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International Conference of Bio-Based Economy and Agricultural Utilization 2019 IOP Conf. Series: Earth and Environmental Science 497 (2020) 012045 IOP Publishing doi:10.1088/1755-1315/497/1/012045 1 Farmer perceptions of microsystem salt production in Bluka Teubai village, Dewantara Subdistrict, North Aceh Regency H Zahara1*, N Shamadiyah1, E Maida1, S Suryadi1, and W S Harianti1 1Department of Agribusiness, Agriculture Faculty, Malikussaleh University, Reuleuet, North Aceh, 24351, Indonesia E-mail: hafni.zahara@unimal.ac.id Abstract. Salt is very important for the people as food ingredients and industrial raw materials, therefore salt becomes a very strategic commodity.

Salt in Indonesia is still produced by traditional systems. Agricultural extension agencies began to improve the technology of salt production using a microsystem to increase salt production. These systems generate salt through the evaporation of seawater. The process of aging the water that previously took 2 weeks [14 days] could be shortened. This research was conducted in the village of Bluka Teubai, Dewantara District, North Aceh Regency. The study aimed to determine farmers' perceptions of microsystem salt-making technology. The data was analyzed using descriptive qualitative analysis with a Likert scale analysis. The results of the study indicate that relative superiority has an index value of 78.80%, conformity of 79.98%, ability to be tested as large as 71.19%, ability to be observed is equal to 77.53%, microsystem making technology for 83.60%, salt marketing for 70.92%, and program mechanism as big as 68.56%. 1.

Introduction Indonesia is known as a maritime country with enormous biological and non-biological marine resources. One of the most abundant of non-biological marine resources owned by Indonesia is salt. As a maritime country with an area that is mostly ocean, Indonesia has a lot of economic potentials that come from marine resources. But

Indonesia is still a fairly large importer of salt in iodized salt and industrial salt [1]. Salt is a white crystalline solid which is a collection of compounds with the largest portion of Sodium Chloride [$> 80\%$] and other compounds, such as Magnesium Chloride, Magnesium Sulfate, Calcium Chloride, and others.

Sources of salt can be obtained in nature come from seawater, saltwater, deposits in the soil, salt mines, and also water sources in the ground [2]. Salt is a strategic commodity that is used for industrial raw materials and food that are needed by the whole community, but currently, the life of salt farmers in several regions in Indonesia is experiencing a difficult situation. Many farmers are not able to survive with their farming some even leave their businesses and switch to other livelihoods. Problems that are faced by salt farmers include the price, quality of salt and a large amount of imported salt supply [3].

Most of the salts produced by farmers are made by traditional systems. Therefore, the quality of produced salt still does not meet health requirements, which is still below the quality standard of National Standard specifications / SII No.140-76. This aspect has an important role in the human body, since consuming healthy salt will affect human health [4]. International Conference of Bio-Based Economy and Agricultural Utilization 2019 IOP Conf. Series: Earth and Environmental Science 497 (2020) 012045 IOP Publishing doi:10.1088/1755-1315/497/1/012045 2 The quality of traditionally produced-salt must generally be reprocessed to be able to be used as both consumption and industrial salt.

Salt quality can be classified by several categories based on differences in NaCl content as the main element of salt. Three classes of quality currently are known, for instance excellent, good and medium. The excellent quality contains more than 95% of NaCl, while good quality contains 90-95% NaCl levels and the last class [medium] contain the NaCl levels between 80-90% [5]. Aceh Province is known as a buffer zone for salt production. This status is based that in 2014 the traditional salt production in North Aceh District increased by 3,121 tons or around 8.6% according to the Ministry of Maritime Affairs and Fisheries [KKP].

However, nationally Aceh is not included as a potential producer for salt production and is seen only as a buffer zone [6]. Of the 27 districts found in Aceh, only 4 districts including Lapang, Seunuddon, Syamtalira Bayu, and Dewantara District that actively produce salt [7]. In order to increase salt production, the Agricultural Extension Center in Aceh Province introduced microsystem salt technology. The microsystem salt technology is a process of fogging the young water to accelerate the water aging process.

The water aging process which previously needs 2 weeks [14 days], is expected to be accelerated to 10 days. The concept of developing this micro salt technology includes expanding the surface of the liquid, increasing the temperature of the liquid, blowing the air over the liquid, and reducing the air pressure above the liquid [8]. Based on the description above, the authors studied the farmers' perception in Bluka Teubai Village, Dewantara District, North Aceh Regency. The purpose of this study was to determine the farmers' perception of micro-salt salt manufacturing technology.

2. Materials and method 2.1. Research location The research was conducted in Bluka Teubai Village, Dewantara District, North Aceh Regency. Location is determined by purposive sampling with the consideration that the district is the only place that applies microsystem salt technology. 2.2. Research sample The scope of this study was limited to farmers' perceptions of the microsystem technology for making salt in Bluka Teubai Village, Dewantara District, North Aceh Regency.

The population consisted of 46 farmers and all of them were used as samples [9]. 2.3. Data Analysis The data used in this study included primary and secondary data. Primary data is data obtained from survey results, direct observations in the location of agricultural extension work areas and interviews with farmers using questionnaires [structured questions]. Secondary data is supporting data as a complement in research obtained from related institutions, literature studies, books, online media, and scientific publications related to this research.

Data obtained in this study will be analyzed using qualitative descriptive methods. The qualitative descriptive method is an analytical method by collecting data and interpreting it so that it provides an overview that is examined in the form of farmers' perceptions of the microsystem salt extension program. The data was tabulated and checked the completeness of data filling and the suitability of the answer to the list of questions, then transferred into the work table that has been provided and measured with a Likert scale and then was scored with the criteria: [1] very poor [2] less good, [3] good [4] very good. The total score of each item and the total score of each question were calculated using the following formula [10]: $T \times P_n$
[3.1] Note: T = Total number of respondents who voted International Conference of Bio-Based Economy and Agricultural Utilization 2019 IOP Conf. Series: Earth and Environmental Science 497 (2020) 012045 IOP Publishing
doi:10.1088/1755-1315/497/1/012045 3 P_n = Likert score selection The highest score [Y] and the lowest number [X] for assessment items were calculated using the following formula: $Y = \text{highest score Likert} \times \text{number of respondents} \times \text{number of questions}$ $X = \text{lowest Likert score} \times \text{number of respondents} \times \text{number of questions}$ The assessment of respondents' interpretations the following formula was used: $\text{Index Value\%} = \text{Total}$

Score / Y x 100 [3.2] The location of the index value was determined using the following score [10]: $I = 75 / \text{Total Score [Likert]}$ [3.3] Then : $I = 75/4 = 18.75$ In this study the interpretation criteria are based on the following intervals: 25.00% - 43.74% = Not very good 43.75% - 62.4 % = Not good enough 62.5% - 81.24% = Good 81.25% - 100.00% = Very good Figure 1. Mindset Map 3. Results 3.1.

Location overview This research was conducted in Bluka Teubai Village, Dewantara District, North Aceh Regency. Bluka Teubai Gampong area has an area of ± 200 Ha consisting of a pond area of 24 Ha, a farm area of 120 Ha, and a yard area of 56 Ha. Dewantara District is the center of salt production which coincides in Bluka Teubai Village. Bluka Teubai Village consists of five hamlets namely Cot U Sibak, Meunasah Hamlet, Ujong Kreung Hamlet, Tgk Di Geulima Hamlet, and Cot Kuthang Hamlet. This village has a total population of ± 1631 inhabitants consisting of 773 female residents and 858 male residents with the majority of the population earning a living as salt makers and fishermen.

The Bluka Teubai Village has natural resources, and many of them have not been fully exploited. Salt Farmer Likert Scale Forming perception factors: 1. Objects 2 Persons 3. Circumstances Farmers' perceptions of agricultural extension programs: 1. Technology Innovation 2. Manufacturing Technology 3. Salt Marketing 4. Program Mechanism International Conference of Bio-Based Economy and Agricultural Utilization 2019 IOP Conf. Series: Earth and Environmental Science 497 (2020) 012045 IOP Publishing doi:10.1088/1755-1315/497/1/012045 4 The educational level of Bluka Teubai Village consists of 311 elementary school graduates, 549 elementary school graduates, 460 junior high school graduates, 252 junior high school graduates, and 42 university graduates.

The socioeconomic conditions of the population in Bluka Teubai Village are: the rich population consists of eight families, the middle-income population consists of thirty-three families and the poor population consists of 341 families. In Bluka Teubai Village there are 46 salt farmers. 45 farmers produce salt with the traditional system and only one farmer used microsystem technology to produce salt. 3.2. Microsystem salt production Microsystem technology in Bluka Teubai Village has been run since 2018. The implementation of the microsystem technology is carried out by the Dewantara Agricultural Extension Center.

The technology can accelerate water aging from 14 days to 10 days. Microsystem technology uses a water pump machine to translocate seawater to a hatchery, making this technology can produce salt twice in a month. Production capacity is approximately

800 kg of boiled salt which is ready to sell by collecting 2,000 liters of seawater in one salt production. The production process with a microsystem is not much different from traditional systems so it does not burden farmers who want to adopt microsystem technology. The process is started from suctioning seawater through pipes.

The seawater then is accommodated in the tub where the water aging process is carried out. During the process, the revocation is also carried out which takes time from 10-12 p.m. This fogging is aimed to separate the freshwater vapor from the saltwater vapor, where the saltwater vapor is characterized by the downward vapor. This fogging is essentially what is referred to as microtechnology. The duration of young water in a micro pool is 7 days. After that, the water in the micro pool is moved to the aging reservoir using a pipe with the help of a water pumping machine. After being in the reservoir then it is called as old water.

The duration of young water becomes old water is 5 days. After 5 days, the old water will be drained into each crystallization table. After that, salt is ready to be harvested. One of the advantages of microtechnology is farmers do not need to buy salt seeds as extractors since farmers can produce their salt seeds by themselves. 3.3. Farmers' perceptions on the microsystem Perception is one of the important psychological aspects for humans in responding to the presence of various aspects and symptoms around them.

Perception is a process when a person organizes information in his mind, experiences, and processes signs or everything that happens in his environment. The index values for each variable can be seen in Table 1. The program mechanism variable has the lowest index value compared to other variables that are equal to 68.56% with a good category. This means that farmers' perceptions of program mechanism variables are good even though they have the lowest index value compared to other variables.

The variable that has the highest index value is the microsystem manufacturing technology variable with an index of 83.60% with a very good category. It can be said that the technology for making microsystems is very well accepted by farmers because in the process of making microsystems technology is assisted by extension workers, making it easier for farmers in the process of making a place. The average perception of farmers on the microsystem making technology has an index of 76.70% with a good category, which means farmers' perceptions of microsystem salt-making technology are good.

doi:10.1088/1755-1315/497/1/012045 5 Table 1. Likert measurement results No Variable Index Value [%] Category 1 Relative Excellence 78.80% Good 2 Suitability 79.98% Good 3 Complexity 77.98% Good 4 Testability 71.19% Good 5 Ability to be Observed 77.53% Good 6 Micro System Manufacturing Technology 83.60% Very Good 7 Salt Marketing 70.92% Good 8 Program Mechanism 68.56% Good Total 608.56% Mean 76.07% Good 3.4.

Relative excellence Relative advantage is the level or level of an innovation perceived better than the previous innovation idea. Usually, relative benefits are measured in economic terms, but factors of social prestige, comfort, and satisfaction are often important components. The more relative advantages perceived by innovation, the faster **the rate of adoption** [11]. Overall, the relative superiority variable shows an index value of 78.80% with a good category, meaning that relative superiority provides good benefits **in the form of** increased production. Production yielded by microsystems is more than traditional systems.

The yield produced by microsystem technology is cleaner than traditional systems. The color of the salt produced by the microsystem is white, while the traditional system is yellowish-white, and the production of salt with a microsystem is smoother than traditional systems. 3.5. Conformity Suitability is the level of an innovation that is perceived to be consistent with existing values, experience, and the needs of potential people as adopters.

An idea that is not by the values and norms in a social system, will not be adopted as quickly as an appropriate innovation [11]. Based on **the results of the** study showed that the suitability variable had an index value of 79.98% with a good category. This shows that the microsystem technology is suitable to be applied **in Bluka Teubai Village** because it can facilitate farmers in the process of salt production and the salt produced is smoother and cleaner than traditional system salt. 3.6. Testability The ability to be tested is where innovation can be tried or not by the recipient. So to be quickly adopted, an innovation must be able to express its superiority.

Based on **the results of the** study, the ability variable to be tested has an index value of 71.19% with a good category. It means that **microsystem salt technology is** easy for farmers to try. The water aging process with microsystem technology is easy for farmers to try because it is not much different from the traditional system. 3.7. The ability to be observed The ability to be observed is whether innovation can be observed or not. An innovation whose results are easily observed will be more quickly accepted by the community, and vice versa if the **results are difficult to** observe, it will long be accepted by the community.

Based on the results, the ability to be observed has an index value of 77.53% with a good category. It means **the microsystem salt technology is** easily observed by farmers. Every farmer who comes to Mr. Isa's place is allowed to see all the places that have been made by the instructor, and given a microsystem technology manual. In microsystem technology, farmers are given the ease of observing the level of water salinity using Be **International Conference of Bio-Based Economy and Agricultural Utilization 2019 IOP Conf.**

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doi:10.1088/1755-1315/497/1/012045 6 meters, while with the traditional system, farmers measure the level of water salinity using candlenut children. 3.8. Microsystem manufacturing technology The mechanism of micro salt technology relies on the process of extracting young water to accelerate the process of water aging. The water aging process which previously needs two weeks [14 days], is expected to be accelerated to 10 days.

Micro salt technology accentuates the process of accelerating the manufacture of old water by **expanding the surface of** liquid through fading so that evaporation can take place optimally. The manufacturing technology showed an index value of 83.60% with a very good category. In the process of making microsystems technology, farmers are assisted by extension workers. Farmers send workers to create a microsystem technology that helps farmers in the manufacturing process. Farmers are always assisted and accompanied by counselors from the beginning of the making to the end of the manufacturing process. So that farmers feel being helped by the existence of extension workers. 3.9.

Salt marketing Marketing is a whole system of various business activities or businesses aimed at planning, determining the price of goods or services, promoting it, distributing it, and being able to satisfy consumers. The salt marketing variable has an index value of 70.92% which is included in both categories. The most effective salt marketing is to agents. In each marketing channel, there is a difference in price from IDR 500 – 1,000. The selling price to agents IDR 5,000 while the selling price to consumers is IDR 5,500 - 6,000. No farmers in the village who sell salt to collecting traders, they only sell to agents and directly to consumers.

The agent comes to the farmer on the day after the salt production has just finished. Usually, the agent directly buys all salt produced by farmers, while consumers usually buy directly from farmers in the afternoon after farmers have just finished producing their salt. 3.10. Program mechanism Program mechanism, which is a system of financing

the construction of a place offered by a microsystem technology program and assistance provided by the government. The program mechanism variable has an index value of 68.56% which is included in the good category. However, inland issues, many farmers are disagreeing, because most of them do not have land. They can rent the land, but most of them are facing financial availability.

They have provided double costs land rent and manufacturing. This is one aspect, which has to be solved for the implementation of microsystems technology. Many farmers only have small land. 4. Conclusion This study concludes that the microsystem has an index value of 83.60% with a very good category. It means that the technology is very well received by farmers. However variable of program mechanism has an index value of only 68.56%, meaning that farmers' perception of the program mechanism variable is good even though it has the lowest index value compared to other variables.

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