The RBC Technology Training Model for Improving Community Skills for Riverbank Erosion Protection

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Abstract:
Background: The RBT method is a simple technology for riverbank protection. A construction method that utilizes local materials and is environmentally friendly. Researchers designed a training model as an introduction to the riverbank protection technology. This study describes the effectiveness of training in increasing community skills in making riverbank protection constructions.
Materials and Methods: This research is a quantitative study with a quasi-experimental approach. Participants of 60 farmers were divided into two groups. The 2F group consisted of 30 farmers trained by two facilitators while five facilitators trained the 5F group. The skill test is divided into four aspects, namely Land Preparation, Foundation Work, Reinforced Concrete Beam Work, and Bag Concrete Work
The data analysis technique used in this study is an Independent-Sample T-Test on four aspects of skills. This test is used to determine whether or not significant differences exist between the two groups.
Results: The descriptive analysis results showed an increase in the participants' skills after the training. The training effectiveness in the 5F group was higher than that of the 2F group. Statistical analysis showed a significant difference in skills improvement between 2F and 5F. Therefore, the number of facilitators at the training gives a significant meaning to the participants' skills achievement.
Conclusion: The analysis results outline that RBC training in the community effectively improves the skills of participants.
Key Word: **Ring Bag Concrete, skills, riverbank, erosion**

I. INTRODUCTION

Erosion of riverbank due to flow dynamics triggers environmental degradation. Land use patterns from forests to agricultural land and settlements impact hydrological conditions of watersheds. The erosion and landslides are related toerosion ofriver cliffs[1]. The kinetic energy in the river flow causes the exfoliation of the soil on the river cliffs. Erosion of river cliffs or soil particles' release can lead to the deposition, muddying, and superficiality of rivers and the water body's closing. This condition caused flooding due toa decrease in river capacity[2]. The build-up of sediment on the body of the river can also lead to the cover of springs. The series of physical events have had an impact on the deterioration of river quality.

Specifically, river cliff protection efforts are taking sediment control measures on the river. Retaining wall and sheet piles as an alternative if the structural protectionsin the river[3]. Efforts to build the structure should involve the community. This will impact the development of community skills towards protecting river quality, as perpetrators who define their own lives.

Researchers are trying to introduce an RBC (Ring Bag Concrete) technology as a simple cliff-climbing construction. This construction is easy to adopt by the community. This construction consists of two parts, namely the upper building and the lower building. The lower building is a foundation using a concrete precast ring (Ring Concrete = RC) diameter 0.8 – 1.0 m with a thickness = 10 cm. This material is a product of the local community industry that uses local natural resources. The bond between RC with a 20/20 cm beam ring that binds with haunted. The upper building is a cliff protector with a sack filled with the concrete mixture by composition 1 PC: 2 sand: 2.5 crush stone. BC is arranged vertically with an angle between 45°-60°. 1.5 – 2 m high so that the forces are bound to one BC with the other BC in a clamp with iron. Some Indonesians find it difficult to access technology that facilitates their lives.

These difficulties lead to low community participation in controlling environmental damage. Training becomes one of the effective alternatives in learning methods towards a community collectively. It is done to increase the community's capacity through the process of community development on an ongoing basis.

Training is a systematic process to transfer the science of skills and impact behavior changes in the family and its environment. Training is oriented towards mastery of skills and competencies specific in particular work[4].

The training program has three stages that include: a) Assessment of training needs, whose purpose is to gather information to determine whether or not a training program is needed; b) Development program, aims to design the training environment and training methods needed to achieve the training objectives; c) Evaluation program, has the purpose of testing and assessing whether the training programs that have been undergoing, effectively able to achieve the goals that have been set[5].

This research developed training methods in the community to develop a simple river cliff protective structure using RBC (Ring Bag Concrete) method.

II. MATERIAL AND METHODS

This comparative study was carried out on two group participants. Each group involves thirty participants. The difference between the two groups lies in the number of facilities. There were two facilitators in the first, while five facilitators handled the second group.

Study Design: research and development
Study Location: It was done in Walannaewatershed and in Soppeng Regency
Study Duration: November 2019 to February2020.
Sample size: 60 participants.

Procedure methodology

Researchers designed a training model following the working hours of farmers. Besides, the researcher first trains the facilitator to understand the stages of the training. The training consists of four syntaxes, starting with caring, transformation of knowledge, and formulation of local materials and skills development. The evaluation process was divided into four aspects: Land Preparation, Foundation Work Reinforced, Concrete Beam Work, and bag concrete work. The skill evaluation of the participants was carried out by comparing the 2F and 4F groups.

Statistical analysis

Data were analyzed using a *t*-test. The test was used to find the significance of differences between the mean values of the two groups. The level $P < 0.05$ was considered as the cutoff value or significance.

III. RESULT

Training model
The training model used in this research refers to the syntax that can be seen in figure 1
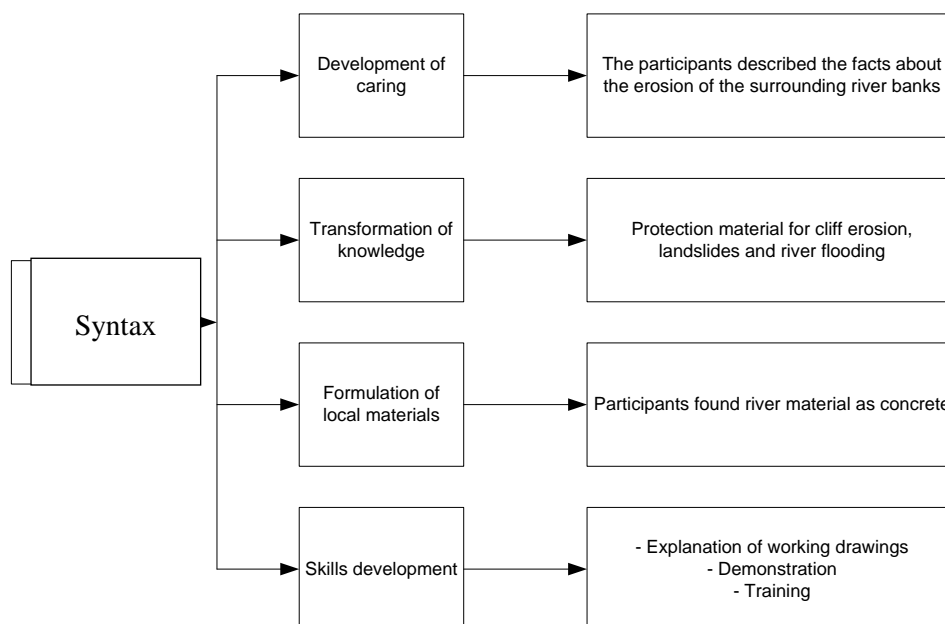

Figure 1: Syntax of Training

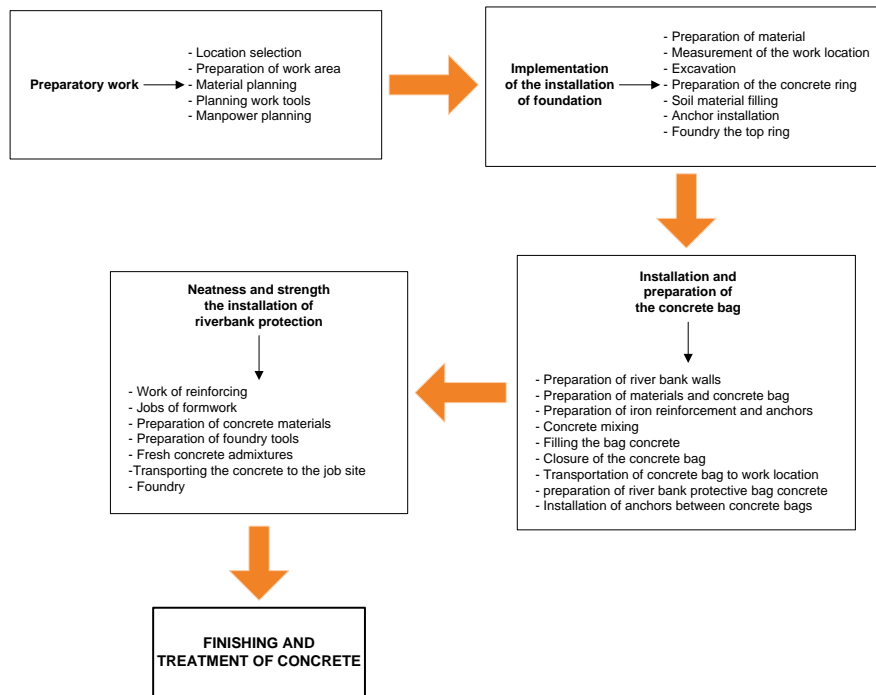River cliff protection uses RBC technology through the following stages:

Figure2: Stage of river cliff making using RBC technology the results of the analysis of farmers' skills on river cliff protection using RBC technology

Descriptive Analysis

This analysis's results have an average difference between 5 facilitators and a group of 2 facilitators, which can be seen in table no 3.

Table no 3: The difference in average skill value per work item

No	Item	Average	
		Five Facilitator	Two Facilitator
1	*Land Preparation*	0.79	0.69
2	*Foundation Work*	0.74	0.67
3	*Reinforced Concrete Beam Work*	0.55	0.46
4	*Bag Concrete Work*	0.90	0.89

The highest average skill score in the group of 5 facilitators is installing Bag Concrete, while the value in the group of 2 facilitators is 0.89. Thus, the participant's skill level tends to be greater than five facilitators compared to two facilitators. The difference in skill scores can be seen in figure 3.
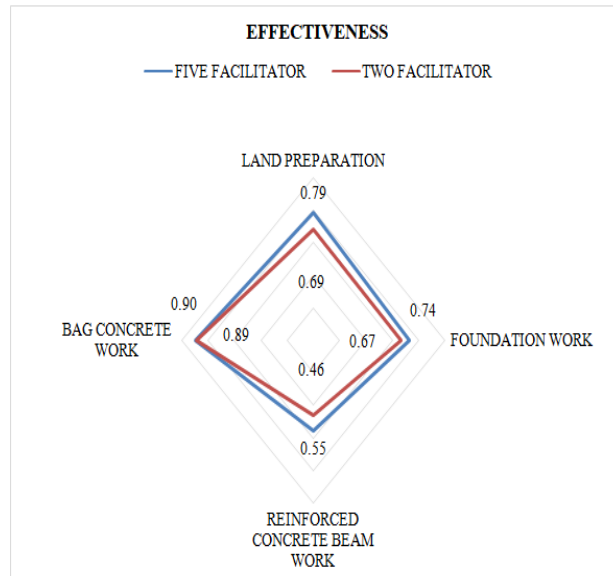
Figure3: The skill difference between the group of 5 facilitators and two facilitators

Statistical Analysis Results
This analysis was developed with four hypotheses that can be seen in table no4.

Table no4: Hypothesis

Hypothesis	Keterangan
Hypothesis 1	H0 = No difference in skills in Land Preparation for 2F and 5F groups
	H1 = There is a difference in participants' skills in Land Preparation for 2F and 5F groups
Hypothesis 2	H0 = No difference in participants' skills in Foundation Work for 2F and 5F groups
	H1 = There is a difference in participants' skills in Foundation Work for 2F and 5F groups
Hypothesis 3	H0 = There was no difference in participants' skills in Reinforced Concrete Beam Work for 2F and 5F groups
	H1 =There is a difference in participants' skills in Reinforced Concrete Beam Work for 2F and 5F groups
Hypothesis	H0 = There is no difference in participants' skills in Bag Concrete Work Work for 2F and 5F groups
	H1 = There are differences in participants' skills in Bag Concrete Work for 2F and 5F groups

Information :
2F   = 2 facilitators
5F   = 5 facilitators

Based on the hypothesis above obtained statistical analysis test results that can be seen in table no 5

Table no5: Hypothetical test results

No	Item Work	sig	Sig. (2-tailed)	Information
1	*Land Preparation*	0.545	0.002	significant differences
2	*Foundation Work*	0.176	0.039	significant differences
3	*Reinforced Concrete Beam Work*	0.105	0.043	significant differences
4	*Bag Concrete Work*	0.877	0.002	significant differences

Based on the output results of the analysis above shows the value of sig.On all items > 0.05, which means that the variance data between 5 facilitators and two facilitators are homogeneous or the same.Furthermore, the sig value. (2-tailed) indicates a value < 0.05, . It means that there is a significant difference between the skills facilitated by five facilitators with two facilitators.

IV.   DISCUSSION

RBC's technology training model aims to develop people's understanding of erosion and sedimentation issues. This model adopts the theory ofthe Akintunde environmental citizenship model[6]. Citizenship theory describes that knowledge of environmental sensitivity risks is a factor that influences a person's knowledge of environmental issues. The training model developed by researchers also focuses on improving people's skills in building cliff protectors.

This study proves that the training model developed successfully developed the community's skills in protecting river cliffs. The improvement in participants' skill scores in the two groups was evidence of the model's effectiveness. However, in the 5F group provided a better increase in knowledge compared to the 2F group. These results prove that the smaller the ratio of facilitators and participants, the better the training results. Explained that facilitators play a role in transforming skills with ease. They share the experience carefully so that participants quickly adopt the material[7]. Besides, participants' attitudes towards the importance of river protection efforts became critical in following the coach's seriousness. Ajzen in the theory of planned behavior outlines that attitudes that are a person's cognitive variable will shape the ability to find solutions and action skills. Environmental management requires technical capabilities as the basis of real action.

The training has been proven to improve the technical skills of the community. In general, trainees who work as farmers do not have good technical skills. There are even those who do not have experience in construction. The work management system is also introduced in this training: preparing working groups, the arrangement of work areas, and using appropriate work tools. This can develop participants' innovations to find additional work.

The findings in this study are that community able to make protectors using RBC technology. RBC technology has the advantage that it can be done gradually. In weather disturbances, i.e., high river water level disturbances, work can be stopped. In addition, the handling of RBC building construction is also proven to protect river cliffs due to critical flows

V.   CONCLUSION

Ring Bag Concrete (RBC) technology develops new technology applied to people living in the river bank. River cliff protection technology is a simple solution in preventing river cliff erosion. The results of the analysis outline that RBC training in the community effectively improves the skills of participants

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