



### STUDY OF THE APPLICATION OF OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM (SMK3) IN THE REHABILITATION AND RECONSTRUCTION OF IRRIGATION SYSTEM PROJECT

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#### ABSTRACT

Work accidents are one of the problems that often occur in the construction sector. The lack of implementation of a good Occupational Safety Management System (SMK3) is one of the causes. Thus, the implementation of SMK3 can be used as a reference for organizing various activities therein and managing K3 systematically and comprehensively in a complete management system. So procedurally, the implementation of K3 can foster trust and confidence in the safety and security of construction service users. This research was conducted in order to provide benefits to construction

service users as an action/improvement in future projects/activities. The method used is a Decision Support System using the Analytical Hierarchy Process (AHP) which can search for the best criteria based on predetermined criteria. Based on the research results, it shows that the dominant criteria in implementing SMK3 for the initial level are Development and Maintenance of Commitment with a value of 2.535, for the transition level, namely Work Safety based on SMK3 with a value of 1.662, and for the advanced level, namely Work Security Based on SMK3 with a value of 0.969.

**KEYWORDS:** Occupational Safety and Health Management System (SMK3), Analytical Hierarchy Process (AHP), Reconstruction, Rehabilitation, Criteria.

## 1. INTRODUCTION

Every construction project activity will certainly have a target of completing the work on time, quality and cost according to what has been planned, however, many construction project activities carried out have several obstacles in them which can cause losses and cause delays in the completion time of the work, one of the causes Disruption is a work accident that may occur on a construction project.<sup>[1]</sup>

Apart from pursuing work implementation times that are in accordance with the stipulated time, the scope of a construction project work also has a high level of work risks and accidents. This is caused by the implementation of K3 which is not implemented properly according to applicable procedures and laws. The implementation of K3 is carried out in accordance with the rules provided by the government in law for all industrial sectors which aim to guarantee and increase the value of performance productivity in construction work so that it can reduce the level of work accidents to reach zero accidents.<sup>[2]</sup>

The implementation of an Occupational Safety and Health Management System (SMK3) is needed so that it can become a reference that regulates various activities therein and manages K3 systematically and comprehensively in a complete management system, so as to minimize the risk of work accidents that will occur.

The Rehabilitation and Reconstruction of Gumbasa Irrigation System project is a construction project that has a high level of risk and work accidents, this is due to the large number of workers involved and the use of heavy equipment which requires special methods and skills and requires supervision in its use. This could potentially cause various undesirable impacts, including aspects of occupational safety and health. Lack of implementation of K3 implementation in construction projects can cause the risk of work accidents. Therefore, this research is needed which aims to study whether the Rehabilitation and Reconstruction of Gumbasa Irrigation System Project implemented has implemented an Occupational Safety and Health Management System (SMK3) in accordance with applicable laws and regulations.

## 2. MATERIALS AND METHODS

### 2.1 Research sites

Rehabilitation and Reconstruction of Gumbasa Irrigation System Project (Main Canal BGKn.24 – BGKn.42 – 2458 H) Kab. Sigi is located in Sigi Regency, Central Sulawesi Province. The time required to conduct this research is from March to June 2023.

## 2.2 Types of research

The type of research used is a descriptive method, which is a type of research that can be interpreted as a problem solving procedure that is investigated by describing the condition of the subject or object in the research, which can be a person based on existing facts.

## 2.3 Research data

The data used in this research are as follows:

### 1. Primary data

Primary data in this research was obtained from the results of surveys or interviews of the objects to be studied.

### 2. Secondary Data

Secondary data is obtained from literature studies that are relevant to the research object and data originating from the project object being researched.

## 2.4 Population and Sample

The population used in this research consisted of Construction Executors and Supervision Consultants. The sample used in the research consisted of 3 teams of Construction K3 Experts from construction implementers and 3 teams of Construction K3 Experts from Supervision Consultants. So the total sample used was 6 people.

## 2.5 Data collection technique

The data collection techniques that will be used in the research consist of:

### a. Surveys

Data collection was carried out through direct observation of the research object.

### b. Use of Questionnaires

A questionnaire is a data collection technique that is carried out by giving a set of questions or written questions to respondents to answer. The questionnaire in this research includes several questions related to the research variables.

The answers obtained from the questionnaire are qualitative data. To convert qualitative data into quantitative, a rating scale is used in the form of numbers 1 to 9, each of which has criteria consisting of:

### 1. Applied

### 2. Not Yet Implemented

## 3. Not Implemented

The scale values from 1 to 9 can be defined in the following table:

**Table 1: Matrix scale.**

Intensity Interest	Definition	Explanation	Source
1	Elements that are equally important compared to other elements (Equal importance)	Both elements contribute equally to these properties.	[3]
3	One element is slightly more important than the other elements (Moderate more importance)	Experience states slightly one sided element	
5	One element is clearly more important than other elements (Essential, Strong more importance)	Experience shows Strongly favor one element	
7	One element is clearly more important than the other elements (Demonstrated importance)	Experience shows strongly favored and His dominance looks deep practice	
9	One element is absolutely more important than the other elements (Absolutely more important)	Experience shows that one element is clearly more important	
2,4,6,8	When in doubt between two adjacent space values (gray area)	This value is given if compromise is required	

## 2.6 Identify Criteria

**Table 2: SMK3 Criteria.**

No	SMK3 Criteria	Source
	<b>Entry Level Implementation</b>	[4]
1	Building and Maintaining Commitments	
2	Making and Documenting K3 Plans	
3	Design and Contract Control	
4	Document Control	
	<b>Implementation of Transition Levels</b>	[4]
1	Building and Maintaining Commitments	
2	Making and Documenting K3 Plans	
3	Design and Contract Control	
4	Document Control	
5	Purchasing and Product Control	
6	Security Works based on SMK3	
7	Monitoring Standards	
	<b>Advanced Deployment</b>	[4]
1	Building and Maintaining Commitments	
2	Making and Documenting K3 Plans	
3	Design and Contract Control	
4	Document Control	

No	SMK3 Criteria	Source
5	Purchasing and Product Control	
6	Security Works based on SMK3	
7	Monitoring Standards	
8	Reporting and Correcting Deficiency	
9	Material Management and Movement	
10	Data Collection and Use	
11	SMK3 inspection	
12	Skills and Abilities Development	

## 2.7 Analysis Method

The analytical method used in this research is using the Expert Choice application as follows:

### a. AHP (Analytical Hierarchy Process)

It is a method for ranking the best decision alternatives, when the decision maker has multiple objectives or criteria that must be met or considered. The processes that occur in the AHP method are as follows:

1. Defining and determining solutions
2. Develop a hierarchical structure
3. Create a pairwise comparison matrix that describes the relative contribution or influence of each element to the criteria at the level above it.
4. Carry out pairwise comparisons to obtain judgments (decisions) of  $n \times ((n-1)/2)$ , where  $n$  is the number of elements being compared.
5. Calculate the eigenvalues and test their consistency. If they are not consistent, then the data collection is repeated.
6. Repeat steps 3,4 and 5 for each hierarchical level.
7. Calculate the eigenvectors of each pairwise comparison matrix.
8. Checking hierarchy consistency. If the value is more than 10 percent then the judgment data assessment must be corrected.

## 3. RESULTS AND DISCUSSION

### 3.1 Pairwise Comparison Matrix Testing

At this stage, a comparative calculation is carried out between one criterion and another using the Expert Choice application to see the resulting calculation results. Each respondent will be calculated to see which criteria will be the dominant priority in implementing SMK3.

### 3.2 Entry Level Pairwise Comparison Matrix Testing

#### 1. Applied

After calculating each respondent, a summary of the calculation results can be seen in the table below:

**Table 3: Recap of Respondent Matrix Calculation Criteria Applied at Initial Level.**

No	Criteria	Priority Weight
	Respondent A	
1	Building and Maintaining Commitments	0.407
2	Making and Documenting K3 Plans	0.260
3	Purchasing and Product Control	0.139
4	Design and Contract Control	0.119
5	Document Control	0.076
	Respondent B	
1	Building and Maintaining Commitments	0.407
2	Making and Documenting K3 Plans	0.260
3	Purchasing and Product Control	0.139
4	Design and Contract Control	0.119
5	Document Control	0.076
	Respondent C	
1	Building and Maintaining Commitments	0.407
2	Making and Documenting K3 Plans	0.260
3	Purchasing and Product Control	0.139
4	Design and Contract Control	0.119
5	Document Control	0.076
	Respondent D	
1	Building and Maintaining Commitments	0.438
2	Making and Documenting K3 Plans	0.248
3	Purchasing and Product Control	0.127
4	Design and Contract Control	0.116
5	Document Control	0.071
	Respondent E	
1	Building and Maintaining Commitments	0.438
2	Making and Documenting K3 Plans	0.248
3	Purchasing and Product Control	0.127
4	Design and Contract Control	0.116
5	Document Control	0.071
	Respondent F	
1	Building and Maintaining Commitments	0.438
2	Making and Documenting K3 Plans	0.248
3	Purchasing and Product Control	0.127
4	Design and Contract Control	0.116
5	Document Control	0.071

Based on the recapitulation results of pairwise comparison matrix calculations for initial level criteria, the most dominant criteria in the implementation of SMK3 are Development and

Maintenance of Commitments with an average value of 2.535, Creation and Documentation of K3 Plans of 1.524, Purchase and Control of Products of 0.798, Control of Design and Contracts were 0.705, and Document Control was 0.076. Proven by an K3 policy that is written, dated and clearly states the K3 goals and objectives and has documented procedures for identifying potential hazards, assessing and controlling risks as a strategic plan carried out by K3 officers in the field.

## 2. Not Yet Implemented

After calculating each respondent, a summary of the calculation results can be seen in the table below:

**Table 4: Recap of Respondent Matrix Calculation Criteria Not Yet Applied at Initial Level.**

No	Criteria	Priority Weight
	Respondent A	
1	Building and Maintaining Commitments	0.310
2	Making and Documenting K3 Plans	0.192
3	Purchasing and Product Control	0.192
4	Design and Contract Control	0.153
5	Document Control	0.153
	Respondent B	
1	Building and Maintaining Commitments	0.310
2	Making and Documenting K3 Plans	0.192
3	Purchasing and Product Control	0.192
4	Design and Contract Control	0.153
5	Document Control	0.153
	Respondent C	
1	Building and Maintaining Commitments	0.310
2	Making and Documenting K3 Plans	0.192
3	Purchasing and Product Control	0.192
4	Design and Contract Control	0.153
5	Document Control	0.153
	Respondent D	
1	Building and Maintaining Commitments	0.257
2	Making and Documenting K3 Plans	0.199
3	Purchasing and Product Control	0.191
4	Design and Contract Control	0.186
5	Document Control	0.167
	Respondent E	
1	Building and Maintaining Commitments	0.257
2	Making and Documenting K3 Plans	0.199
3	Purchasing and Product Control	0.191
4	Design and Contract Control	0.186

5	Document Control	0.167
	Respondent F	
1	Building and Maintaining Commitments	0.257
2	Making and Documenting K3 Plans	0.199
3	Purchasing and Product Control	0.191
4	Design and Contract Control	0.186
5	Document Control	0.167

Based on the recapitulation results of pairwise comparison matrix calculations for criteria that have not been implemented at the initial level, the dominant criteria are Building and Maintaining Commitments with an average value of 1.860, Making and Documenting K3 Plans at 1.173, Purchasing and Controlling Products at 1.149, Designing and Contract Control at 1.017, and Document Control of 0.960. Proven by the involvement and scheduling of workers with company representatives, documented and disseminated to all workers on the project.

### 3. Not Implemented

After calculating each respondent, a summary of the calculation results can be seen in the table below:

**Table 5: Recap of Respondent Matrix Calculation Criteria Not Applied at Initial Level.**

No	Criteria	Priority Weight
	Respondent A	
1	Document Control	0.380
2	Design and Contract Control	0.243
3	Purchasing and Product Control	0.196
4	Making and Documenting K3 Plans	0.111
5	Building and Maintaining Commitments	0.071
	Respondent B	
1	Document Control	0.380
2	Design and Contract Control	0.243
3	Purchasing and Product Control	0.196
4	Making and Documenting K3 Plans	0.111
5	Building and Maintaining Commitments	0.071
	Respondent C	
1	Document Control	0.380
2	Design and Contract Control	0.243
3	Purchasing and Product Control	0.196
4	Making and Documenting K3 Plans	0.111
5	Building and Maintaining Commitments	0.071
	Respondent D	
1	Document Control	0.406
2	Design and Contract Control	0.223



3	Purchasing and Product Control	0.199
4	Making and Documenting K3 Plans	0.107
5	Building and Maintaining Commitments	0.064
	Respondent E	
1	Document Control	0.406
2	Design and Contract Control	0.223
3	Purchasing and Product Control	0.199
4	Making and Documenting K3 Plans	0.107
5	Building and Maintaining Commitments	0.064
	Respondent F	
1	Document Control	0.406
2	Design and Contract Control	0.223
3	Purchasing and Product Control	0.199
4	Making and Documenting K3 Plans	0.107
5	Building and Maintaining Commitments	0.064

Based on the recapitulation results of pairwise comparison matrix calculations for criteria not applied at the initial level, the dominant criteria are Document Control with an average value of 2.358, Design and Contract Control of 1.398, Product Purchasing and Control of 0.199, Creation and Documentation and Commitment Maintenance of 0.107, and Building and Maintaining Commitment of 0.064. This is proven by the fact that there is no document control procedure which requires the creation of a document masterlist or a list containing the titles of K3 documents used including their status (last revision and revision date) on the project.

### 3.3 Transition Level Pairwise Comparison Matrix Testing

#### 1. Applied

After calculating each respondent, a summary of the calculation results can be seen in the table below:

**Table 6: Recap of Respondent Matrix Calculation Criteria Applied Transition Level.**

No	Criteria	Priority Weight
	Respondent A	
1	Security Works Based on SMK3	0.289
2	Monitoring Standards	0.218
3	Building and Maintaining Commitments	0.175
4	Making and Documenting K3 Plans	0.123
5	Purchasing and Product Control	0.076
6	Design and Contract Control	0.069
7	Document Control	0.050
	Respondent B	
1	Security Works Based on SMK3	0.289
2	Monitoring Standards	0.218

3	Building and Maintaining Commitments	0.175
4	Making and Documenting K3 Plans	0.123
5	Purchasing and Product Control	0.076
6	Design and Contract Control	0.069
7	Document Control	0.050
	Respondent C	
1	Security Works Based on SMK3	0.289
2	Monitoring Standards	0.218
3	Building and Maintaining Commitments	0.175
4	Making and Documenting K3 Plans	0.123
5	Purchasing and Product Control	0.076
6	Design and Contract Control	0.069
7	Document Control	0.050
	Respondent D	
1	Security Works Based on SMK3	0.265
2	Monitoring Standards	0.223
3	Building and Maintaining Commitments	0.195
4	Making and Documenting K3 Plans	0.126
5	Purchasing and Product Control	0.073
6	Document Control	0.070
7	Design and Contract Control	0.048
	Respondent E	
1	Security Works Based on SMK3	0.265
2	Monitoring Standards	0.223
3	Building and Maintaining Commitments	0.195
4	Making and Documenting K3 Plans	0.126
5	Purchasing and Product Control	0.073
6	Document Control	0.070
7	Design and Contract Control	0.048
	Respondent F	
1	Security Works Based on SMK3	0.265
2	Monitoring Standards	0.223
3	Building and Maintaining Commitments	0.195
4	Making and Documenting K3 Plans	0.126
5	Purchasing and Product Control	0.073
6	Document Control	0.070
7	Design and Contract Control	0.048

Based on the results of the recapitulation of pairwise comparison matrix calculations for criteria applied at the transition level, the most dominant criteria in implementing SMK3 are Work Safety based on SMK3 with an average value of 1.662, Monitoring Standards of 1.323, Development and Maintenance Commitments of 0.903, Creation and Documentation of K3 Plans of 0.747, Purchasing and Product Control of 0.447, Document Control of 0.360, and Design and Contract Control of 0.351. Proven that competent officers have identified

potential hazards arising from a work process and there are documented procedures or work instructions to control risks identified on the project.

## 2. Not Yet Implemented

After calculating each respondent, a summary of the calculation results can be seen in the table below:

**Table 7: Recap of Respondent Matrix Calculation Criteria Not Yet Applied Transition Level.**

No	Criteria	Priority Weight
	Respondent A	
1	Security Works Based on SMK3	0.338
2	Monitoring Standards	0.225
3	Purchasing and Product Control	0.125
4	Making and Documenting K3 Plans	0.085
5	Building and Maintaining Commitments	0.079
6	Design and Contract Control	0.074
7	Document Control	0.074
	Respondent B	
1	Security Works Based on SMK3	0.338
2	Monitoring Standards	0.225
3	Purchasing and Product Control	0.125
4	Making and Documenting K3 Plans	0.085
5	Building and Maintaining Commitments	0.079
6	Design and Contract Control	0.074
7	Document Control	0.074
	Respondent C	
1	Security Works Based on SMK3	0.338
2	Monitoring Standards	0.225
3	Purchasing and Product Control	0.125
4	Making and Documenting K3 Plans	0.085
5	Building and Maintaining Commitments	0.079
6	Design and Contract Control	0.074
7	Document Control	0.074
	Respondent D	
1	Security Works Based on SMK3	0.334
2	Monitoring Standards	0.239
3	Building and Maintaining Commitments	0.103
4	Purchasing and Product Control	0.088
5	Making and Documenting K3 Plans	0.083
6	Design and Contract Control	0.077
7	Document Control	0.075
	Respondent E	
1	Security Works Based on SMK3	0.334
2	Monitoring Standards	0.239

3	Building and Maintaining Commitments	0.103
4	Purchasing and Product Control	0.088
5	Making and Documenting K3 Plans	0.083
6	Design and Contract Control	0.077
7	Document Control	0.075
	Respondent F	
1	Security Works Based on SMK3	0.334
2	Monitoring Standards	0.239
3	Building and Maintaining Commitments	0.103
4	Purchasing and Product Control	0.088
5	Making and Documenting K3 Plans	0.083
6	Design and Contract Control	0.077
7	Document Control	0.075

Based on the recapitulation results of pairwise comparison matrix calculations for transition level criteria, the most dominant criteria that have not been implemented by SMK3 are Safety and Work based on SMK3 with an average value of 2.016, Monitoring Standards of 1.392, Product Purchasing and Control of 0.639, Development and Maintenance Commitments of 0.546, Making and Documenting K3 Plans 0.504, Design and Contract Control 0.453, and Document Control 0.447. This is proven by the fact that the PPE used in work is not fully equipped or has not been used at all at the project site.

### 3. Not Implemented

After calculating each respondent, a summary of the calculation results can be seen in the table below:

**Table 8: Recap of Respondent Matrix Calculation Criteria Not Applied Transition Level.**

No	Criteria	Priority Weight
	Respondent A	
1	Document Control	0.293
2	Design and Contract Control	0.212
3	Purchasing and Product Control	0.181
4	Making and Documenting K3 Plans	0.122
5	Building and Maintaining Commitments	0.082
6	Monitoring Standards	0.062
7	Security Works Based on SMK3	0.049
	Respondent B	
1	Document Control	0.293
2	Design and Contract Control	0.212
3	Purchasing and Product Control	0.181
4	Making and Documenting K3 Plans	0.122
5	Building and Maintaining Commitments	0.082

6	Monitoring Standards	0.062
7	Security Works Based on SMK3	0.049
	Respondent C	
1	Document Control	0.293
2	Design and Contract Control	0.212
3	Purchasing and Product Control	0.181
4	Making and Documenting K3 Plans	0.122
5	Building and Maintaining Commitments	0.082
6	Monitoring Standards	0.062
7	Security Works Based on SMK3	0.049
	Respondent D	
1	Design and Contract Control	0.312
2	Document Control	0.204
3	Purchasing and Product Control	0.183
4	Making and Documenting K3 Plans	0.112
5	Building and Maintaining Commitments	0.078
6	Monitoring Standards	0.058
7	Security Works Based on SMK3	0.053
	Respondent E	
1	Design and Contract Control	0.312
2	Document Control	0.204
3	Purchasing and Product Control	0.183
4	Making and Documenting K3 Plans	0.112
5	Building and Maintaining Commitments	0.078
6	Monitoring Standards	0.058
7	Security Works Based on SMK3	0.053
	Respondent F	
1	Design and Contract Control	0.312
2	Document Control	0.204
3	Purchasing and Product Control	0.183
4	Making and Documenting K3 Plans	0.112
5	Building and Maintaining Commitments	0.078
6	Monitoring Standards	0.058
7	Security Works Based on SMK3	0.053

Based on the recapitulation results of pairwise comparison matrix calculations for criteria not applied at the transition level, the most dominant criteria are Design and Contract Control with an average value of 1.572, Document Control of 1.491, Product Purchase and Control of 1.092, K3 Plan Creation and Documentation of 0.702, Development and Maintenance Commitment of 0.480, Monitoring Standards of 0.360, and Security and Work based on SMK3 of 0.306. The dominant criteria that are not applied in implementing SMK3 are Design and Contract Control because all procedures and design criteria have been carried out and fulfilled the requirements before the contract runs so that the implementer does not apply these criteria to the project.

### 3.4 Advanced Pairwise Comparison Matrix Testing

#### 1. Applied

After calculating each respondent, a summary of the calculation results can be seen in the table below:

**Table 9: Recap of Respondent Matrix Calculation Criteria Applied Advanced Level.**

No	Criteria	Priority Weight
	Respondent A	
1	Security Works Based on SMK3	0.165
2	SMK3 inspection	0.156
3	Skills and Abilities Development	0.113
4	Monitoring Standards	0.103
5	Building and Maintaining Commitments	0.087
6	Reporting and Correcting Deficiency	0.084
7	Making and Documenting K3 Plans	0.070
8	Purchasing and Product Control	0.063
9	Material Management and Movement	0.046
10	Design and Contract Control	0.041
11	Data Collection and Use	0.038
12	Document Control	0.035
	Respondent B	
1	Security Works Based on SMK3	0.165
2	SMK3 inspection	0.156
3	Skills and Abilities Development	0.113
4	Monitoring Standards	0.103
5	Building and Maintaining Commitments	0.087
6	Reporting and Correcting Deficiency	0.084
7	Making and Documenting K3 Plans	0.070
8	Purchasing and Product Control	0.063
9	Material Management and Movement	0.046
10	Design and Contract Control	0.041
11	Data Collection and Use	0.038
12	Document Control	0.035
	Respondent C	
1	Security Works Based on SMK3	0.165
2	SMK3 inspection	0.156
3	Skills and Abilities Development	0.113
4	Monitoring Standards	0.103
5	Building and Maintaining Commitments	0.087
6	Reporting and Correcting Deficiency	0.084
7	Making and Documenting K3 Plans	0.070
8	Purchasing and Product Control	0.063
9	Material Management and Movement	0.046
10	Design and Contract Control	0.041
11	Data Collection and Use	0.038
12	Document Control	0.035

	Respondent D	
1	Security Works Based on SMK3	0.158
2	SMK3 inspection	0.157
3	Skills and Abilities Development	0.112
4	Monitoring Standards	0.104
5	Building and Maintaining Commitments	0.096
6	Reporting and Correcting Deficiency	0.085
7	Making and Documenting K3 Plans	0.071
8	Purchasing and Product Control	0.062
9	Material Management and Movement	0.044
10	Document Control	0.043
11	Data Collection and Use	0.035
12	Design and Contract Control	0.033
	Respondent E	
1	Security Works Based on SMK3	0.158
2	SMK3 inspection	0.157
3	Skills and Abilities Development	0.112
4	Monitoring Standards	0.104
5	Building and Maintaining Commitments	0.096
6	Reporting and Correcting Deficiency	0.085
7	Making and Documenting K3 Plans	0.071
8	Purchasing and Product Control	0.062
9	Material Management and Movement	0.044
10	Document Control	0.043
11	Data Collection and Use	0.035
12	Design and Contract Control	0.033
	Respondent F	
1	Security Works Based on SMK3	0.158
2	SMK3 inspection	0.157
3	Skills and Abilities Development	0.112
4	Monitoring Standards	0.104
5	Building and Maintaining Commitments	0.096
6	Reporting and Correcting Deficiency	0.085
7	Making and Documenting K3 Plans	0.071
8	Purchasing and Product Control	0.062
9	Material Management and Movement	0.044
10	Document Control	0.043
11	Data Collection and Use	0.035
12	Design and Contract Control	0.033

Based on the recapitulation results of pairwise comparison matrix calculations for advanced level applied criteria, the most dominant criteria are Work Safety based on SMK3 with an average value of 0.969, SMK3 Inspection of 0.939, Skills and Ability Development of 0.675, Monitoring Standards of 0.621, Construction and Maintenance Commitment of 0.549, Reporting and Correcting Deficiencies of 0.507, Making and Documenting K3 Plans of 0.423, Purchasing and Controlling Products of 0.375, Material Management and Movement



of 0.27, Document Control of 0.234, Design and Contract Control of 0.222, and Collection and Data Usage is 0.219. Proven that competent officers have identified potential hazards arising from a work process and there are documented procedures or work instructions to control risks identified on the project.

## 2. Not Yet Implemented

After calculating each respondent, a summary of the calculation results can be seen in the table below:

**Table 10: Recap of Respondent Matrix Calculation Criteria Not Yet Applied Advanced Level.**

No	Criteria	Priority Weight
	Respondent A	
1	Security Works Based on SMK3	0.200
2	Skills and Abilities Development	0.149
3	SMK3 inspection	0.133
4	Monitoring Standards	0.110
5	Reporting and Correcting Deficiency	0.072
6	Purchasing and Product Control	0.057
7	Building and Maintaining Commitments	0.056
8	Making and Documenting K3 Plans	0.048
9	Design and Contract Control	0.046
10	Material Management and Movement	0.046
11	Data Collection and Use	0.043
12	Document Control	0.040
	Respondent B	
1	Security Works Based on SMK3	0.200
2	Skills and Abilities Development	0.149
3	SMK3 inspection	0.133
4	Monitoring Standards	0.110
5	Reporting and Correcting Deficiency	0.072
6	Purchasing and Product Control	0.057
7	Building and Maintaining Commitments	0.056
8	Making and Documenting K3 Plans	0.048
9	Design and Contract Control	0.046
10	Material Management and Movement	0.046
11	Data Collection and Use	0.043
12	Document Control	0.040
	Respondent C	
1	Security Works Based on SMK3	0.200
2	Skills and Abilities Development	0.149
3	SMK3 inspection	0.133
4	Monitoring Standards	0.110
5	Reporting and Correcting Deficiency	0.072



6	Purchasing and Product Control	0.057
7	Building and Maintaining Commitments	0.056
8	Making and Documenting K3 Plans	0.048
9	Design and Contract Control	0.046
10	Material Management and Movement	0.046
11	Data Collection and Use	0.043
12	Document Control	0.040
	Respondent D	
1	Security Works Based on SMK3	0.198
2	Skills and Abilities Development	0.150
3	SMK3 inspection	0.133
4	Monitoring Standards	0.115
5	Reporting and Correcting Deficiency	0.072
6	Building and Maintaining Commitments	0.063
7	Making and Documenting K3 Plans	0.048
8	Design and Contract Control	0.047
9	Purchasing and Product Control	0.046
10	Material Management and Movement	0.046
11	Data Collection and Use	0.042
12	Document Control	0.039
	Respondent E	
1	Security Works Based on SMK3	0.198
2	Skills and Abilities Development	0.150
3	SMK3 inspection	0.133
4	Monitoring Standards	0.115
5	Reporting and Correcting Deficiency	0.072
6	Building and Maintaining Commitments	0.063
7	Making and Documenting K3 Plans	0.048
8	Design and Contract Control	0.047
9	Purchasing and Product Control	0.046
10	Material Management and Movement	0.046
11	Data Collection and Use	0.042
12	Document Control	0.039
	Respondent F	
1	Security Works Based on SMK3	0.198
2	Skills and Abilities Development	0.150
3	SMK3 inspection	0.133
4	Monitoring Standards	0.115
5	Reporting and Correcting Deficiency	0.072
6	Building and Maintaining Commitments	0.063
7	Making and Documenting K3 Plans	0.048
8	Design and Contract Control	0.047
9	Purchasing and Product Control	0.046
10	Material Management and Movement	0.046
11	Data Collection and Use	0.042
12	Document Control	0.039

Based on the recapitulation results of pairwise comparison matrix calculations for criteria that have not been implemented at advanced level, the most dominant criteria are Work Safety based on SMK3 with an average value of 1.194, Skills and Ability Development of 0.897, SMK3 Inspection of 0.798, Monitoring Standards of 0.675, Reporting and Repair of Deficiencies of 0.432, Construction and Maintenance Commitments of 0.357, Purchase and Control of Products of 0.309, Creation and Documentation of K3 Plans of 0.288, Control of Design and Contracts of 0.279, Material Management and Movement of 0.276, Collection and Use of Data of 0.255, and Control Document of 0.237. This is proven by the fact that the PPE used is not fully equipped or has not been used at all on the project.

### 3. Not Implemented

After calculating each respondent, a summary of the calculation results can be seen in the table below:

**Table 11: Recap of Respondent Matrix Calculation Criteria Not Applied Advanced Level.**

No	Criteria	Priority Weight
	Respondent A	
1	Document Control	0.143
2	Data Collection and Use	0.142
3	Design and Contract Control	0.137
4	Material Management and Movement	0.112
5	Purchasing and Product Control	0.091
6	Making and Documenting K3 Plans	0.082
7	Reporting and Correcting Deficiency	0.074
8	Building and Maintaining Commitments	0.068
9	Monitoring Standards	0.049
10	Skills and Abilities Development	0.044
11	SMK3 inspection	0.029
12	Security Works Based on SMK3	0.028
	Respondent B	
1	Document Control	0.143
2	Data Collection and Use	0.142
3	Design and Contract Control	0.137
4	Material Management and Movement	0.112
5	Purchasing and Product Control	0.091
6	Making and Documenting K3 Plans	0.082
7	Reporting and Correcting Deficiency	0.074
8	Building and Maintaining Commitments	0.068
9	Monitoring Standards	0.049
10	Skills and Abilities Development	0.044
11	SMK3 inspection	0.029

12	Security Works Based on SMK3	0.028
	Respondent C	
1	Document Control	0.143
2	Data Collection and Use	0.142
3	Design and Contract Control	0.137
4	Material Management and Movement	0.112
5	Purchasing and Product Control	0.091
6	Making and Documenting K3 Plans	0.082
7	Reporting and Correcting Deficiency	0.074
8	Building and Maintaining Commitments	0.068
9	Monitoring Standards	0.049
10	Skills and Abilities Development	0.044
11	SMK3 inspection	0.029
12	Security Works Based on SMK3	0.028
	Respondent D	
1	Design and Contract Control	0.166
2	Data Collection and Use	0.151
3	Document Control	0.117
4	Material Management and Movement	0.110
5	Purchasing and Product Control	0.092
6	Making and Documenting K3 Plans	0.077
7	Reporting and Correcting Deficiency	0.074
8	Building and Maintaining Commitments	0.062
9	Monitoring Standards	0.048
10	Skills and Abilities Development	0.044
11	Security Works Based on SMK3	0.030
12	SMK3 inspection	0.029
	Respondent E	
1	Design and Contract Control	0.166
2	Data Collection and Use	0.151
3	Document Control	0.117
4	Material Management and Movement	0.110
5	Purchasing and Product Control	0.092
6	Making and Documenting K3 Plans	0.077
7	Reporting and Correcting Deficiency	0.074
8	Building and Maintaining Commitments	0.062
9	Monitoring Standards	0.048
10	Skills and Abilities Development	0.044
11	Security Works Based on SMK3	0.030
12	SMK3 inspection	0.029
	Respondent F	
1	Design and Contract Control	0.166
2	Data Collection and Use	0.151
3	Document Control	0.117
4	Material Management and Movement	0.110
5	Purchasing and Product Control	0.092
6	Making and Documenting K3 Plans	0.077
7	Reporting and Correcting Deficiency	0.074

8	Building and Maintaining Commitments	0.062
9	Monitoring Standards	0.048
10	Skills and Abilities Development	0.044
11	Security Works Based on SMK3	0.030
12	SMK3 inspection	0.029

Based on the recapitulation results of pairwise comparison matrix calculations for criteria not applied at the advanced level, the most dominant criteria are Design and Contract Control with an average value of 0.909, Data Collection and Use of 0.879, Document Control of 0.780, Material Management and Movement of 0.666, Purchasing and Controlling Products amounting to 0.549, Making and Documenting K3 Plans amounting to 0.477, Reporting and Correcting Deficiencies amounting to 0.444, Building and Maintaining Commitments amounting to 0.390, Monitoring Standards amounting to 0.291, Skills and Ability Development amounting to 0.264, SMK3 Inspection amounting to 0.174 and Work Safety based on SMK3 of 0.174. The dominant criteria that are not applied in implementing SMK3 are Design and Contract Control because all procedures and design criteria have been carried out and fulfilled the requirements before the contract runs so that the implementer does not apply these criteria to the project.

#### 4. CONCLUSION

Based on the results of the research and discussion presented in the previous chapter, the following conclusions can be drawn:

1. At the initial level of implementing SMK3, the dominant criteria in implementing SMK3 are Building and Maintaining Commitment with a value of 1.425, for the transition level, namely Work Safety based on SMK3 with a value of 1.323, and for the advanced level, namely Work Security based on SMK3 with a value of 0.969.
2. At the initial level, the criteria that are not met are Document Control, improvements/improvements that need to be made include placing special marks on documents and implementing a new and perfect information system to facilitate the selection/use of old and newest documents. Furthermore, at the transition and advanced levels that were not met, namely Contract Control and Design, however in the Sigi Regency Rehabilitation and Reconstruction of Irrigation System project these criteria were not applied/fulfilled because all procedures and contract design had been carried out and met the requirements before the contract started.

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