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THE PROCEEDING OF 3RD INTERNATIONAL SEMINAR ON EDUCATION AND TECHNOLOGY (ISET)

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PREFACE

This Conference Proceedings volume contains the written version of all of the contributions presented during **3rd International Seminar on Education and Technology (ISET).** The conference was taken place in Graduate Program from 10 universities, namely Universitas Negeri Semarang, Universitas Muhammadiyah Semarang, Universitas Kristen Satya Wacana Salatiga, Universitas PGRI Semarang, Universitas Negeri Padang, Universitas Negeri Gorontalo, Universitas Negeri Makasar, Universitas Negeri Yogyakarta, Universitas Negeri Yogyakarta, Universitas Negeri Surabaya, and Universitas Negeri Medan at 24 May 2017.

The proceedings of ISET came from researchers, practitionaers, private and public stakeholders, and educators from various field. ISET ks expected to provide acceleration of technological innovation that has the potential to accelerate the progress of industry and economics growth, solve the multidimensional social problems, and revolutionize the world of education in Indonesia.

We would like to thank all participans for their contributions to the Conference program and for their contributions to the Proceedings. Many thanks go as well to the all invited speakers. Our special thanks go to Rector of Universitas Negeri Semarang, Director of Post Graduate Program of Universitas Negeri Semarang, and all university collaborators (Universitas Muhammadiyah Semarang, Universitas Kristen Satya Wacana Salatiga, Universitas PGRI Semarang, Universitas Negeri Padang, Universitas Negeri Gorontalo, Universitas Negeri Makasar, Universitas Negeri Yogyakarta, Universitas Negeri Yogyakarta, Universitas Negeri Surabaya, and Universitas Negeri Medan).

The Proceedings Team,

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EXPLORATION OF ORIGINAL SCIENCE (INDEGENOUS SCIENCE) SALT FARMERS IN THE TRADITIONAL SALT PRODUCTION AS A RELIABLE EFFECT OF CHEMICAL LARGE BASED MATERIALS

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Abstract

One of the concepts of indigenous science that can be explored is local knowledge of traditional salt production. This study aims to describe the condition of indigenous science of Central Java salt farmers in the salt production process. The design of this research is survey and descriptive research. This research uses qualitative research approach through ethnosains. The background of this research is salt farming area located in two regencies in Central Java, namely Jepara and Pati districts. This research is a qualitative research. Researchers in this study relate to several key informants (key person) and other informants and involve respondents and research participants. The next informant was determined based on the instruction of the selected key informant using purposive and snowball sampling principles. The process of data analysis in this study is done simultaneously and cyclic with the data collection process. It also uses data triangulation techniques through analysis of several data sources be it primary or secondary data. The result of this research is document of indegenous science condition of farmer daram in traditional salt production process. Furthermore, the document can be developed into teaching materials based on local wisdom.

Key words: *local wisdom, indegeneous science, salt farmers, teaching materials*

I. Introduction

Local wisdom is the value of noble values prevailing in the life order of society. Something that has been attached to the community and has become a hallmark of certain areas and hereditary and has been recognized by the wider community. One of the traditional local wisdom of Central Java is the making of traditional salt in Jepara and Pati districts. Traditional salt making has been implemented or known by the community starting from year. Original science about the process of salt generation is developing generations between generations that exist in a family so it is still preserved until now.

The development of science education is strongly influenced by the rapid development of science and technology. The development of science and technology then gave birth to formal science as it has been taught in schools. While in the traditional community there is original knowledge (original science) on how to behave towards nature in the form of customs and messages that are trusted by the community and delivered from generation to generation. This form of indigenous knowledge has not been systematically structured in the form of concepts applied to the curriculum and implemented in formal education, but in the form of messages and messages passed from generation to generation in an indigenous community such as how to preserve forests, how to grow crops, how to catch Fish, and so forth.

Knowledge that lives in society and has not experienced this formalization ditrasformasikan into scientific knowledge, it can be utilized in the learning process as a source or alternative science learning media. The original science knowledge in society, its development pattern is continuously passed between generations, is not structured systematically in a curriculum, is local, informal, and generally a knowledge of people's perception of a natural phenomenon (Battiste, 2005). While scientific knowledge of science

can only be understood scientifically and based on scientific work, therefore scientific knowledge science is objective, universal, and value-free process and can be accounted for. In scientific level, original science knowledge or indegenous science is often referred to as folk knowledge, traditional konwledge, western science or traditional ecological knowledge (Battiste, 2005; Duitt, 2007).

Methods

Researchers in this study were associated with several key informants and other informants and involved respondents and research participants (Spradley, 1979; Goctz & LaComte, 1984). Initially the researcher will work with some key informant (key person). These key informants were stratified differently ie small, medium, and large strata salt farmers in each district (research setting). Small farmers are farmers producing under 100 tons per year, medium (100-400 tons per year), large (> 400 tons per year). Subsequent informants were determined based on the key informant guidelines selected using purposive and snowball sampling principles (Patton, 1982).

During the data collection, researchers were directly involved in the various activities and lives of the salt farmers. Primary data collection techniques are through observation, in-depth interviews, discussions, and direct observation in the field. In addition, also conducted analysis of salt water concentration on salt table using salinometer measuring instrument. Meanwhile, secondary data was obtained by collecting data from the office and related offices, as well as reviewing documents related to salt production. The researcher becomes the main instrument in order to collect the original science data of the community as much as possible, done verification, reconstruction, formulation, and conception to become scientific science knowledge (Battiste, 2005).

Results and Discussion

This study aims to find out indigenous science of traditional salt farmers in Jepara and starch regencies as the basis for making local wisdom-based teaching materials in formal science learning in schools. The respondents in this study are the salt farmers in the area of jepara, starch, pugar salt group, marine service and various related parties. This study was conducted with direct observation and interviews to salt farmers, as well as documentation. The authors maintain the confidentiality of the respondent's name then the author uses the initial term. The following data respondents can be seen in table 1.

Table 1. Background of Salad Farmer Participants

Amount of Respondence	**1**	**2**	**3**	**4**
Respondence Code	**NA**	**HA**	**MU**	**AS**
Age	52	40	37	
Background of Education	Elementery School	Senior High School	Senior High School	Fress graduate
Address	Batangan, Pati	Bulak baru Jepara	Bulak baru Jepara	Pati

Characteristic	Nervous in the first interview	Doing table	Wake up early	Doing tasn in the office

Based on data table 1 on the background of salt farmers in these two areas. The process of exploration of original science or science indegenius about the basic natural science knowledge of salt farmers by using question formulation in accordance with the instruments in table 2.

Table 2 List of Instruments and Questions

No	Research Area	Aspect Of Question
1	Experience and knowledge of traditional salt production	1) 1) Duration or span of time in salt farming 2) 2) The origin of such knowledge is owned
2	Motivation for salt farming	1) Motivation in salt farming
3	Determination of salting location	1) Early determination of salt farm location 2) What things to consider to determine the location of salt farming land
4	Land preparation process	How to prepare the land for salt farming Traditional salt production process
5	Traditional salt production process:	
	a. Stage of drying of land	1) Is there a drying process of land before processing sea water to become salt? 2) What is the purpose of the land drainage activity?
	b. Treatment of wastewater / reservoir	1) How does the process of water treatment take place? 2) Is there a difference between water wasting and seawater? 3) What is the purpose of this processing?
	c. Groundwater treatment	1) What is the purpose of groundwater treatment?
	d. Phase of crystallization	1) When is the crystallization stage done? 2) What is the purpose of the crystallization stage?
	e. The levy stage	1) When is the levy imposed? 2) How the salt obtained from the levy stage
6	Technical factors affecting salt	1) Anything that affects salt production

production.	results
	2) Why the yield of salt on each farm may be different
A. Stage of drying land	3) How to obtain products with good quality
B. Wastewater treatment / reservoir	1) Is there a drying process prior to treating sea water to become salt?
	2) What is the purpose of the land drainage activity?
C. Groundwater treatment	1) What is the process of water treatment?
D. Stage of crystallization	2) Is there a difference between water wasting and seawater?
E. The levy stage	3) What is the purpose of this processing?
6. Technical factors affecting salt production.	1) What is the purpose of groundwater treatment?
	1) When is the crystallization stage done?
	2) What is the purpose of the crystallization stage?
	1) When are the charges levied?
	2) How the salt obtained from the levy stage
	1) Anything that affects salt production results
	2) Why the yield of salt on each farm may be different
	3) How to obtain products with good quality

1. Description of Indegenius Science Respondents NA

NA is a salt farmer who has a primary school education background. NA started as a pond or salt farmer since 1990. NA obtained the science of salt making from NA parents. How to make salt is derived. NA states that the source of experience is self-taught from caring for parents and participating in helping parents in salt farming. NA has land for salt farming is a lease land. The land is 1.5 ha with a price of Rp. 15 million / year. Experience and knowledge of traditional salt production developed with the counseling from the

Department of Marine Pati so that people have a deeper ability to process salt qualitatively and quantitatively.

NA has the motivation to farm salt very strong because the livelihood of Batangan Pati from year to year is salt farmers and milkfish farmers or shrimp. Motivation of the farmers because of the proximity of the sea to the mainland so as to make the potential of Pati Batangan area as salt-producing areas and milkfish or shrimp. Agricultural transition in the area is divided into two, namely dry season and rainy season. The dry season is used as a salt rice field and the rainy season is used as a pond. According to the NA the transition was due to weather. NA knowledge of weather intensity is very influential because in the presence of high rainfall then the resulting salt is brown and rigid that can not be harvested, it can affect the quality of salt produced.

Determination of salting location in salt farming by NA no exceptions or without land selection. So all the existing land can be used as a salt pond. The area of NA salt rice land of 1.5 Ha is divided into 30 boxes or tables. 10 table salt box is used as a place of young water (table bean). Twenty more tables are used as a salt table (the process of becoming salt). Other tables are used for salt harvesting that is ready for harvest. For NA that distinguishes between saltable table with salt table is its land processing process. For welding table is wider and does not need in slander or compacted, because only as sea water reservoir before drainage to salt table. As for the salt table is compacted first, this is done because so that the mud yag there in land not participate in salt so that salt produced more white.

According to NA during this process of land preparation conducted after the rainy season is the draining of land. The soil is dried for approximately 20 days this is done so that the soil yag will be used for making salt warm and barren. Once the salt farmers do less drying then the salt obtained is dirty and hard to harvest it will affect the quality and quantity of salt produced. According to NA good soil for the process of making salt is clay and sand, the material tesrsebut if compacted will be more flat and the color of water produced also clear, with the clear water used then the color salt obtained is also good. According to NA in the presence of sand and clay, so the process of adsorption of soil and water can be adsorbed quickly. So land bean and salt table, there is the term "caren". Caren is a flow of water that connects between the salt table and the place of administration and the place of old salt (Bittrern water). This caren serves to place the flow or distribution of sea water. So to set the Be or the level of salt formation of bus caren.

The traditional salt production process originated from seawater flowed into pond ponds, from lake wells used "ebor" or diesel or windmills. Among the three tools that are often used are age windmills. The knowledge of salt farmers is always evolving, the use of "ebor" is very time consuming and very tiring so sometimes switch to using diesel, but the diesel use is in dire need of a very large amount of money. So the cost of production also increases. Today, people often take advantage of windmills, in addition to the affordable price of salt farmers do not need to spend energy and energy to move water into a box or salt table (bean) continuously until half full (figure 1).

The next process waits for three to five days and is tested using a baumometer with drajat Be = 22. The next process of flowing to the table gram with waiting approximately five days so that have degree Be = 27. This shows the salt on the table salt ready to harvest. The process of salt harvesting is still manual that is using a rake of wood, collecting salt on the edge of the pond and then put into the sack. Usually the harvest is dried first.

Figure 1

"After the process of harvesting the bitterns in the stream again into the box bean then added again with young sea water. This is done because to accelerate the process of salt formation again "assumption of pack NA, yes it will be more easily formed white crystals, but keep in mind that the oldest water content is the most dominant is Magnesium. The color of magnesium is also white, so it is possible that the salt still contains magnesium.

The technical factors affecting sea salt production are weather conditions, according to NA in the presence of rain can result in a point in brown salt. Soil processing for soil preparation also affects the salt yield, if the sea water is used too little then the salt produced is too little, and if too much then the evaporation process that happened too long, the way salt levy must also be careful, Air Bittern if too old salt produced bit bitter. The longer the age of sea water in the salt box or the salt table the resulting crystals become larger. This happens because there is continuous evaporation. But if too long the salt water or the harvesting process is not done immediately then there is clumping. The use of a tarpaulin as a foundation on the salt table, can produce a salt with a high enough level and the salt obtained is good.

2. Description of Indegenius Science Respondents HA

HA is a salt farmer who has high perseverance. Science obtained by amateur with see and observe HA parents when in has been a salt farmer for 4 years learn from parents. The motivation of being a salt farmer is to utilize the existing land and to earn additional income. Beginning began to be forced salt farmers, because the area is close to the north sea.

Determination of salting location in accordance with existing land. So according to HA all the land can be used, but according to HA land that its red color is less good if used as salt land. If drying is approximately 1 month, so the soil becomes cracked. The more dry the salt field before beat then the better the results. The dry land is not mixed with salt.

The traditional salt production process originated from seawater flowed into pond ponds, from pond wells used "ebor" to move sea water into the first salt table. The use of "ebor" or scoop is associated with wood, then with a pole embedded in the ground. How this ebor works by swinging the wood until it is full and then raised up and directed toward the first salt table (bean). The use of ebor is very time consuming and energy and discomfort due to exposure to very hot sun. The use of windmills has not been done by HA. Although some places already exist that use a windmill. The presence of sunburn every day makes the skin of salt farmers become black and feels thick. This is also in accordance with research Elisabeth (2002) that salt farmers experience health problems such as pain in the eyes and also a high level of consumption. The need for standardization of places in the manufacture of salt is necessary to reduce the health disorder.

The second process after the transfer of sea water to the first table with a depth of 1 meter is wait to level baumemeter ± 20 Be. After that stage, the sea level is added to the level of 20 Be into the second pond plot with a depth of 7 cm. The help of sunlight and wind, then the sea water can crystallize. The crystallization process lasts for 1 week. After seawater crystallizes, it is done by leveling and compacting the land using a wooden broker. Then wait three to five days and tested using baumometer with drajat Be = 22. The next process of flowing to the table gram with waiting approximately five days sehigga have degree Be = 27. This shows the salt on the table salt ready to harvest. The process of salt harvesting is still manual that is using a rake of wood, collecting salt on the edge of the pond and then put into the sack. Usually the harvest is dried first. The table preparation for the crystallization process is shown in FIG. 2.

Figure 2. The soil compaction process using the selender

The process with water is always flowing, the water enters the crystallization table for more than 20 days, if less than 20 days the soil becomes loose so the salt becomes black, the difference in the salt yield with the tarpaulin and not is, which uses the tarpaulin easily harvested, the result is whiter, the more time Long, while without tarpaulins difficult to harvest and shorter time. Salt is harvested after Be 25 and above, old water is mixed again with young water to make salt faster again. After 3 harvests the results are not much more, red soil makes the results are not good. Result first salt leveled with soil and then added with the same BE water, the second result is newly harvested. Before there is a test water size with cigarettes, young water floating or floating, old water drowned.

3. Description of Indegenius Science of Respondents MU

MU is a diligent farmer and extraordinary spirit. MU has 9 years become salt farmers and have their own land. MU studied the process of making salt, learning from the parent. Land used to produce approximately 90 tons / season. MU motivation in salt farming is the need for survival and family. In addition to being a salt farmer MU also work as a carpenter. Making the wood as a side when not in salt and during the rainy season.

Implementation of drying of land approximately 1 month, can cause land not yet dry. So the process of using land waits until the soil is cracked (indicating the soil is dry). The drying of the land will affect the quality and quantity of salt. Land used as a table of salt according to MU drier then the result is better because the soil is not mixed with salt.

Water treatment process from seawater, then accommodated in the water reservoir or well, from the shelter is transferred to the table bean with windmills. The shelter is in the zig zag method. The zigzag method is a method of water flow in the process of clearance. The goal is that absorption and evaporation happen faster. According to MU the harvesting

process is done when Be> 25, if degree baume has not reached 25 then it must be streamed again. According to the MU selection of transfer or crystallization based on the height of the soil, from the place of bean has a higher altitude compared with the salt table. The salt table is also higher than the remaining table or bittern place. According MU to reduce leakage on the table bean then done the process of making for compaction. In addition MU also uses insect repellent to kill animals. With the existence of insect animals such as whole and worms, as well as ants will result in holes, with the hole can disturb the density of the soil. Soil silinder to be solid and flat, and the results are better because it is hotter.

According to MU salt results will be better if using Geoisolator. Geoisolator is a base system of thick plastic material (tarpaulin) is black. The use of geoisolator is provided by the district government with PUGAR guidance. PUGAR in jepara district is quite proactive, PUGAR chairman can facilitate activities and also has an information network. Processing and training process is also carried out by PUGAR yag facilitated by the Department of Maritime and Fisheries Jepara. The obstacle faced by PUGAR is public awareness to improve the quality of salt and its quantity. Figure 3 is an application of Baumemeter usage,

Figure3. Using Of Baometer

The use of geoisolator can pay attention to the processing speed and quality of salt yields that have high levels. Measure MU NaCl levels higher by using geooisolator. Factors that affect salt production result is rainfall, If exposed to rain water salt to yellow. The salt crystal becomes brown. According MU if terajdi rain in mid-season then the land must be drained first. So given the young water again and start from the process of bean. If not drained the size of the crystal is not stable. And crystalline results tend to have very little weight. After the process of bleaching until the crystallization process, water is crystallized + water of removal (not disposed). Exposure from MU that water on salt table more than 27 degree baume then white foam. Factors that affect: the journey of water and sunlight. Moving from box 1 to another box after the 2-strip membrane size, so if you want water with Be 27 there is 13 flow follow exposure from brother MU.

4. Description of Indegenius Science US Respondents

The US is the head of the existing service in Pati regency. Salt farmers have been around since the VOC days, initially in determining that water is ready to be salt or dipaen using bamboo filled with sea water or salt water in bamboo is given bamboo sticks and given lines scale unit. Along with the development of the era, now began to be used tool to know Be water that can be a salt that is Baumometer, currently salt farmers are being pursued so that all get the help of tarpaulin / geoisolator for the results of salt production better and more, besides salt farmers group managers Are being counseled on all salt-related matters with the aim of being forwarded to all the salt farmers under it, the only obstacles faced are many

farmers who know the problems faced is the farmers know the process of making salt for the best results, but many fishermen are still reluctant to do so. This is because the habit factor and usually takes a little longer time, other than that the low price of salt is also an inhibiting factor, because as good as any salt obtained the price is not much adrift with other salts, so that many farmers who think practical, important results Many with prices in general rather than fewer results at a marginally small price which in the end when calculated results are not much different.

The results of the analysis of the original science that has been found in the salt farming communities in the area of jepara, starch and rembang, revealed that the original science is related to the daily life of hereditary community or inheritance from parents. This original science is part of the life or culture of society that is still maintained and believed to be true. This original science is retained because they see and experience their own truth based on life experiences (natural experiments) over the years from one generation to the next through the process of adaptation to the natural and cultural environment in which they are. Unlike Western science, original science is still in the form of concrete experience knowledge, whereas Western science is a reproducible concept, principle, theory or law (tested experimentally in the laboratory) and has been recognized by the scientific community . This original science knowledge is transformed through the oral tradition of their parents' "parent" to the next generation and concrete experience in interacting with their environment. In the course of time, it is possible that the entry of new cultures in accordance with the development of science and technology, but the thoughts (beliefs) inherited from the previous generation is still maintained.

These findings can serve as a basis for reconstructing the original science curriculum on salt farmers. The activities that need to be done in reconstructing the understanding of salt making by transforming to learners which is expected to help students in learning science without having to leave the cultural roots.

IV. Conclusion

Based on the results of this study, it is concluded that the salt pembutan process starts from the preparation of tools and materials are very simple, some tools are meter, pump, windmill, selender, hoe, crowbar, scop, rake. Furthermore, the traditional process of salt making through four processes, namely Enter the sea water into the first saline saline plot, Enter the sea water with levels of 20 Be into the second pond plot with a depth of 7 cm, The third process is the buildup. Enter the sea water with levels above 20 Be (22-25 Be) into the second pond plot, Salt taking is done once a week. Factor influencing factor is weather because during this time sun and also geothermal as energy source in crystallization process.

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