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Education of Trass Utilization for Developing Local Economy in Nagreg Kendan, West Java

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***Abstract*—Education of trass utilization was given to local communities of Nagreg Kendan, West Java. This activity was intended to explore the potential of the communities for development of trass deposit utilization for local economy. This activity is expected to provide recommendation and encouragement for communities to develop entrepreneurship in utilizing and managing mineral resources potential. Nagreg Kendan village as one of the villages in the district Nagreg which has the potential of trass deposits has quite a lot of opportunities in developing its business to utilize trass deposits. One of the determining factors for the use of trass is the characteristics of trass deposits. The chemical elements contained in the Nagreg trass deposit are SiO_2 49.15%, Al_2O_3 29.56%, Fe_2O_3 4.52%, TiO_2 0.45%, CaO 1.12%, MgO 0.94%, Na_2O 0.12% and K_2O 0.20%, and specific Gravity 2.6. These characteristics are related to the utilization technology for roof tiles and concrete blocks.**

Keywords—trass deposits; local economy; roof tiles; communities development

I. INTRODUCTION

Mining has played an important role in the economic development of many countries, particularly developing nations [1]. Mining as extractive industry can be disintegrated into two broad categories based on the scale and methods of resources extraction: industrial mining (IM) and artisanal and small-scale mining (ASM). IM is capital-intensive mode of resource exploitation that requires small amounts of skilled labour to extract, transport, and process minerals. Meanwhile, ASM is a low-tech, low-capital, and labour-intensive mode of resource. ASM can potentially lift people out of poverty [2]. In the past 10-15 years, ASM has become an important topic in international development [3].

ASM can be easily developed by local communities because of its simple requirements. Minerals coming from ASM can also utilized conveniently using simple technology that can be managed by local communities' resources. Trass deposit in Nagreg Kendan Village, West Java is an example of potential prospect to be promoted.

Trass utilization by local communities is still minimal even though Nagreg Kendan has a great potential of trass deposit. Trass mining had been done for years and stopped 10-15 years ago. There is no continuation or development in mining activity.

Trass is a variety of volcanic tuff formed by volcanic eruption [4]. It is fine-grained and dominated by SiO_2. The chemical elements contained in the Nagreg trass deposit are SiO_2 49.15%, Al_2O_3 29.56%, Fe_2O_3 4.52%, TiO_2 0.45%, CaO 1.12%, MgO 0.94%, Na_2O 0.12% and K_2O 0.20%, and specific Gravity 2.6 [5]. Trass is usually used for main and additional raw material in roof tiles and concrete blocks industries. It is also used as an alternative raw material for Portland cement because of its hydraulic properties [6]. If trass is mixed with quicklime and water at room temperature, they will produce cement-like material [7].

There are still lack of information about trass deposit in West Java, although it has more than 63 million ton of measured resources [8]. Collecting more comprehensive information would be necessary for optimizing trass utilization [9].

There are many factors that is related to trass utilization in local communities, including knowledge about utilization technology, trass deposit's characteristics, etc. Education program for local communities is necessary for developing trass deposit utilization for local economy.

Effort to grow local businesses is a more flexible approach and more suitable for general regional conditions. According the results of discussions with some entrepreneurs, many local entrepreneurs received a large amount of demand, but it was difficult to fulfil due to limited production's quality and quantity requirements. This is certainly an opportunity to connect large businesses and small producers / suppliers.

Small-medium scale business development is a popular approach in many regions. The approach taken is mostly too narrow, especially focused only on supply and assistance in production (technical assistance, equipment, credit, etc.). More attention and consideration are needed to assist marketing side and introduction of buyers' needs or tastes. They are necessary to expand economic actors and stakeholders involved through developing cluster links.

Business development through cluster development approach is fairly promising, especially for producers in small-medium scale business' development. Its features are focusing on chosen cluster, with potential to sell their products to markets outside their region and aiming for increasing

competitiveness of regions at national level, even international level.

II. Area of Activity

Research area is located at Nagreg Kendan Village, Nagreg Sub-district, Bandung Regency, West Java Province (Figure 1). According to Bandung Regency's Regional Urban Planning for 2007-2017, Nagreg Sub-district is a part of regional green open space. However, with this designation, the economy of Nagreg Sub-district that only relying on the local economy causes the economy of communities is not well-developed. Among all villages in Nagreg Sub-district, trass deposit can only be found in Nagreg Kendan Village. There are more than five hectares of trass deposit that has not been mined (Figure 2).

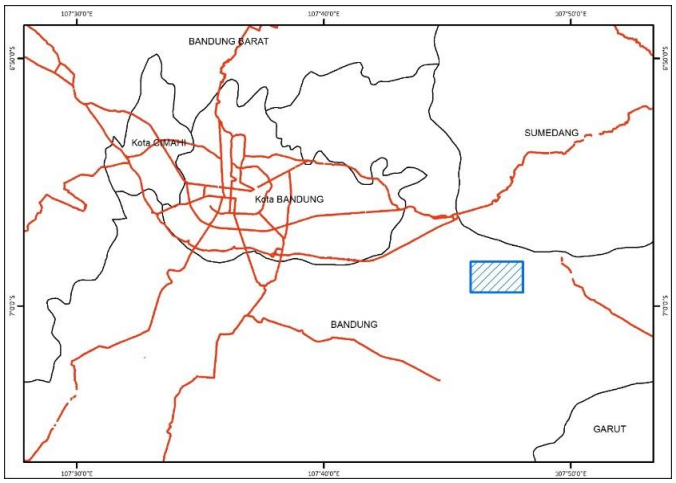

Fig. 1. Reseach area at Nagreg Kendan, Nagreg, Bandung, West Java (blue box).

Fig. 2. Trass deposit in Nagreg Kendan village.

III. Method

This activity is targeted to provide basic knowledge about trass utilization to local communities of Nagreg Kendan Village, Nagreg Sub-district, Bandung Regency, West Java. It also gave great opportunity to local communities to start new business in trass utilization along with local village government. Hopefully, this activity could be a facilitator for local communities in exploiting natural resources for their own welfare.

This activity was divided into several parts, they are pre-test, counseling, discussion, and post-test. Local communities' understanding about trass utilization was evaluated by written pre-test at the beginning of education activity. The test included ten questions in multiple choice form and it had to be done in twenty minutes. There are three categories of question in the test, they are basic knowledge about trass deposit, technological aspect in trass utilization, and local economy activities. Counseling consists of four subjects of discussions: (1) mining commodity characteristics, especially trass deposit;(2) environment-friendly trass deposit exploitation; (3) mining commodity processing, especially for trass; and (4) utilization technology of trass. It is followed by discussion with participants and Nagreg Kendan Village's stakeholders. Post-test was intended to evaluate local communities' comprehension after counseling and discussion. The test included ten questions that is similar to pre-test's in multiple choice form. It had to be done in twenty minutes.

Participants were from local communities of Nagreg Kendan Village. They were divided into three categories: (1) Category I, 17-30 years old, (2) Category II, 31-45 years old, (3) Category III, 46-60 years old.

IV. Results and Discussion

Education activity was divided into 3 major parts, they are pre-test, counselling and discussion, and post-test.

A. Pre-test

Before giving education for trass utilization to local communities, an evaluation was necessary to evaluate their comprehension about trass and its utilization technology. Pre-test was given to participants at the beginning of this activity.

Ten participants were chosen as respondents for pre-test from each category. Previously, this activity had been planned for up to 100 persons. There were several obstacles affecting changes in plans such as room capacity, concerns on security, and effectivity and efficiency in delivering counseling and discussion.

According to pre-test results (Table 1), participants have not understood about trass deposit and its characteristics yet. About 80% of participants answered they recognized trass as clay deposit, and 3.33% recognized trass correctly. About 60% of participants know trass as alluvial deposit that was formed in plain terrain such as rice field. About 76,67% of participants know that trass is usually utilized for foundation rocks, 16,67% of participants answered "temple" rocks, and only 6,67% answered roof tiles or "batako".

TABLE I. PRE-TEST RESULT ON LOCAL COMMUNITIES OF NAGREG KENDAN

No.	Questions	Answers				Total	Category
		A	***B***	***C***	***D***		
1	What do you know about trass deposit in Nagreg Kendan Village?	24	4	1	1	30	Basic knowledge about trass deposit
		80,00%	13,33%	3,33%	3,33%	100%	
2	What does trass deposit look like?	20	5	2	3	30	
		66,67%	16,67%	6,67%	6,67%	100%	
3	Where can you find trass deposits in Nagreg Kendan Village, or any other region?	18	8	2	2	30	
		60,00%	26,67%	6,67%	6,67%	100%	
4	What do you know about trass utilization?	23	5	2	0	30	
		76,67%	16,67%	6,67%	0,00%	100%	
5	What do you know about trass as a main raw material in many industries?	15	11	4	0	30	Technological aspect in trass utilization
		50,00%	36,67%	13,33%	0,00%	100%	
6	What kind of technology do "batako" production use?	5	11	6	8	30	
		16,67%	36,67%	20,00%	26,67%	100%	
7	What is the purpose of trass usage in cement and ceramic industries?	6	8	6	10	30	
		20,00%	26,67%	20,00%	33,33%	100%	
8	What do you expect if mining commodity can be utilized for something more valuable?	22	4	4	0	30	Local economy activities
		73,33%	13,33%	13,33%	0,00%	100%	
9	Who should be the main actor in small-medium business if trass utilization can empower local economy?	10	6	8	6	30	
		33,33%	20,00%	26,67%	20,00%	100%	
10	What does communities expect from trass utilization?	8	14	8	0	30	
		26,67%	46.67%	26,67%	0,00%	100%	

Half of total participants gave opinion that the current trass utilization technology is more for roof tiles. Only 36,67% and 13,33% participants recognize trass as raw material for "batako" and bricks. Participants has various knowledge about technology used in trass utilization. About 16,67% participants know that the technology used nowadays is sophisticated technology, while 36,67%, 20%, and 26,67% participants know that trass utilization uses conventional, semi-conventional, and simple technology. For analysis of trass utilization in the process of making cements and ceramics, opinions of participants were 33,33% as the main raw material, 26,67% for mixed raw materials, and 20% for reinforcing raw materials and main raw materials.

Most of participants predicted trass utilization would give them economic benefits. About 73,33% participants gave the opinion that the use of trass could open business opportunities and improve the economy of local communities, 13.33% opened opportunities and increased numbers of workers, 13.33% opened up opportunities for conflict. Analysis of the results of the opinions of participants related to the use of trass that are linked to the main actors for business actors, namely participants provided answers as follows; 33,33% of participants gave the opinion that the community was the main actor with cooperative venture capital, 20% of the local government through cooperatives, 26,67% of business people who had strong capital and 20% by local communities with their own capital. About 26,67% of participants considered that trass utilization would increase people's income, meanwhile 46,67% and 26,67% of participants considered that trass utilization would reduce unemployment and increase outside investment.

B. Counseling and Discussion

Counseling and discussion were held at multipurpose building of Village Office of Nagreg Kendan. Participants were from local communities of Nagreg Kendan Village. They had various profession, such as entrepreneur, farmer, merchant, etc. They were divided into 3 categories: (1) Category I, 17-30 years old, (2) Category II, 31-45 years old, and (3) Category III, 46-60 years old.

Counseling consists of 4 subjects of discussions. Mining commodity characteristics, especially trass deposit, delivered

by Dono Guntoro. Environment-friendly trass deposit exploitation, delivered by Dudi Nasrudin Usman. Mining commodity processing, especially for trass, delivered by Sriyanti. Meanwhile, utilization technology of trass, delivered by Sri Widayati

C. Post-test

According to post-test results on local communities after counselling and discussion of education program (Table 2), they can be analysed that most of participants recognized trass characteristics well. About 85,71% of participants known trass is solid sand but physically relatively soft. Only 7,14% of participants answered incorrectly. About 83.33% of the answers recognize trass as deposits formed in areas with hilly to medium to high morphological conditions due to the influence of genesis and geological formation factors. About 83,33% of participants aware that trass deposits are more commonly used for tiles and bricks. Meanwhile 13,33% and 3,33% of participants recognized trass usage for foundation stones.

TABLE II. POST-TEST RESULT ON LOCAL COMMUNITIES OF NAGREG KENDAN

No.	Questions	Answers				Total	Category
		A	***B***	***C***	***D***		
1	What do you know about trass deposit in Nagreg Kendan Village?	2	1	1	24	28	Basic knowledge about trass deposit
		7,14%	3,57%	3,57%	85,71%	100%	
2	What does trass deposit look like?	4	26	0	0	30	
		13,33%	86,67%	0,00	0,00	100%	
3	Where can you find trass deposits in Nagreg Kendan Village, or any other region?	1	1	25	3	30	
		3,33%	3,33%	83,33%	10,00%	100%	
4	What do you know about trass utilization?	23	5	2	0	30	
		3,33%	13,33%	83,33%	0,00%	100%	
5	What do you know about trass as a main raw material in many industries?	5	21	4	0	30	Technological aspect in trass utilization
		16,67%	70,00%	13,33%	0,00%	100%	
6	What kind of technology do "batako" production use?	4	19	5	2	30	
		13,33%	63,33%	16,67%	6,67%	100%	
7	What is the purpose of trass usage in cement and ceramic industries?	23	6	1	0	30	
		76,67%	20,00%	3,33%	0,00%	100%	
8	What do you expect if mining commodity can be utilized for something more valuable?	4	25	1	0	30	Local economy activities
		13,33%	83,33%	3,33%	0,00%	100%	
9	Who should be the main actor in small-medium business if trass utilization can empower local economy?	4	1	23	2	30	
		13,33%	3,33%	76,67%	6,67%	100%	
10	What does communities expect from trass utilization?	24	4	2	0	30	
		80,00%	13,33%	6,67%	0,00%	100%	

Most of participants understood that trass utilization technology is commonly used for "batako" Only 16,67% and 13,33% of participants knew that trass utilization is more for tiles and bricks. About 13,67% participants know that the technology used nowadays is sophisticated technology, while 63,67%, 16,67%, and 67% participants know that trass utilization uses conventional, semi-conventional, and simple technology. For analysis of trass utilization in the process of making cements and ceramics, opinions of participants were 76,67% as main raw material, 20 for mixed raw materials, and 3,33% for reinforcing raw materials and main raw materials.

Most of participants predict trass utilization would give them economic benefits. About 83,33% participants gave the opinion that the use of trass could open business opportunities and improve the economy of local communities, 13.33% opened opportunities and increased numbers of workers, 3.33% opened up opportunities for conflict. Analysis of the results of the opinions of participants related to the use of trass that are linked to the main actors for business actors 76,67% of participants gave

the opinion that the community was the main actor with cooperative venture capital, 13,33% of the local government through cooperatives, 3,33% of business people who had strong capital and 6,67% by local communities with their own capital. About 80% of participants considered that trass utilization would increase people's income. Meanwhile 13,33% and 6,67% of participants considered that trass utilization would reduce unemployment and increase outside investment.

V. CONCLUSION

Based on the results of the activities showing communities' good enthusiasm to know and gain insight and knowledge about trass utilization, especially to improve the welfare of local communities through empowering local economy. The strength of local communities in the development program plan is very high, this is indicated by the willingness and desires of the Village Government so that the results of this activity can provide realistic and real input on the characteristics of trass deposits both in terms of quality and quantity as well as encouragement and support from local government. The existing community strength is the basic capital to dare to open business opportunities for local communities through trass utilization.

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