	4.22	0.2532				
0.078	4.50	0.3510	1.3072	0.299	4.3719	4.2162
0.037	4.32	0.1598				
0.039	4.34	0.1693				
0.027	4.32	0.1166				
0.015	4.52	0.0678	0.5135	0.119	4.3151	
0.040	4.63	0.1852				
0.035	4.41	0.1544				
0.026	4.36	0.1134	0.4529	0.101	4.4812	

D. Performance Comparison and Analysis

As in the Table 11 that the comprehensive scores of the

analytic hierarchy process Project A is 4.19624 and Project B is 4.34448, fuzzy analytic hierarchy process in Project A is 4.51287 and Project B is 4.21621, respectively. The

results show that the fuzzy comprehensive evaluation method scores significant successful as represented above 4.0, and the computational in FAHP-fuzzy comprehensive evaluation method is the highest. The variance of the first level indicator scores of the comprehensive scores respectively represented among the four criteria and two methods. It shows that the first level fuzzy indicator of fuzzy

comprehensive evaluation method are sequential values. By the performance comparison and analysis, the FAHP-fuzzy comprehensive evaluation method is better method for evaluating performance evaluation in projects performance. It takes on a higher computational successfully and sequential values.

Table 11. The calculation and method comparison results

Methods	First level Indicator Score	Fuzzy Comprehensive Evaluation Score	
		Project A	Project B
Analytic Hierarchy Process method	0.378	4.19624	4.34448
	0.312		
	0.196		
	0.114		
Fuzzy Analytic Hierarchy Process method	0.481	4.51287	4.21621
	0.299		
	0.199		
	0.101		

Table 12. Comparison in evaluation result of Project A and Project B

First Level Indicators	ADB		AHP		FAHP	
	Project A	Project B	Project A	Project B	Project A	Project B
Relevance	4.0	Relevant	3.8169	4.3053	4.6143	4.2744
Efficiency	4.0	Efficient	4.5423	4.3391	4.4997	4.3719
Effectiveness	4.3	Effective	4.2582	4.3454	4.2319	4.3151
Sustainability	4.3	Likely Sustainable	4.4000	4.4877	4.4000	4.4812
Overall Evaluation/ Scores	Successful	Successful	4.19624	4.34448	4.51287	4.21621

On the Table 12 that evaluation results of Project A and Project B, based on the ADBs, AHP and FAHP that adjustment by the model evaluation process. ADBs evaluation results, the results and success in the sustainability and continuing of the project in completion report. The basis of the assessment itself only includes the overall calculation or weights based on ADB's assessment guidelines that using percentages, in evaluation result shows that ADBs [20] shows directly point level evaluation terms in 4.0, 4.0, 4.3, 4.3 point successfully in Project A and in Project B [21] shows in terms which is short out in the report relevant, efficient, effective, and likely sustainable. Whereas AHP in adjustment model that in Project A have scores for each criterion 3.8169, 4.5423, 4.2582, 4.4000 and Project B 4.3053, 4.3391, 4.3454, 4.4877. Then, FAHP in Project A is 4.6143, 4.4997, 4.2319, 4.4000 and in Project B 4.2744, 4.3719, 4.3151, 4.4812. The variance in comprehensive scores for both projects' evaluation scores. It shows that the project A and project B in FAHP-fuzzy comprehensive evaluation method is computational scores in performance evaluation for projects evaluation. It takes on a detail numbers of scores for projects performance evaluation consideration.

VI. CONCLUSION

A. General Policy and Evaluation Model

Based on the research objective and purpose, namely for the performance of ADB loan projects in Indonesia based on ADB evaluations, change to an adjustment model to be used as beneficiary evaluation as stated in "introduction" is giving new perspectives and important for sustainable, development, numerical and simulation model methods in financial country growth.

1) The indicators that have been adjusted and established in this evaluation are not only in the form of percentages

based on evaluation suggestions from ADB, but also to provide more specific numerical results for the evaluations carried out. As a recipient of project funds, it is necessary to know in detail for evaluation of project performance in planning, state regulations, governance, the impact of its development either in terms of state profits or private companies that are still under the auspices of the state or government. The selection of indicators that affect performance evaluation is improvement selected indicator system to make convenient in evaluation, sorting out of Indonesia index systems by experts confirmed through document reports, questionnaires, and interviews.

2) To find out in "Improvements to ADB's Evaluation process at the recipient country's standpoint," the researcher used the ADB scale for the situation and conditions according to the beneficiaries, but the figures obtained were sufficient to present and use it for the beneficiaries as a self-assessment. The purpose of this adjustment is to be used as a model for self-assessment of the company itself. In selecting the scale using a Likert-scale 1-5, and not using the ADBs scale option because the model and scale used is a model that has been specifically adapted to the beneficiaries as an evaluation of performance. Therefore, the scale used is 1-5 is to get an absolute final score using AHP and FAHP scales option. That is why, the scale being changed is reasonable.

3) In the selection of "Literature performance method," AHP. Adjusted and established as beneficiary's model. In presenting using Saaty's scale to obtain the weights by AHP. Forming a hierarchical structure, presenting scores to form a matrix, then forming a matrix calculation is carried out to get the weight of the experts based on the first level, secondary level, and combined AHP. The AHP method is used to create comparison matrix between criteria, comparison matrix between sub-criteria, and comparison matrix between sub-criteria and test the consistency of the

matrix pair comparison. If the matrix is consistent or the value of CR 0.1 so it will get the weight of each criterion, sub-criteria, used to get the weight value.

4) FAHP. As a developed from AHP method that is giving more extent detail of the result. That compare to AHP method comparison result. By this two process, experts and evaluator can choose either AHP or FAHP as performance evaluation process. In here, AHP as to get the Experts Weight and FAHP Weight. The AHP method is used to create comparison matrix between criteria, comparison matrix between sub-criteria, and comparison matrix between sub-criteria and test the consistency of the matrix pair comparison. If the matrix is consistent or the value of CR 0.1 then the matrix will be converted into a scale triangular fuzzy number using the method fuzzy, so it will get the weight of each criterion, sub-criteria, used to get the weight value.

The process of weighting criteria or sub criteria with the FAHP method takes a long time relatively longer than the process in the method AHP. However, the FAHP method has advantage of faster processing time alternative weighting.

5) Fuzzy comprehensive evaluation method. As Performance Evaluation in project results as the second process after the AHP and FAHP to get scores. Formed a fuzzy comprehensive evaluation method to get the second weight matrix, the first weight and the final comprehensive evaluation result and then compare the findings. Performance evaluation has a significant influence on project development and progress in a project agreement or activity based on funding. Determine the weight of priority to calculation using in Fuzzy comprehensive evaluation, which uses a Likert scale to get a direct score with a factor set formula and is convenient to use to assist in evaluation calculations. In decision-making shows that the specification between the highest to lowest weights in the knowledge of the importance of the factors of the success of a project, the factors that affect the success of the project and other factors to be involved in influencing the project objectives for its importance. Therefore, this model is quite helpful to assist, find and determine the decision-making results for recipients.

6) in assessing each main criteria that mentioned in "Analysis on the Fuzzy Comprehensive Outcome," that Relevance become the center of the findings where Project A in AHP-Fuzzy Comprehensive Evaluation Method processes have 3.0 values but have a significant impact on the sustainability of the project. Increase in investment and focus on Policy affects project work based on the country's policy of planning growth and achievement of program results with the set targets. In accordance with existing regulations, the agreement and the intended objectives are the policies and needs of the country and are estimated in a mature plan. Because based on the project, it must also implement constitutional rules in terms of development which are expected to have a good impact on the life sector, the environment, and citizens as well as economic progress. And well Strategy is one of main influenced aspect of the project based on the country's economic growth strategy in Implementing, structuring, and improving and not overlapping or one-sided. And for long-term cooperation sustainability project, sustainable is impact after the project

completion as review for upcoming and new project for the country environment and economic growth in operation maintenance, promote sustainable of the project and budget cost. In FAHP-Fuzzy Comprehensive Evaluation Method that Relevance, Efficiency, Effectiveness, and Sustainable scores got above 4.0 point and successful.

And this model also can be considered and used to assist in the evaluation of development financing projects in various industries, national policies, and corporate projects. By AHP-Fuzzy Comprehensive Evaluation model is suggest using or else FAHP-Fuzzy Comprehensive Evaluation. FAHP is a development method from AHP and the latest is more complex, but with the existing findings indicate that the gray zone is quite significant in the processes of counting, and according to the situation and needs of the recipient, the indicators used can be adjusted based on the needs and objectives of the evaluation for future users. As a consideration of these findings, using the AHP-Fuzzy Comprehensive Evaluation method is a safer and more convenient method for performance evaluation as beneficiaries or recipient especial in Indonesia. But it does not rule out the possibility of using FAHP to have a high level of accuracy in terms of performance accuracy in evaluation results with recommendations experts.

B. Research Contribution and Implications

In research contribution as use of this model as **General Implications for Donors, Recipients, and Companies**, Project A and B originally is success projects with high percentage based on ADBs project report, after build adjustment model with beneficiary's indicators that both projects have different result score but in the same point aspect need to improve. By using AHP-Fuzzy comprehensive evaluation and FAHP-fuzzy comprehensive evaluation have the similar evaluation results but different scores to compare the ADB's evaluation results which tend to show only the percentage or terms of evaluation and for public knowledge. AHP gave simply detail scores when FAHP gave more complex detailed scores. In obtained the weight of AHP and FAHP got different value, and in the sub-criteria by Fuzzy comprehensive evaluation method got similarities scores. It also provides a specific value for each system indicator and indicates which level or factor has more influence on the success of a project. Then, the recipient and companies of project funds can use the adjustment model (modification) as a reference material to improvement and the results will be a focus on undervalued in indicators for future projects. And for donors, it becomes a material for consideration in managing long-term cooperation between recipients and donors. For the adjustment model AHP for gain experts' weight indicators consistency and FAHP-Fuzzy Comprehensive Evaluation for performance evaluation is reasonable and successful, the multicriteria decision method as a performance evaluation, it was declared accepted.

Finally, **implications for Project A and Project B** in the comparison results in the performance evaluation of loan projects have differences based on the main criteria that method using as beneficiary which based on ADB's guideline. The adjustment model in Project A and B are listed, the detailed results of which can be a guide for future

projects. And can be used as a self-evaluation project. With the results found, the adjustment model is very efficient as an evaluation facility to be used in two different projects and two different sectors. However, based on the result should pay more attention to the surroundings, the environment and the impact for the country need, customers need, and country develop need so that with a relevant and sustainable value that in the future both projects need to focus on strategy, policy and stronger regulations so that even though before project results are quite successful, the well planning, well strategy and good regulations will be quite significant impact for starting. And sustainability project is impact after the project completion as review for upcoming and new project for the country environment and economic growth in operation maintenance, promote sustainable of the project and budget cost for long-term cooperation.

C. Limitation and Future Research

This study only focuses on 2 projects, 2 sectors and 4 main criteria of evaluation with 14 sub-criteria. Directions for future research that can use other methods and add Decision Support System (DSS) is a functioning system to support decision makers (managers or experts) in a semi-structured decision situation; performance evaluation system can be used dynamically by being able to add existing criteria, sub-criteria, and sub-sub-criteria; performance evaluation system can be integrated with all different projects and sectors.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

YHC contributed to the ideas, research guideline, and writing revision. MK contributed to the research design, data collection and analysis, and writing. All authors contributed to the article and approved the submitted final version.

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