INTERNATIONAL JOURNAL ON ADVANCED TECHNOLOGY, ENGINEERING, AND INFORMATION SYSTEM (IJATEIS)

ANALYSIS OF CRITERIA AFFECTING THE EFFECTIVENESS OF IMPLEMENTING SELF-MANAGED CONSTRUCTION PROJECTS BASED ON COMMUNITY EMPOWERMENT AND CONTRACTUALITY

Aki' Suprapto[1*], Esti Wulandari[2], Hanie Teki Tjendani[3]
[1-3]Master of Civil Engineering, Faculty of Engineering, Universitas 17 Agustus 1945 Surabaya
E-mail: [1)] suprapto.pnpmjatim@gmail.com, [2)] wulandariesti@untag-sby.ac.id,
[3)] hanie@untag-sby.ac.id

Abstract

With the dominance of top-down development, the aspirations of the community's ideas in every stage of construction development are not perfectly absorbed, resulting in community antipathy towards every government policy. Therefore, to recreate public sympathy, the government released a program to strengthen village governance and development (P3PD) or better known as the village fund program. The AHP (Analytical Hierarchy Process) method is used to analyze the results of the questionnaire so that the weight value of the criteria and sub criteria can be known as the basis for selecting the implementation of construction activities. Based on the results of the analysis, the weight value of the criteria can be found as follows: quality criteria are the main criteria in the selection of construction projects with a weight of 0.235, cost with a weight of 0.203, time with a weight of 0.192, community participation with a weight of 0.144, labor with a weight of 0.117 and administration with a weight of 0.110.

Keywords: *Analytical Hierarchy Process Method, Self-management of Community Empowerment, Contractual*

1. INTRODUCTION

One of the government's efforts in implementing bottom-up activities is the enactment of Law No. 6/2014 on villages, the implementation of which is the program to strengthen village governance and development (P3PD) or better known as the village fund program under the auspices of the Ministry of Villages, Development of Disadvantaged Regions and Transmigration. This program has been running since the year it was established, and all activities are purely sourced from the aspirations and creative ideas of the community, starting from the proposal stage, implementation, utilization to maintenance, all of which are based on village deliberations. The village fund program has objectives including improving the welfare of village communities, accelerating rural development and equitable development in Indonesia.

Self-management activities based on community empowerment in the village fund program prioritize the active participation of village communities to reduce unemployment and poverty, as stated in the provisions of the village fund program which requires allocating a minimum of 30% of the workforce in one of its infrastructure activities called village cash-intensive activities (PKTD). In addition to prioritizing local human resources, community empowerment-based self-management activities in the village fund program prioritize using local products or materials to raise the selling value of natural resources in the village.

The village fund program focuses on developing infrastructure, natural and human resources, and various programs such as education, food security, waste management, peace and public order, prevention, child and women protection, public health, clean water, disaster response, and inflation mitigation. Approaches include decentralization, community self-help, empowerment, participation, institutional capacity building, development program integration, alignment with the poor, gender equality, justice, and inclusion of minorities, women, and the elderly.

Good quality construction project management is a desirable goal. It can bring many benefits if executed well. However, there are obstacles like project delays, inadequate resources, subpar materials, and improper administrative procedures that can lead to serious problems such as cost overruns, complaints, loss of trust, and project failure.

This will certainly make a huge loss for all parties. However, this can be predicted early by considering important criteria that affect the success and smooth implementation of construction projects. In order for the implementation of a project to run smoothly and in accordance with the agreed specifications, it is necessary to take a good construction approach that is appropriate and can meet the requirements for achieving successful development, besides that it is also necessary to maintain communication and relationships with each stakeholder. In the implementation of construction projects, the balance between scope, schedule, cost, quality, resources and risk is needed to produce an activity that is as expected.

To analyze and evaluate performance in an activity implementation to achieve strategic goals, an indicator is needed, one of which is project management KPI (Key Performance Indicator) as a measuring tool in describing the criteria that determine the success of an organization's goals. KPI is also one way to find out about the validity of an alternative so that it really reaches the goal or purpose of a process. A good KPI must have several criteria as a measuring tool for an alternative analysis. KPIs are also used as navigation in making the direction of a goal that can be used as a target in the discussion.

In order to make decisions to analyze and evaluate an activity implementation, a method is needed. One method that is often used is the analytical hierarchy process (AHP) method. This method has the ability to prioritize and also decompose complex multi-criteria and variable problems into a hierarchical structure. The basic principles of AHP are compiling a hierarchical structure, assessing criteria with pairwise comparisons, determining priorities and consistency of methods. The advantage of the analytical hierarchy process (AHP) method is that it makes extensive irregular and unstructured problems into a model that is easy to understand. From the background above, it shows that there are important criteria that greatly affect the effectiveness of a construction project implementation.

Another method that is commonly used and is a continuation of the analytical hierarchy process (AHP) method is the analytic network process (ANP) method. Analytic Network Process (ANP) is a technique that helps solve a problem. ANP does not focus only on being used as a priority determinant of choices with many criteria, but also its use has developed as an alternative model for solving various problems. ANP is basically a general method of measuring tools. This method is more difficult than the AHP method because the ANP method requires relationships and dependence on networks. The ANP

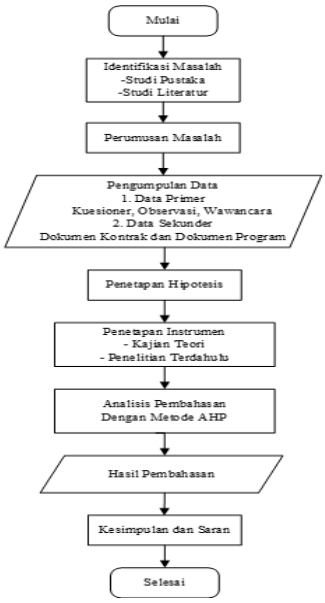
method is able to improve the shortcomings that exist in the AHP method such as the ability to develop linkages between alternatives or criteria (Muhendra et al., n.d.).

The objectives to be achieved in this study are to analyze the criteria and sub-criteria that affect the effectiveness of the implementation of community empowerment-based self-management construction projects and contractual-based construction projects in Sumenep District.

2. RESEARCH METHODS

2.1. Research Flow

The research flow is a method used to determine the steps of research in order to produce a flow that is in accordance with the objectives and characteristics of the research.



Source: Processed by Researcher, 2024

Figure 1. Research Flow

The flowchart outlines the key steps in the research process, starting with identifying the research problem or question, followed by gathering and processing data through methods such as data collection, observation, interviews, and document review. It continues with developing a hypothesis, selecting appropriate research instruments based on theoretical frameworks and previous studies, and analyzing the data using a specific method or model, such as AHP. The process concludes with drawing conclusions and making recommendations, and final selection or decision.

2.2. Research Object

The object of this research is to focus on analyzing the implementation of community empowerment-based self-managed construction and contractual work in the village fund program in Sumenep District, East Java Province (Cahyono et al., 2022; Muhendra & Hasibuan, 2018; Nugroho et al., 2019).

2.3. Research Location

The research location analyzes the implementation of community empowerment-based self-managed construction and contractual work in Juruan Daya Village, Batuputih District, Sumenep Regency, East Java Province (Setiawan, 2017).

2.4. Research Instruments

The Research Instruments are as follows:

a. The documents refer to the existing documents in Juruan Daya Village, Batuputih Sub-district, Sumenep District, East Java Province and in the relevant OPD.
b. Stationery to record the results of interviews and observations.
c. Mobile phone camera to document every activity and observation result.

2.5. Data Collection Procedure

a. Primary data

Primary data is obtained directly either from the results of observations or direct observations in the field, questionnaires and interviews with respondents who are parties involved in the project or construction implementation program, namely service providers, commitment-making officials, community empowerment experts, academics, sub-district heads, relevant section heads, village facilitators / assistants, activity implementation teams, village councils, community leaders, workers and also village governments (Soetjipto et al., 2021).

b. Secondary Data

Secondary data is data obtained from planning documents, implementation and accountability of the Juruan Daya Village government, Batuputih District, Sumenep Regency, East Java Province (Aziiz & Prastiti, 2019; Nahruddin, 2014). As for the sampling carried out is by judgment sampling method, meaning that the sample is selected based on the judgment of the researcher that the person concerned is the best party to be sampled and also uses random sampling, meaning that the sample is taken randomly. In this study the respondents were taken as many as 40 (forty) people with different levels of education and work experience.

2.6. Data Analysis Technique

Data analysis will be conducted after all necessary data is collected. The goal is to identify the most important success factor using the AHP method, project guidelines, and field data. The AHP method helps determine the priority of success criteria for the self-management project. This will ensure better control and improved results for the building construction project. (Zulkarnain, 2019).

The criteria that affect the implementation of construction are organized as a criterion, the criteria are further divided into several sub-criteria (Yulianto et al., 2022). Next is the preparation of a questionnaire to find out the opinions of respondents. Before the questionnaire was distributed to respondents, the validity and reliability of each question item was tested first on 29 (twenty-nine) respondents. If the questionnaire items are declared reliable and valid, then the questionnaire is distributed to 40 (forty) respondents.

3. RESULTS AND DISCUSSION

3.1. Validity and Reliability Test of Questionnaire Items

Analyzing data using SPSS will help create reliable question items for research. Validity of questionnaire items is determined by rstatistic and must be <0.05. With N=29 and rtable=0.367, all items are valid. Reliability of question items is confirmed with Cronbach's Alpha >0.6, which was 0.902 in this case.

3.1.1. Pairwise Comparison

One of the decision-making methods by comparing two or more alternatives using a varied scale used in this research is pairwise comparison. The assessment is carried out by giving weight to the criteria and sub criteria on a scale of 1 to 9.

a. Construction Project Implementation Criteria

Table 1. Geomean Value

Criteria	W	B	M	P	T	A
W	1,000	1,264	0,862	1,041	1,393	1,809
B	0,791	1,000	0,871	1,611	1,827	2,068
M	1,091	1,149	1,000	1,907	1,884	2,288
P	0,961	0,621	0,524	1,000	1,441	1,114
T	0,718	0,547	0,531	0,694	1,000	1,050
A	0,609	0,484	0,424	0,898	0,953	1,000
Total	**5,170**	**5,064**	**4,211**	**7,151**	**8,498**	**9,328**

Table 2. Normalization of Pairwise Matrix

Criteria	W	B	M	P	T	A	Average
W	0,193	0,250	0,205	0,146	0,164	0,194	**0,192**
B	0,153	0,197	0,207	0,225	0,215	0,222	**0,203**
M	0,211	0,227	0,237	0,267	0,222	0,245	**0,235**
P	0,186	0,123	0,125	0,140	0,170	0,119	**0,144**
T	0,139	0,108	0,126	0,097	0,118	0,113	**0,117**
A	0,118	0,095	0,101	0,126	0,112	0,107	**0,110**
Total	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**

Table 3. Consistency Test

Criteria	W	B	M	P	T	A	Total
W	0,192	0,242	0,165	0,200	0,267	0,347	1,413
B	0,161	0,203	0,177	0,327	0,371	0,420	1,660
M	0,256	0,270	0,235	0,448	0,442	0,537	2,188
P	0,138	0,089	0,075	0,144	0,207	0,160	0,813
T	0,084	0,064	0,062	0,081	0,117	0,123	0,530
A	0,067	0,053	0,047	0,099	0,105	0,110	0,480

Table 4. Finding Vector [A]

W	1,413	/	0,192	=	**7,368**
B	1,660	/	0,203	=	**8,168**
M	2,188	/	0,235	=	**9,318**
P	0,813	/	0,144	=	**5,661**
T	0,530	/	0,117	=	**4,540**
A	0,480	/	0,110	=	**4,367**
			Total	=	**39,442**

Amount of data (n) = 6

Find the maximum eigenvector value (λ max):

λ max $= \frac{\text{vektor [A]}}{n} = \frac{39{,}442}{6} = 6{,}570$

Finding the Consistency Index (CI):

$CI = \frac{\lambda_{Maximum} - n}{n-1} = \frac{6{,}570 - 6}{6-1} = 0{,}114$

Finding the Random Index (RI):
the value of n = 6 then the value RI = 1,24

Finding Consistency Ratio (CR):

CR = $\frac{CI}{RI} = \frac{0{,}114}{1{,}24} = 0{,}092 = 9{,}20\ \%$

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

b. Time Criteria in Construction Project Implementation

Table 5. Geomean Value

Criteria	W1	W2	W3
W1	1,000	0,775	1,409
W2	1,290	1,000	1,347
W3	0,710	0,742	1,000
Total	**2,999**	**2,518**	**3,756**

Table 6. Normalization of Pairwise Matrix

Citeria	W1	W2	W3	Average
W1	0,333	0,308	0,375	0,339
W2	0,430	0,397	0,359	0,395
W3	0,237	0,295	0,266	0,266
Total	**1,000**	**1,000**	**1,000**	**1,000**

Table 7. Consistency test

Criteria	W1	W2	W3	Total
W1	0,339	0,263	0,478	1,079
W2	0,510	0,395	0,532	1,437
W3	0,189	0,197	0,266	0,652

Table 8. Finding Vector [A]

W1	1,079	/	0,339	=	3,185
W2	1,437	/	0,395	=	3,637
W3	0,652	/	0,266	=	2,452
			Total	=	9,273

Amount of data (n) = 3
Find the maximum eigenvector value (λ max):
λ max = $\frac{\text{vektor [A]}}{n} = \frac{9,273}{3}$ = 3,091

Finding the Consistency Index (CI):
$CI = \frac{\lambda_{Maximum} - n}{n-1} = \frac{3,091 - 3}{3-1} =$ 0,046

Finding the Random Index (RI):
the value of n = 3 then the value RI = 0,58

Finding Consistency Ratio (CR):
CR = $\frac{CI}{RI} = \frac{0,046}{0,58}$ = 0,079 = 7,85 %

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

c. Cost Criteria in the Implementation of Construction Projects

Table 9. Geomean Value

Criteria	B1	B2	B3	B4	B5	B6
B1	1,000	1,307	1,360	1,431	1,660	2,240
B2	0,765	1,000	1,004	1,129	0,978	2,313
B3	0,735	1,006	1,000	1,356	1,180	1,850
B4	0,699	0,888	0,738	1,000	0,956	1,892
B5	0,582	0,965	0,800	1,046	1,000	1,726
B6	0,431	0,408	0,541	0,558	0,621	1,000
Total	**4,212**	**5,575**	**5,442**	**6,519**	**6,395**	**11,021**

Table 10. Normalization of Pairwise Matrix

Criteria	B1	B2	B3	B4	B5	B6	Average
B1	0,237	0,235	0,250	0,219	0,260	0,203	0,234
B2	0,182	0,179	0,184	0,173	0,153	0,210	0,180
B3	0,175	0,181	0,184	0,208	0,184	0,168	0,183
B4	0,166	0,159	0,136	0,153	0,150	0,172	0,156
B5	0,138	0,173	0,147	0,160	0,156	0,157	0,155
B6	0,102	0,073	0,099	0,086	0,097	0,091	0,091
Total	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**

Table 11. Consistency test

Criteria	B1	B2	B3	B4	B5	B6	Total
B1	0,234	0,306	0,318	0,335	0,389	0,524	2,106
B2	0,138	0,180	0,181	0,203	0,176	0,417	1,296
B3	0,135	0,184	0,183	0,248	0,216	0,339	1,305
B4	0,109	0,138	0,115	0,156	0,149	0,295	0,962
B5	0,090	0,150	0,124	0,162	0,155	0,268	0,950
B6	0,039	0,037	0,049	0,051	0,057	0,091	**0,325**

Table 12. Finding Vector [A]

B1	2,106	/	0,234	=	8,999
B2	1,296	/	0,180	=	7,189
B3	1,305	/	0,183	=	7,127
B4	0,962	/	0,156	=	6,173
B5	0,950	/	0,155	=	6,119
B6	0,325	/	0,091	=	3,559
			Total	=	**39,166**

Amount of data (n) = 6

Find the maximum eigenvector value (λ max):

$\lambda \text{ max} = \frac{\text{vektor [A]}}{n} = \frac{39{,}166}{6} = 6{,}528$

Finding the Consistency Index (CI):

$CI = \frac{\lambda_{Maksimum} - n}{n-1} = \frac{6{,}528 - 6}{6-1} = 0{,}106$

Finding the Random Index (RI):
n = 6 then the value of RI = 1,24

Finding Consistency Ratio (CR):

$CR = \frac{CI}{RI} = \frac{0{,}106}{1{,}24} = 0{,}085 = 8{,}51\ \%$

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

d. Quality Criteria in Construction Project Implementation

Table 13. Geomean Value

Criteria	M1	M2	M3
M1	1,000	1,234	0,641
M2	0,810	1,000	0,726
M3	1,524	1,378	1,000
Total	**3,335**	**3,612**	**2,367**

Table 14. Normalization of Pairwise Matrix

Criteria	M1	M2	M3	Average
M1	0,300	0,342	0,271	**0,304**
M2	0,243	0,277	0,307	**0,276**
M3	0,457	0,381	0,422	**0,420**
Total	**1,000**	**1,000**	**1,000**	**1,000**

Table 15. Consistency test

Criteria	M1	M2	M3	Total
M1	0,304	0,375	0,195	**0,874**
M2	0,223	0,276	0,200	**0,699**
M3	0,641	0,579	0,420	**1,640**

Table 16. Finding Vector [A]

M1	0,874	/	0,304	=	**2,875**
M2	0,699	/	0,276	=	**2,536**
M3	1,640	/	0,420	=	**3,902**

Amount of data (n) = 3

Find the maximum eigenvector value (λ max):

$\lambda \text{ max} = \frac{\text{vector [A]}}{n} = \frac{9{,}313}{3} = 3{,}104$

Finding the Consistency Index (CI):

CI = (λ (Maximum)- n)/(n - 1)= (3,104 - 3)/(3 - 1)= 0,052

Finding the Random Index (RI):

N value = 3 then the value of RI = 0,58

Finding Consistency Ratio (CR):

$CR = \frac{CI}{RI} = \frac{0{,}052}{0{,}58} = 0{,}090 = 9{,}00\ \%$

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

e. Criteria for Community Participation in Construction Project Implementation

Table 17. Geomean Value

Criteria	P1	P2	P3	P4
P1	1,000	1,020	0,933	0,959
P2	0,980	1,000	0,736	1,073
P3	1,072	1,358	1,000	1,210
P4	2,667	0,059	0,000	1,000
Total	**5,719**	**3,437**	**2,669**	**4,243**

Table 18. Normalization of Pairwise Matrix

Criteria	P1	P2	P3	P4	Average
P1	0,175	0,297	0,350	0,226	0,262
P2	0,171	0,291	0,276	0,253	0,248
P3	0,187	0,395	0,375	0,285	0,311
P4	0,466	0,017	0,000	0,236	**0,180**
Total	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**

Table 18. Consistency test

Criteria	P1	P2	P3	P4	Total
P1	0,262	0,267	0,244	0,251	**1,024**
P2	0,243	0,248	0,182	0,266	**0,939**
P3	0,333	0,422	0,311	0,376	**1,441**
P4	0,480	0,011	0,000	0,180	**0,670**

Table 19. Finding Vector [A]

P1	1,024	/	0,262	=	**3,912**
P2	0,939	/	0,248	=	**3,790**
P3	1,441	/	0,311	=	**4,640**
P4	0,670	/	0,180	=	**3,726**
			Total	=	**16,068**

Amount of data (n) = 4

Find the maximum eigenvector value (λ max):

λ max = $\frac{\text{vector [A]}}{n} = \frac{16,068}{4} = 4,017$

Finding the Consistency Index (CI):

$CI = \frac{\lambda_{Maximum} - n}{n-1} = \frac{4,017 - 4}{4-1} = 0,006$

Finding the Random Index (RI):
the value of n = 4 then the value of RI = 0,90

Finding Consistency Ratio (CR):

CR = $\frac{CI}{RI}$ = $\frac{0{,}006}{0{,}90}$ = 0,006 = 0,63 %

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

f. Labor Criteria in the Implementation of Construction Projects

Table 20. Geomean Value

Criteria	T1	T2	T3	T4	T5
T1	1,000	0,924	2,048	1,567	0,829
T2	1,083	1,000	2,022	1,347	1,204
T3	0,488	0,495	1,000	0,765	0,681
T4	0,638	0,743	1,307	1,000	0,474
T5	1,206	0,830	1,408	1,928	1,000
Total	**4,415**	**3,991**	**7,784**	**6,606**	**4,188**

Table 21. Normalization of Pairwise Matrix

Criteria	T1	T2	T3	T4	T5	Average
T1	0,226	0,231	0,263	0,237	0,198	0,231
T2	0,245	0,251	0,260	0,204	0,288	0,249
T3	0,111	0,124	0,128	0,116	0,162	0,128
T4	0,145	0,186	0,168	0,151	0,113	0,153
T5	0,273	0,208	0,181	0,292	0,239	0,239
Total	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**

Table 22. Consistency test

Criteria	T1	T2	T3	T4	T5	Total
T1	0,231	0,214	0,473	0,362	0,192	1,472
T2	0,270	0,249	0,504	0,336	0,300	1,660
T3	0,063	0,063	0,128	0,098	0,087	0,440
T4	0,097	0,113	0,199	0,153	0,072	0,635
T5	0,288	0,198	0,336	0,460	0,239	**1,520**

Table 23. Finding Vector [A]

T1	1,472	/	0,231	=	6,367
T2	1,660	/	0,249	=	6,655
T3	0,440	/	0,128	=	3,429
T4	0,635	/	0,153	=	4,162
T5	1,520	/	0,239	=	6,372
			Total	=	**26,985**

Amount of data (n) = 5

Find the maximum eigenvector value (λ max):

λ max = $\frac{\text{vector [A]}}{n}$ = $\frac{26{,}985}{5}$ = 5,397

Finding the Consistency Index (CI):

$$CI = \frac{\lambda_{Maximum} - n}{n-1} = \frac{5{,}397 - 5}{5-1} = 0{,}099$$

Finding the Random Index (RI):
the value of n = 5 then the value RI = 1,12

Finding Consistency Ratio (CR):

$$CR = \frac{CI}{RI} = \frac{0{,}099}{1{,}12} = 0{,}089 = 8{,}86\ \%$$

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

g. Administrative Criteria in Construction Project Implementation

Table 24. Geomean Value

Criteria	A1	A2	A3
A1	1,000	0,724	1,137
A2	1,351	1,000	1,470
A3	0,879	0,719	1,000
Total	**3,230**	**2,442**	**3,607**

Table 25. Normalization of Pairwise Matrix

Criteria	A1	A2	A3	Average
A1	0,310	0,296	0,315	**0,307**
A2	0,418	0,409	0,407	**0,412**
A3	0,272	0,294	0,277	**0,281**
Total	**1,000**	**1,000**	**1,000**	**1,000**

Table 25. Consistency test

Criteria	A1	A2	A3	Total
A1	0,307	0,222	0,349	**0,878**
A2	0,556	0,412	0,605	**1,573**
A3	0,247	0,202	0,281	**0,731**

Table 25. Consistency test

A1	0,878	/	0,307	=	**2,861**
A2	1,573	/	0,412	=	**3,821**
A3	0,731	/	0,281	=	**2,598**
			Total	=	**9,279**

Amount of data (n) = 3
Find the maximum eigenvector value (λ max):

$$\lambda \text{ max} = \frac{\text{vektor [A]}}{n} = \frac{9{,}279}{3} = 3{,}093$$

Finding the Consistency Index (CI):

CI= (λ (Maximum)- n)/(n - 1)= (3,093 - 3)/(3 - 1)= 0,047

Finding the Random Index (RI):
the value of n = 3 then the value RI = 0,58

Finding Consistency Ratio (CR):
CR = $\frac{CI}{RI}$ = $\frac{0,047}{0,58}$ = 0,080 = 8,03 %

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

h. Alternative Construction Project Implementation

Table 26. Geomean Value

Criteria	Contractual	Self-management
Contractual	1,000	1,002
Self-management	0,998	1,000
Total	**1,998**	**2,002**

Table 27. Normalization of Pairwise Matrix

Criteria	Contractual	Self-management	Average
Contractual	0,501	0,501	0,501
Self-management	0,499	0,499	0,499
Total	**1,000**	**1,000**	**1,000**

Table 28. Consistency test

Criteria	Contractual	Self-management	Total
Contractual	0,501	0,502	1,002
Self-management	0,498	0,499	0,998

Table 29. Finding Vector [A]

Contractual	1,002	/	0,501	=	**2,002**
Self-management	0,998	/	0,499	=	**1,998**
			Total	=	**4,000**

Amount of data (n) = 2
Find the maximum eigenvector value (λ max):
λ max = $\frac{\text{vector [A]}}{n}$ = $\frac{4,000}{2}$ = 2,000

Finding the Consistency Index (CI):
$CI = \frac{\lambda_{Maximum} - n}{n - 1}$ = $\frac{2,000 - 2}{2 - 1}$ = 0,00000277

Finding the Random Index (RI):
the value of n = 2 then the value of RI = 0,00

Finding Consistency Ratio (CR):

CR = $\frac{CI}{RI}$ = $\frac{0{,}00000277}{0{,}00}$ = 0,000 = 0,00 %

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

i. Alternative Construction Project Implementation Criteria Against Time

Table 30. Geomean Value

Criteria	Contractual	Self-management
Contractual	1,000	1,416
Self-management	0,719	1,000
Total	**1,719**	**2,416**

Table 31. Normalization of Pairwise Matrix

Criteria	Contractual	Self-management	Average
Contractual	0,582	0,586	0,584
Self-management	0,418	0,414	0,416
Total	**1,000**	**1,000**	**1,000**

Table 32. Consistency test

Criteria	Contractual	Self-management	Total
Contractual	0,584	0,827	1,411
Self-management	0,299	0,416	0,715

Table 33. Finding Vector [A]

Contractual	1,411	/	0,584	=	**2,416**
Self-management	0,715	/	0,416	=	**1,719**
			Total	=	**4,134**

Amount of data (n) = 2

Find the maximum eigenvector value (λ max):

λ max = $\frac{\text{vektor [A]}}{n}$ = $\frac{4{,}134}{2}$ = 2,067

Finding the Consistency Index (CI):

$CI = \frac{\lambda_{Maximum} - n}{n-1}$ = $\frac{2{,}067 - 2}{2-1}$ = 0,067

Finding the Random Index (RI):

the value of n = 2 then the value of RI = 0,00

Finding Consistency Ratio (CR):

CR = $\frac{CI}{RI}$ = $\frac{0{,}067}{0{,}00}$ = 0,000 = 0,00 %

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

j. Alternative Construction Project Implementation Criteria against Cost Criteria

Table 34. Geomean Value n

Criteria	Contractual	Self-management
Contractual	1,000	0,966
Self-management	1,036	1,000
Total	**2,036**	**1,966**

Table 35. Normalization of Pairwise Matrix

Criteria	Contractual	Self-management	Average
Contractual	0,491	0,491	0,491
Self-management	0,509	0,509	0,509
Total	**1,000**	**1,000**	**1,000**

Table 36. Consistency test

Criteria	Contractual	Self-management	Total
Contractual	0,491	0,474	0,966
Self-management	0,527	0,509	1,036

Table 37. Finding Vector [A]

Contractual	0,966	/	0,491	=	**1,966**
Self-management	1,036	/	0,509	=	**2,036**
			Total	=	**4,001**

Amount of data (n) = 2
Find the maximum eigenvector value (λ max):

$\lambda \text{ max} = \frac{\text{vektor [A]}}{n} = \frac{4,001}{2} = 2,001$

Finding the Consistency Index (CI):

$CI = \frac{\lambda_{Maximum} - n}{n-1} = \frac{2,001-2}{2-1} = 0,001$

Finding the Random Index (RI):
the value of n = 2 then the value of RI = 0,00

Finding Consistency Ratio (CR):

$\text{CR} = \frac{CI}{RI} = \frac{0,001}{0,00} = 0,000 = 0,00\ \%$

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

k. Alternative Construction Project Implementation Criteria Against Quality Criteria

Table 38. Geomean Value

Criteria	Contractual	Self-management
Contractual	1,000	1,009
Self-management	1,002	1,000
Total	**2,002**	**2,009**

Table 39. Normalization of Pairwise Matrix

Criteria	Contractual	Self-management	Average
Contractual	0,500	0,502	0,501
Self-management	0,500	0,498	0,499
Total	**1,000**	**1,000**	**1,000**

Table 40. Consistency test

Criteria	Contractual	Self-management	Total
Contractual	0,501	0,505	1,006
Self-management	0,500	0,499	0,999

Table 41. Finding Vector [A]

Contractual	1,006	/	0,501	=	**2,009**
Self-management	0,999	/	0,499	=	**2,002**
			Total	=	**4,010**

Amount of data (n) = 2
Find the maximum eigenvector value (λ max):

$$\lambda \text{ max} = \frac{\text{vector [A]}}{n} = \frac{4{,}010}{2} = 2{,}005$$

Finding the Consistency Index (CI):

$$CI = \frac{\lambda_{Maximum} - n}{n - 1} = \frac{2{,}005 - 2}{2 - 1} = 0{,}005$$

Finding the Random Index (RI):
the value of n = 2 then the value of RI = 0,00

Finding Consistency Ratio (CR):

$$\text{CR} = \frac{CI}{RI} = \frac{0{,}005}{0{,}00} = 0{,}000 = 0{,}00\ \%$$

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

l. Alternative Construction Project Implementation Criteria against Community Participation Criteria

Table 42. Geomean Value

Criteria	Contractual	Self-management
Contractual	1,000	0,359
Self-management	2,789	1,000
Total	**3,789**	**1,359**

Table 43. Normalization of Pairwise Matrix

Criteria	Contractual	Self-management	Average
Contractual	0,264	0,264	0,264
Self-management	0,736	0,736	0,736
Total	**1,000**	**1,000**	**1,000**

Table 44. Consistency test

Criteria	Contractual	Self-management	Total
Contractual	0,264	0,095	0,359
Self-management	2,052	0,736	2,789

Table 45. Finding Vector [A]

Contractual	0,359	/	0,264	=	1,359
Self-management	2,789	/	0,736	=	3,789
			Total	=	**5,147**

Amount of data (n) = 2
Find the maximum eigenvector value (λ max):

$$\lambda \text{ max} = \frac{\text{vector [A]}}{n} = \frac{5,147}{2} = 2,574$$

Finding the Consistency Index (CI):

$$CI = \frac{\lambda_{Maximum} - n}{n-1} = \frac{2,574-2}{2-1} = 0,574$$

Finding the Random Index (RI):
the value of n = 2 then the value of RI = 0,00

Finding Consistency Ratio (CR):

$$\text{CR} = \frac{CI}{RI} = \frac{0,574}{0,00} = 0,000 = 0,00\ \%$$

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

m. Alternative Construction Project Implementation Criteria against Labor Criteria

Table 46. Geomean Value

Criteria	Contractual	Self-management
Contractual	1,000	1,316

Self-management	0,760	1,000
Total	**1,760**	**2,316**

Table 47. Normalization of Pairwise Matrix

Criteria	Contractual	Self-management	Average
Contractual	0,568	0,568	0,568
Self-management	0,432	0,432	0,432
Total	**1,000**	**1,000**	**1,000**

Table 48. Consistency test

Criteria	Contractual	Self-management	Total
Contractual	0,568	0,748	1,316
Self-management	0,328	0,432	0,760

Table 49. Finding Vector [A]

Contractual	1,316	/	0,568	=	**2,316**
Self-management	0,760	/	0,432	=	**1,760**
			Total	=	**4,076**

Amount of data (n) = 2
Find the maximum eigenvector value (λ max):

$$\lambda \text{ max} = \frac{\text{vektor [A]}}{n} = \frac{4{,}076}{2} = 2{,}038$$

Finding the Consistency Index (CI):

$$CI = \frac{\lambda_{Maximum} - n}{n-1} = \frac{2{,}038 - 2}{2-1} = 0{,}038$$

Finding the Random Index (RI):
the value of n = 2 then the value of RI = 0,00

Finding Consistency Ratio (CR):

$$\text{CR} = \frac{CI}{RI} = \frac{0{,}038}{0{,}00} = 0{,}000 = 0{,}00\ \%$$

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

n. Alternative Construction Project Implementation Criteria Against Administration Criteria

Table 50. Geomean Value

Criteria	Contractual	Self-management
Contractual	1,000	1,254
Self-management	0,797	1,000
Total	**1,797**	**2,254**

Table 51. Normalization of Pairwise Matrix

Criteria	Contractual	Self-management	Average
Contractual	0,556	0,556	0,556
Self-management	0,444	0,444	0,444
Total	**1,000**	**1,000**	**1,000**

Table 51. Consistency test

Criteria	Contractual	Self-management	Total
Contractual	0,556	0,698	1,254
Self-management	0,354	0,444	0,797

Table 52. Finding Vector [A]

Contractual	1,254	/	0,556	=	**2,254**
Self-management	0,797	/	0,444	=	**1,797**
			Total	=	**4,052**

Amount of data (n) = 2
Find the maximum eigenvector value (λ max):
λ max = $\frac{\text{vector [A]}}{n} = \frac{4,052}{2}$ = 2,026

Finding the Consistency Index (CI):
$CI = \frac{\lambda_{Maximum} - n}{n-1} = \frac{2,026 - 2}{2-1} = 0,026$

Finding the Random Index (RI):
the value of n = 2 then the value of RI = 0,00

Finding Consistency Ratio (CR):
CR = $\frac{CI}{RI} = \frac{0,026}{0,00}$ = 0,000 = 0,00 %

With a CR value smaller than 0.1 or 10%, the conclusion is that the data used is consistent and can be accounted for.

4. CONCLUSION

Based on the results of the research analysis that has been carried out, comparing alternative contractual-based construction implementation and community empowerment-based self-management construction implementation, the following conclusions can be drawn: The important criteria that influence the selection between contractual-based construction project implementation and community empowerment-based self-management construction implementation were identified through surveys, interviews, and in conjunction with Project Management KPIs. These criteria include time, cost, quality, community participation, labor, and administration. The analysis results show that the quality criteria are the most important, with a weight of 0.235.

Within the quality criteria, the sub-criteria of quality suitability has the highest weight, at 0.420.

REFERENCES

Aziiz, M. N., & Prastiti, S. D. (2019). Faktor-faktor yang mempengaruhi akuntabilitas dana desa. *Jurnal Akuntansi Aktual*, *6*(2), 334–344.

Cahyono, L., Apriani, M., Nugraha, A. T., & Utomo, A. P. (2022). Potensi Risiko Waktu Pelaksanaan Proyek Swakelola di Kabupaten Pasuruan melalui Program Kotaku Kementerian PUPR. *Jurnal Spektran*, *10*(2), 118.

Muhendra, H., & Hasibuan, S. (2018). Seleksi Sub-Kontraktor Proyek Konstruksi Jalan Layang. *Jurnal Manajemen Transportasi & Logistik (JMTRANSLOG)*, *5*(1), 43–54.

Muhendra, H., Hasibuan, S., & Buana, U. M. (n.d.). *Seleksi Sub-Kontraktor Proyek Konstruksi Jalan Layang The Sub-Contractor Selection of Fly Over Construction Project*. *05*(01), 43–54.

Nahruddin, Z. (2014). Akuntabilitas dan transparansi pengelolaan dana alokasi desa Di desa pao-pao kecamatan tanete rilau Kabupaten barru. *Otoritas: Jurnal Ilmu Pemerintahan*, *4*(2).

Nugroho, L. D., Witjaksana, B., Oetomo, W., & Setiawan, A. (2019). Analysis of Construction Contract Project Comparison with PNPM Based Projects in Construction Projects (PPIP Project Implementation Study in Tuban District). *Journal of Physics: Conference Series*, *1364*(1), 12052.

Setiawan, A. (2017). *Analisis Perbandingan Proyek Kontrak Konstruksi Dengan Proyek Berbasis PNPM Pada Proyek Konstruksi (Studi Kasus Pelaksanaan Proyek PPIP Di Kabupaten Tuban)*. Universitas 17 Agustus 1945.

Soetjipto, J. W., Hanafi, M. N., & Sukmawati, S. (2021). Sistem Pengambilan Keputusan Metode Konstruksi Berbasis Analytical Hierarchy Process. *Konstruksia*, *12*(2), 1–13.

Yulianto, A. H., Witjaksana, B., & Tjendani, H. T. (2022). Perencanaan Teknis Dan Biaya Kontruksi Tempat Pembuangan Sementara (Tps) Sampah Berbasis Masyarakat Desa Pinggir Papas Kecamatan Kalianget Kabupaten Sumenep. *Senakama: Prosiding Seminar Nasional Karya Ilmiah Mahasiswa*, *1*(1), 87–97.

Zulkarnain, I. (2019). Model Penetapan Proyek Konstruksi Sistem Kontraktual Atau Berbasis Pemberdayaan Masyarakat. *Teknologi Sipil*, *1*.

Copyrights