

## Challenge of Sea Salt Farming in Central Region of Thailand: Indigenous Knowledge and SWOT Analysis

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**ABSTRACT** Sea salt farming in Thailand is challenging the end of indigenous knowledge which has been blended in this career since the reign of King Rama V. This qualitative research aimed to investigate that indigenous knowledge and to doing SWOT analysis of sea salt farming community. The key methods were in-depth interview, participatory observation, and focus group. Participants were selected by purposive samplings from sea salt farmers, folk philosophers and members of cooperatives in totally 387 people. The content analysis, interpretation together with triangular checked were used. The results found that 1) the indigenous knowledge: The communities were proud of sea salt farming which has been inherited since the reign of King Rama V. Their life style reflected career, language and ritual. They designed their sea salt farm with five portions: “WangNum”, “NaTark”, “Na RongCheua”, “NaCheua” and “NaPlong”. People used local materials for making their tools. The main products are salt flower and black salt 2) SWOT analysis; they were challenging in digital period. There were disadvantages on weather fluctuation, lack of business successors, lack of marketing and also technology knowledge. There were competitive advantages on produce quality and pricing. Consumers were trust of quality, and their community was strong. They created better chances by getting processed products with added value and community touring services for survival of sea salt farming community in digital economy.

**Keywords:** Indigenous knowledge, Sea salt farming, SWOT analysis, Thailand

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### Introduction

Sea Salt Farming in the past covered a huge area of three Samuts: Samut Prakarn, Samut Songkram and Samut Sakorn including Petchaburi throughout the southern part as far as Pattani. Only in Samut Sakorn the area counted to 40 Rai per person (Leupong Junthong, 2019). The natural productive period covered 6-7 months each year usually beginning from November to May of the following year. Most sea salt farmers started their harvesting from about the middle of January. This sea salt farming was highly found in the area close to the coastal areas at which its soil condition is clay; therefore, it can catch sea water to make sea salt.

It is the process of drying the sea water by dehydrating it into salt crystal. This process was called solar evaporation system. It is different from rock salt which is produced by spraying water into the salt pond in order to dissolve salt. Subsequently, the water is pumped up to be dried in the sun or boiled for salt sludge. Salt is frequently found in

the area like soil basin in the eastern part of Thailand (Supapan Muangprom, 2017).

Sea salt farming in the central part of Thailand is complicated because it applies a lot of indigenous knowledge, experience and that indigenous knowledge which has been accumulated and inherited for many generations (Department of internal Trade, 2017; Kajorn Ponimthai, 2015; Jaruwan Kumpet, 2012). They have learned that north wind would come in winter and sea breeze would come in summer. They knew how to baler water into salt field using wind power from the wind turbine which is considered to be clean energy (Tuangtong Sornprasert, 2017). In order to use folk way to crystalize sea water which contains natural salinity by applying the four natural elements: soil, water, wind and fire. The saline becomes pure white natural salt crystal rich in minerals (Kajorn Ponimthai, 2015). Salt has been produced and used since ancient time. It has been considered as one of the world old career and it belongs to Thai people. The government determined salt as a

fundamental agricultural goods according to the Bank Act for Agriculture and Agricultural Cooperatives. It is highly found in the coastal areas of the central part of Thailand because there are both wind currency and sunlight to help with crystallizing (Kajorn Ponimthai, 2015; Government Information Center of Samut Songkram, 2017; Supapan Muangprom, 2017). However, sea salt farming is still challenging in this digital economy era.

**Sea salt farming in Samut Sakorn:** Due to the fact that Samut Sakorn is a province which lies on Ta Chine river bank about 30 kilometers from Bangkok, the city slogan is “Fishing city full of factories, agricultural area and historical sights” (National Statistical Office, 2010). The old salt field on the right road faced difficulty of transporting saline. Therefore, there appeared new developed area on the left of the road. However, there was still low productivity at the beginning because the salinity was not stable (Salt route...Samut Sakorn, 2013). As a result, Samut Sakorn has lost the championship of the most salt fields and the most salt productivity to Petchaburi province.

**Sea salt farming in Samut Songkram:** Samut Songkram is a province which is about 65 kilometers far from Bangkok. It has city slogan: “City of clam, best lychee, King Rama II Park, Mae Klong river passing through and Luang Por Ban Lam Temple” (National Statistical Office, 2010). The indigenous knowledge on sea salt farming here has been applied to the career for more than 100 years, but there was a problem that people of this old career have changed to other career such as shrimp farming and working in industrial factories. The reason was that the new careers held less responsibility than salt farming. At the same time, the salt price was lower every day; therefore, it was not worth the investment. A lot of sea salt farmers decided to desert their salt field. The president of sea salt Agricultural cooperatives said in the interview that if this career was not preserved, we would lose our indigenous knowledge. It was seen that at present the sea salt farming in Tambol Bangkeaw, and Lad Yai remained only 5,000 Rai. (Chow Hengsakul, 2019).

**Sea salt farming in Petchaburi:** Petchaburi is the province about 123 kilometers far from Bangkok and its city slogan is “Khao Wang signature, dessert, Buddha city, excellent art, moral area and beautiful sea sight” (National Statistical Office, 2010). The indigenous knowledge here is shown as the main sea salt production source (Ban Lam salt field, 2017). It is located on Klong Kone -Bang Taboon-Ban Lam road. It is a shortcut road to Cha-am.

The salt fields lie on both sides of the road. Some are filled with water, but others are filled with salt in piles with men moving them to the storeroom. It is so beautiful that the tourism organization held the exhibition called “Art of salt” or “Salt sculpture” on Na-Glua- Ban- Lam road annually between March and April because it is the period that this area is full of salt and there are salt mills along the roadsides (Straddling the Salt route “Petchaburi” watching for natural surprise, 2017). However, sea salt farmers have to face the problem of marketing monopoly through the middleman.

The manager of Thai Sea “Petchaburi” Agricultural Cooperatives said that in the past years the middlemen have imported salt from India and tried not to buy salt from members of the cooperatives expecting to lower the salt price (Wiwat Pimpama, 2019).

From the coordination with government agencies: Provincial Agricultural Extension Office, Community Development Office, Thai Sea Salt Institute, and Thai Sea Salt Assembly, the researchers found that Sea salt is the product that shows both real knowledge and life style. There was a lack of perfect record on sea salt farming which is enough to be conservative data and to be published for further inheriting. The community groups have shown interest to develop business knowledge, marketing management, human resource management and knowledge on technology but they have not yet performed analysis on the current condition of sea salt farming community. In order to find guidelines on network administration of the community, the collection of knowledge about sea salt farming and the analysis of the current condition are needed to find competitive advantage and disadvantage. As a result, we would find the guidelines to promote strengths and to solve weaknesses. Subsequently, we would apply obstacles to create business opportunity based on community potential among all the fluctuations in the digital economy period.

## Literature Review

**1 . Indigenous knowledge:** UNESCO concluded that Indigenous knowledge refers to the understandings, skills and philosophies of societies with long histories of interaction with their natural surroundings. Local knowledge informs decision-making about fundamental aspects of day-to-day life of community people. It is integral to a cultural complex that also encompasses. This means language, systems of classification, resource use practices, social interactions, ritual and spirituality. These

unique life-styles of knowing are important facets of the world's cultural diversity, and it will provide a foundation for locally-appropriate sustainable development (UNESCO, 2018).

Indigenous knowledge is the knowledge and ability used for living the life in one specific place by applying intelligence to wildly accumulate knowledge, to blend all the facets in life: religion, climate, environment and career (Roj Nakruksa, 2014). Indigenous knowledge is characterized by the use of knowledge, skills, belief and behavior to convey the relationship between people, people and nature as well as people and supernatural phenomena. Therefore, it is a collective knowledge with cultural foundation which has always been adapted for social development balance in all aspects: problem solving, managing, adapting, learning to survive individually and socially (Information Center, Department of Agricultural Extension, 2009). In each locality there is knowledge which is created by local people and it becomes identity of those local people. The difference of knowledge in each locality relies on environment and life style of those local people.

In conclusion, sea salt farming knowledge can be said to mean the community knowledge of sea salt farming, living basics, language, life style, culture that shows identities under the context of sea salt farming area in the central region of Thailand.

**2. SWOT analysis:** The SWOT framework was invented by Albert Humphrey at Stanford Research Institute. He developed it for business with potential business data from more than 500 sectors by SWOT analysis. It was popularly used to assist the decision making assisting organizations of all types. The use of SWOT analysis became the first necessity for the administrators supplementary to their decision making. Therefore, the organizations need SWOT analysis to review their strategies at least once a year regularly (Berry, 2018) to understand clearly the current condition both on the internal environment factors and the external environment factors of the organizations (Berry, 2018; Rouse, 2013). This might affect the efficiency of the organizations, the production projects either place or personnel (Rouse, 2013).

The word SWOT is abbreviations of four words: Strengths, Weaknesses, Opportunities, and Threats which rise from the analysis whether the conditions of the organizations get advantages or disadvantages caused by the business environment aspects. **Firstly**, if they are

positive factors, they will render advantages to the organization or they will benefit the business implementation. If it is caused by internal environment factors, the business will be considered to have strengths, but if it is caused by the external environment factors, the business is considered to have opportunities. **Secondly**, in case they are negative factors, they will render disadvantages or they will negatively affect the business implementation. This will cause disadvantages to the organization, or they will cause negative effect to the business implementation. If it is caused by internal environment factors, the business is considered to have weaknesses, but if it is caused by the external environmental factors, the business is considered to have threats. In conclusion, this research focused on the study to analyze the business condition of Na-Gluea community business which refers to the analysis of the current condition around the year 2019. SWOT analysis gave overview of Na-Gluea community business in the central region of Thailand

### Objectives

This article is a part of the research titled "The Potential Development of Sea Salt Community Businesses for Sustainability Based on Digital Economy, Central Region of Thailand" (Yordchim & Panthura, 2019). There are two objectives as following:

1. To investigate the indigenous knowledges of sea salt farming of communities in the central region of Thailand
2. To analyze the challenges of sea salt community business in the central region of Thailand in digital economy period based on SWOT analysis.

### Methodology

This research was implemented by a qualitative research methodology to find the context and explain the phenomena with in-depth information. The research has been done according to "Certificate of Exemption in the consideration of Research Ethics as certificate number COE.2 -0 0 3 / 2 0 1 9". The authors started the study the secondary sources: research articles, forums, books, texts and related literatures. Subsequently, they gather primary information by visiting the community. Key methods contained in-depth interviews, participation observations and focus groups in sea salt communities of three provinces in the central region which were the targeted areas.

Research participants were the key informant participants who were willing to give information consisted of 27 people selected from sea salt farm owner, folk philosophers, and members of the community cooperatives. The focus group focused the community participation from three provinces. There were 30-40 persons from each time. The target groups were important knowledgeable persons from government and private sectors including 120 people from sea salt community business stakeholders: all levels of upstream, midstream and downstream business. The participants were selected by purposive samplings from sea salt farmers, elderly in community, government officers, academicians and members of the community cooperatives. Therefore, there were totally 387 participants in this research.

The tools used in this research consisted of human instruments or the research team who must work on collecting data and also interpret it. The data collecting tools consisted of Semi-structural interview form, record form, digital data logger, field notebook, digital camera and flash drive.

After obtaining data which were in the forms of description, message, picture and all information, they were interpreted and organized by using the content analysis together with constant comparison according to

the collected facts. The main issue of the information had to be triangular checked. After summarizing them, the presentation report was prepared in prose description (Panthura, 2019) together with Figures and comparison tables.

### Research Findings

The findings according to the research objectives were presented as follows:

1. Indigenous knowledges of sea salt community in the central of Thailand:

1.1 Sea salt farming is a career founded by King Rama V for Thai people by providing a piece of land of about 2000 Rai which is on the west of Wat Bang ya Praek on November 25, 1921 due to the fact that it is appropriate for sea salt farming. At the same time that King Rama V gave this piece of land Khun Samut Maneerut was also promoted this rank. His original name was Mengha Maneerut. He was born on August 20, 1879. At the time when he was given the land, he worked for a special committee of Samut Sakorn province. (Department of Cooperative Promotion; an important person of Samut Sakorn province, 2017) For this reason, sea salt farmers in Na-Glua community obviously value sea salt farming highly (Leupong Juntong, 2019; Wannajit Sintakerd, 2019).

**Table 1:** Sea Salt Production Sources in Thailand

Source	Area	Province of Sea Salt Producer
Fine Arts Department, 2001	4	Samut Sakorn, Samut Songkram, Samut Prakarn and Petchaburi
Department of Internal Trade, 2017	3	90% produced in Petchaburi, Samut Sakorn, Samut Songkram, and 10% produced in Choburi, Juntaburi, Chachuengsao and Pattani
Government Information Center, 2017	3	Samut Sakorn, Samut Songkram and Petchaburi
Jutamas Taklaewpan, 2019	3	Petchaburi, Samut Sakorn, Samut Songkram: Main area
Ketkaew Sampaotong, 2019	7	Main area- Samut Songkram, Petchaburi, Samut Sakorn Secondary area- Juntaburi, Pattani, Choburi, Chachuengsao
Luepong Juntong, 2019	5	Samut Sakorn, Samut Songkram, Petchaburi and Pattani also Samut Prakarn in the past
Wiwat Pimpama, 2019	3	Petchaburi and Samut Sakorn have a lot, but Samut Songkram has less

**Source:** Compiled from the above sources

It was found from the finding that sea salt farming in the central region has changed as shown in Table 1. In the past there were four provinces that were main sources of sea salt farming (Fine Arts Department, 2001) Secretary of the Thai Sea Salt Farmer Federation indicated that there were only 7 provinces in Thailand producing sea salt. The most were in the central region: Samut Songkram with 55,000 Rai. 80% of which were rented;

Petchaburi with 36,000 Rai; Samut Sakorn with 21,000 Rai. All three provinces could produce totally about 992 million kilograms. Moreover, the sea salt here was considered to be from deep-sea brine with higher salinity than those from other provinces: Juntaburi, Patani, Choburi and Chacheungsao. However, there was only small amount of production. The overview marketing value of Thai sea salt was about 1,800-2,000 million baht

a year. (Ketkeaw Sampaotong, 2019). The sea salt production weighed about a little more than one million tons each year. It was worth about 1,000 million baht. Petchaburi can produce more than 60%; secondly, Samut Sakorn 30%. The rest was from Samut Songkram (Department of Internal Trade, 2017).

1.2 Community life style: Salt has been very binding to life style. Therefore, sea salt farming was a culture that could reflect life style of people. On the aspect of male career, the income could support the family. According to the statement, “woman spins cotton thread, but man

makes salt” It is noticeable that at present there are more female than male; as a result, there is a lack of male labor, so sea salt farming faces male labor shortage. For this reason, sea salt farming uses both male and female labor. Woman, as a result, has more chance of sea salt farming. On the aspect of language, it is seen that Thai people are poetic; therefore, “salt” is brought into use in the life style appearing in idiom, proverb and metaphor to reflect the life living compared with the property of salt both positively and negatively. The writer has collected some of them from the interviews and group conversations and related literature found in the research as shown in Table 2.

**Table 2** “salt” and language lifestyle

“salt” in Thais Idiom (Romanization)	Meaning	Attitude
จงรักษาความดีดุจเกลือรักษาความเค็ม chong raksa khamdi dut gleua raksa khamkem	Live the life by always doing good	Good
กัดก้อนเกลือกิน kat kon gleua kin	Life when in difficulty	Not good
ใกล้เกลือกินต่าง klai gleua kin dang	Do not value those being nice to us	Not good
เกลือจิ้มเกลือ gleua chim gleua	Fight back equally	Good
เกลือเป็นหนอน gleua pen noon	There is someone unfaithful in the group	Not good
แกงจืดจึงรู้คุณค่าเกลือ kang chuet chueng ru khun gleua	Value something after losing it	Good
ข้าวเหลือเกลือชิม khaw luea gleua im	Live the life where there is plenty of food	Good
ขวัญข้าวเท่าหัวเรือ ขวัญเกลือเท่าหัวช้าง kwan khaw tao hua ruea, kwan gleua tao hua pae	At the ritual “Kwan Gleua”, there is plenty of offerings	Good

**Source:** The researcher compiled them from (Thai knowledge on sea salt farming, 2009; Na Gluea Learning Center, 2013; Tuangtong Sornprasert, 2017; Supapan Muangprom, 2017; Boonprod Jaroenrit, 2019; Pramote Chao Muang Kong, 2019)

community: local Thai, migrant, Thai-Chinese, Thai-Lao. For this reason, there were many specific words being used among the sea salt farmers; for example, they called the salt field “anna”, or Kratong, Yak nam, Lue, Ladna Lob Yai Gleua/Ruer Gleua as shown in Table 3.

It appeared that many languages (plurality) were being used in the area because there were many races in the

**Table 3:** Vocabulary to know for live style in Na-Gleua agricultural community

Vocabulary	Meaning
Anna or Kratong	“Plang Na” or a field with ridges dividing it into 6-8 kratong of smaller pieces
Yak Nam	To “Yak Nam” is to dig passages for water to flow as directed
Luer	One “Luer” means one barn of salt harvested from the field
Lad Na	To push water into the field/let brine drench the field to the determined level before drying it for 10-15 days
Tod Na	To drain water out or irrigate brine and let it dry for 3-4 days
Lob	After drying the field until the soil is not sticky to the feet, roll it thoroughly normally twice.
Na krak/ Na taek	There are two characters 1) “Na Taek” of dry type shows cracks which are big enough for the



finger to go in. This means the fresh water can seep in 2) Na Taek in which water from underground spring up and it has very bad smell. Na Krark happens because salt was collected too many times or underground water is dirty. As a result, the soil in the field is damaged. This field cannot yield productivity because it is contaminated.

Yai Gluea/Luer Gluea It is the harvesting or the sweeping of salt crystal from the field which sometimes is called "Lue Gluea".

**Source:** The researcher compiled them from (Tuangtong Sornprasert, 2017; (Thai knowledge on sea salt farming, 2009; Na Gluea learning center, 2013; Supapan Muangprom, 2017; Boonprod Jaroenrit, 2019)

The rituals contain cultural plurality according to the belief of the Thai-Chinese, the Thai- Buddhist, the Thai-Cambodian including cultural roots according to Buddhism and Taoism which pays respect to spirit the same as the West culture that set up Halloween night. Na Gluea community celebrate 4 main rituals to promote morale with a lot of offerings.

Moreover, they believe to respect house Goddess, and they settle up shrine to house spirit of the death: 1) "Rack Na Gluea" ritual before preparing the soil, 2) "Tam Kwan Na Gluea" ritual before and after the harvest, 3) Salt barn opening ritual 6-12 months after keeping salt product in the barn, and 4) Crack treading opening when having problem of Na taek or Na Krark.

### 1.3 Knowledge on Sea Salt Farming Design

Sea salt farming according to indigenous knowledge has been obtained from sea salt farming community in the Central region of Thailand. There are two types categorized by the area condition: One is "Na Yeun" with straight wide area, but switched farming "Na won" with winding area. The standardized sea salt farming needs the area not less than 25 Rai because it needs a vast area to dry water. The area is divided by clay ridges. Sea brine is pushed in by wind power. The brine is evaporated by solar power for more salinity. It spends about 20-30 days for brine to crystalize and becomes sea salt.

There are some differences between indigenous knowledge of sea salt farming in different areas in the aspect of names and steps. However, most sea salt farms have similar planning of the field starting from "Wang Nam", "Na Tark", "Na Rong Cheua", "Na Cheua" and "Na plong" The main production is sea salt which is crystalized as layers in "Na Plong" It can yield production of 4-9 tons per Rai or 2.5-6 kilograms per one square meter. Main production of sea salt farming is salt flower, white salt, medium salt and black salt. Besides, in each process there are by-products from sea salt farming.

Those are from sea salt field which is called "Kee Dad Na Gluea", gypsum or "Gluea Jerd" and Epsom salts or "Dee Gluea" as shown in Figure 1 and Table 4.

On the aspect of sea salt farming process, there might be a little difference between each farming area. Some follow 5 steps of farming techniques ( Panthura & Nimpinij, 2020). From studying main issue in the community (Na gleua learning center, 2013; Umnuaay Poonsuk 2019), it can be concluded as follows:

In the preparation for sea salt farming field, around the end of rainy season about November, the rain can help soaking the soil before levelling the area with roller made of wood about two meters long with 50 centimeters in diameter and about 100 kilograms in weight. Water passages were dug for water irrigation from the field to the sea for about 4 kilometers long. Subsequently, equipment such as water turbine, baler machine and others are set up.

1) Water retention: Sea salt farmers start filling brine from "Lam Pradong" into "Wang Nam" or "Na Wang", and later on sewage waits to silt.

2) To dry brine: Brine from "Wang Nam" is drained to "Na tark" or "Na pratieb" to expose to sunlight for drying.

3) To wait for salt germ or to wait for salt to crystallize: Sea salt farmers drain water from "Na Tark" into "Na Rong Cheua" to add salinity and concentration for salt to get germ in 2-3 days. Subsequently, water is drained once again from "Na Rong Cheua" into "Na Cheua"

4) To wait for salt to crystalize or "Plong Na": This is done by draining water with appropriate salinity into "Na Plong". In order to stimulate salt crystal to be beautifully white and become bigger in quantity, the field ground needs to be compacted well for salt to crystallize in 10-15 days. When salt becomes one inch thick, it can be "Ruer" or swept.

5) To harvest the product or "Ruer gleua": It starts by using rake or "Kata Ruer" to gouge out salt then line up the salt piles with another kind of rake or "Kata Taew" Next, with another kind of rake "Kata Sum", salt is piled up like pyramids to dry up salt without too much

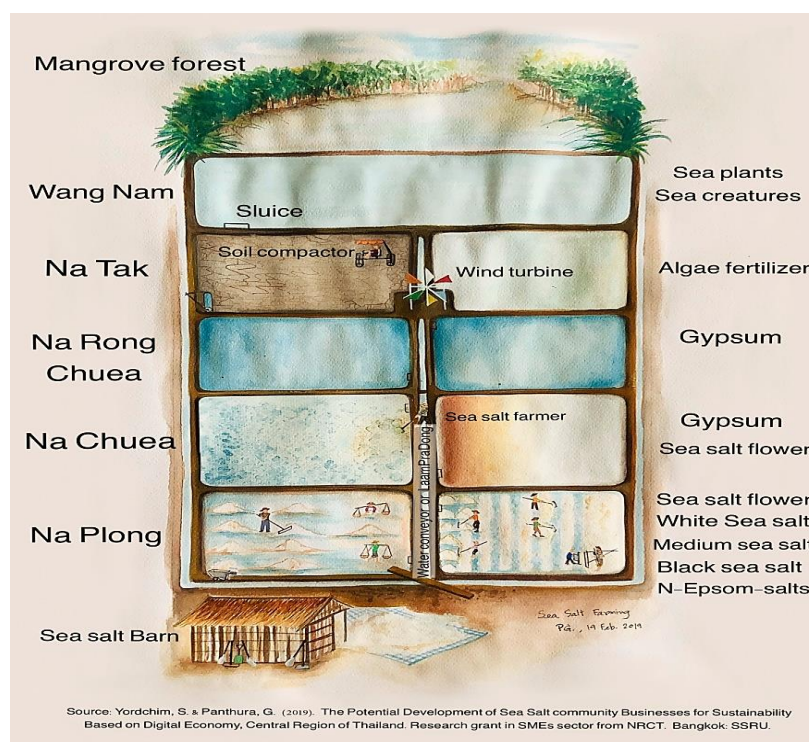
remaining water. After that, salt is loaded to the barn or the storeroom waiting for sale.

“Lan Gleua” to eliminate humidity, and salt is loaded to

**Table 4:** Names of the area, task, salinity and products from each field according to sea salt farming indigenous knowledge

Name	Task	Salinity Bome degree	Product
“Wang Num” or “NaKang”	A bigger area where saline is pushed in with water transplanted through “Lum Pradong” or man-made water passage	Less than 5 degrees or soft water	Natural aquatic animals/ aquatic plants
“NaTark” or “Na Pratieb” or “Na Pair”	From “WangNum”, saline is transferred into “NaTark” which is about 6-7 centimeters higher to be dehydrated and wait for sewage to silt.	6-10 degrees	“Kee Dad Na Gleua”
“Na Rong Cheua”	This area support water from “NaTark” to dehydrate saline for higher salinity. Salt is processing to crystalize.	18-20 degrees	Gypsum or “Gleua Jerd”
“Na Cheua” or “Na dok”	It is the area where salt appears for the first time, so it is called “NaCheua” which is the area where the water from “NaTark” is dried by solar power for higher salinity until it reaches the saturation point	22-25 degrees or old water	Gypsum, Sea salt flower
“Na Plong” or “Na Wang”	The saline from “NaCheua” is dried for increasing salinity to encourage salt crystal. The soil in this area must be compacted well waiting for salt crystal.	25-28 degrees	salt flower white salt medium salt black salt N-Epsom-salts

**Figure 1.** Indigenous knowledges of the sea salt farm design, Thailand



Source: (Yordchim & Panthura, 2019)

Figure: Panthura Gallery

#### 1.4 Sea salt farming tools

Na gluea community has applied knowledge by using available and easy to find local materials for sea salt farming tools focusing on materials that are strong and durable. Moreover, they should be corrosion resistant from salinity of sea salt such as tamarind wood, red wood, bamboo and Taboon wood and other materials such as those made of stainless steel, fiber glass, and PVC pipe. The necessary tools for main work are as follows: 1) “Kata” is used for hoisting, and piling up salt 2) “Tao” for shoveling soil or salt 3) Shovel for digging 4) “Erun” for

breaking salt crystal 5) “Ngure” for lining up salt 6) Post and wicker basket or cart for moving salt 7) Mercury for measuring salinity of water in the field 8) Wind turbine and water turbine for transferring and loading water 9) Roller or roller machine for compacting soil, and 10) Barn/salt store room to keep salt for sale. It is noticeable that sea salt farming community considered better administration in order to reduce working time. Therefore, more technology has been brought into use; for example, water pump replaced water turbine; and roller machine replaced ordinary roller shown at figure 1.

**Figure 2.** Sea salt farming tools in the past and those at present





Roller by human labor



Machine roller presently working by motor



Wind turbine and water turbine working by wind power



Wind turbine is a tourist check point



carrying salt using pole on shoulder



carrying salt by cart

Source: Panthura, Gallery

2. The analysis result about business condition of sea salt farming community was obtained by applying SWOT analysis. It was found by entrepreneurs and stakeholders that in overall picture, sea salt business still has to face

high challenge of self-adaption to the changing environment. The reason is that most entrepreneurs have held family business of which the target focuses more on

business sustainability for the next generation than marketing for big business. In other words, it means:

2 . 1 The positive business conditions of sea salt community obtain competitive advantage, or it affects good result to the business grouped as 7 strengths and 6 business chances. Therefore, it can be concluded that the business of sea salt community still has business potentiality because of the sea salt quality, the cheap price and the confidence of consumers towards quality of products.

2 . 2 The negative business conditions of sea salt community which have competitive disadvantages might affect the 13 weak points of business implementation and 10 threats towards the business. It can be concluded that business of sea salt community is affected by high fluctuation of climate change, shortage of business successors as well as the lack of marketing and technology knowledge. As a result, these factors become the cause of increasing competitors.

## Discussion

From the findings on sustainable potential development of sea salt community based on digital economy in the central region of Thailand, the researcher concluded about the result from main issues as follows:

1 . It was clearly seen from sea salt farming context, the farmers felt cherished, and they loved their profession. It might be because this career was founded by King Rama V. The distinguished remaining of sea salt farming area is in three provinces: Petchaburi, Samut Sakorn and Samut Songkram (Department of Internal Trade, 2017, Samut Songkram Provincial Government Information Center, 2017; Wiwat Pimpama, 2019). Sea salt community has still applied indigenous knowledge in farming relying on wind power and natural sunlight in salt production (Leupong Junthong, 2019; Ketkaew Sampaathong 2019; Wiwat Pimpama, 2019) Nowadays only in Petchaburi that we can find human labors carrying salt with post and baskets (Juthamas Takaewpan, 2019; Umuay Poonsuk, 2019). It was noticed that sea salt farming community was adapted to business community. Sea salt farmers have gathered in groups for salt trading business in the form of cooperatives. There has been adaptation to survive amidst the changing trends of transportation, economy and decreasing farming area.

The study result corresponded to the research result. It was found that sea salt farming was affected by the

decrease of farming area. (Supaporn Samae and Wirinthorn Aksornnit, 2014). Moreover, some research found that numbers of sea salt farmers have been decreasing. There should be a coordination to conserve indigenous knowledge of sea salt farming which can be in the form of cooperatives. There should be a network to promote transferring knowledge of sea salt farming from parents and experts to the new generations as well as setting up cooperatives (Siriporn RungReung, Ekachai Tanad Dern Kao and Laddawan Yam Ubon) It was found that at present Samut Sakorn Provincial Culture Office values sea salt farming as a component of culture roots (Pramote Chao Mueng Kong, 2019).

As already stated, every sector should participate in promoting the conservation of this career to be with Thai people before the complete extinction. This career is a folk process, and natural sea water is used as raw material. Sea salt farming area contains salt marsh which also acts as a buffer zone.

2. The community life style: Sea salt farming occupation is a culture that reflects male career for family welfare, while weaving is the culture reflecting female for family care taking. Women spend their spare time weaving for clothing. This shows that salt binds closely with life style of many people on their career, food and life style of community.

The study result corresponded to the article which stated that salt has unceasingly been a factor essential to human life since the past until present. People need to use salt both in consumption and necessities either in cooking, preserving food or being medication. Therefore, it could be said that human life could not lack salt (Supapan Muangprom, 2017). Moreover, salt could convey understanding about relationship in society, family and economy (Jaruwan Kampet, 2012). This statement corresponded to study result titled "The inheritance and development of rock salt production". Moreover, it was found that the new generation are not interested in rock salt producing career with the thought that this career is too hard and tiring. As well as the article on the guidelines for sea salt farming career promotion: a case study of Tan Yong Lu Lo community in Tambol Tan Yong Lu Lo, Umphur Meung, Pattani Province (Supaporn Samaelae, Wirintorn Aksornnit, 2014), it was found that there were changes on value and knowledge of salt farming because it is not popular to the youth at present.

3 . On the aspect of language culture, Thai people are poetic; as a result, many words of "salt" is brought into

use in life in the form of idiom, proverb and metaphor to reflect the way of living by the property of salt both positively and negatively. This corresponded to the writer's compilation from interviews with well-informed persons and group conversations (Boonplod Jaroenrit, 2019; Pramote Chao Muang Kong, 2019 and related literatures (Thai knowledge on sea salt farming, 2009; Na Gleua Learning Center, 2013; Tuang Tong Sorn Prasert, 2017; Supapun Muangprom, 2017, 2019). As well as the article online of Sri Nakarintrawirote University titled "Salty as sea salt: sea salt farming with indigenous knowledge" which wrote that Thai people were acquainted with salt either in the aspect of cooking or many idioms on "salt" (Jaruwan Kumpetch, 2012).

4. Rituals of sea salt farmers: It was found that people held rituals to create morale with a lot of offerings, paying respect to the Goddess as well as shrines housing the souls of those who have passed away. This corresponded to the beliefs of sea salt farmers in the community (Leupong Junthong, 2018; Tum Kwan Gleua ritual, 2019; Boonplod Jaroenrit, 2019). There are 4 main rituals: 1) "Raek Na Gleua" ritual before preparing the area 2) "Tum Kwan Na Gleua" ritual before and after sweeping salt 3) Salt storeroom opening ritual after keeping salt in the storeroom for 6-12 months and 4) Stepping on the crack ritual when there is problem of "Na Taek/Na Krak". This research result found in the article titled "sea salt...at Samut Sakorn" (Supapun Muangprom, 2017) Those rituals that create morale are "Raek Na" ritual, "Tum Kwan Na Gleua" ritual, Salt storeroom opening ritual and Stepping on the crack ritual. Similar to Online video titled "sea salt farming at Mae Glong" produced by Samut Songkhram Educational Service Area Office, it concluded that sea salt farming rituals that contain culture about creating morale since the past until present were "Raek Na Gleua" ritual, "Tum Kwan Na Gleua" ritual and Salt storeroom opening ritual (Surin Ratanasitorn, 2009).

5. Sea salt farming tools: They have learned from their collective knowledge to choose tools made of available local materials which are easy to find focusing on materials that are hard and durable. They should be corrosion resistant materials against salinity of sea water such as tamarind wood, red wood, bamboo and Taboon wood. Some are made of stainless steel, fiber, and PVC pipe. It is noticeable that from the knowledge of sea salt farming, farmers make use of what they can find in the community. However, they also adapt to use modern items which are more expensive. For example, they use roller machine in place of human-laboring roller; water

pump in place of wind turbine and water turbine including using mercury in place of skilled sea salt farmers (Nai Na) who could tell salt concentration just from using their finger feeling the water or from the observation of salt stain on the field edge. Moreover, they could tell water concentration by lower a lump of rice into water. If it sinks, that means the water is not old enough. If it floats, it means the water is concentrated enough for salt to crystalize. It can be concluded that there have been changes about their value and knowledge such as human laboring, funding, tools and skills in sea salt farming. This corresponded to the research result which found that a large salt production source in Thailand in Petchaburi where they have used the inherited method by indigenous knowledge has changed their production process, production area ownership, and production inheritor (Jaruwan Kumpetch, 2012). There was also a consistency with an article titled "Guideline of sea salt farming promotion: a case study of Tan Yong Lu Lo community, Tambol Tan Yong Lu Lo, Umphur Mueng, Pattani province" which found that value and sea salt farming knowledge have changed such as their sea salt farming tools and the neatness of farming. Moreover, at the present time sea salt farming is not popular any more.

6. There are some differences on sea salt farming in each province. However, naming and sequencing of most farms are alike. That is to say, the design of each salt farm starts from "Wang Num", "Na Tark", "Na Rong Cheua", "Na Cheua" and "Na Plong". There is a consistency with the result of a research titled "Identity and Technique of Sea Salt Farming at Khok Kham Community (Panthura & Nimpinij, 2020) which found that the sea-salt farmers used similarly five steps techniques: the farm preparation, the sea water retention, the drying portion, the stimulation of salt crystallizing and the harvesting".

There are two characteristics of sea salt farming according to its area characters: "Na Yeun" and "Na Won". Each standardized sea salt farm needs not less than 25 Rai because it needs large area to dehydrate water. The area is divided into portions by clay ridges. Wind power is used for transferring sea water. Solar power is used for water evaporation to the appropriate concentration. It spends about 20-30 days each round for the crystallization. The main production is the salt crystal for an average of 4-9 tons per one Rai or 2.5-6 kilograms for the area of one square meter. There are 4 main characteristics of salt production: salt flower, white salt, medium salt and black salt. Besides, each sea salt farming process can yield extra



income in the form of by-products as well. Those by-products are “Kee Dad Na Gleua”, gypsum and good salt.

From study result as stated above, there is a consistency with the secondary data (Department of Internal Trade, 2017; Supapan Muangprom, 2017; Jaruwan Kumpet, 2012) together with in-depth interviews according to the qualitative research process with folk philosophers, President of Bangkok Cooperatives, Samut Sakhon Province Company Limited, sea salt farmers and well-informed person of sea salt farming (Leupong Junthong, 2018; Jutamas TaGleawpun, 2019; Boonplod Jaroenrit, 2019; Sompit Junthong, 2019; Sunisa Raudpisa, 2019; Umnuay Poonsuk, 2019)

7 . Analysis result about business condition of sea salt farming community using SWOT analysis found that

7 .1 On competitive advantages: Sea salt community business still obtains business potentiality because of product quality and rather low price. Moreover, consumers are confident of the product's quality. This research result corresponded with the research performing analysis on marketing management condition of a small business on pottery products in the community. It found that the strengths would be obtained under the following conditions. The product has clear identity, high quality, beautiful color, durability and reasonable price which is set according to the market price. Therefore, marketing chance will remain good if consumers accept the product quality ( Yordchim, Jasuwana & Panthura, 2015 ). In addition, it corresponded with an article in AIMS Journal of Research titled “Marketing Strategies in Woven Fabric Community Business of Thailand Central Region: Marketing Factor and Purchase Intention”. This business community research result also found that *the sustainable woven fabric business should define product strategies, social value strategies, and place or marketing channels strategies to increase purchase intention of consumers.* (Panthura & Jasuwana, 2017).

Besides, the community is strong with coordination in the form of cooperatives creating business chance of selling sea salt accompanied with sea salt farm tourism service which set up the salt route and sea salt cafe coupled with added value products. Therefore, added valued products can bring increasing benefit back to the community.

7 .2 On competitive disadvantage: Sea salt farming community business was affected by high fluctuation of climate change, lack of inheriting business successors as well as lack of marketing and technology knowledge

which cause increasing competitors. Result of this research corresponded with the study which found that after studying about problems and obstacles of sea salt farming in Samut Sakorn and nearby provinces since the past up to present, it revealed that sea salt farming has faced decreasing price. In addition, farmers also have changed their attitude from working hard to working comfortably, and labor wage of sea salt farming has risen. (Siriporn Rungreung Ekachai Tanad dernkao and Laddavan Yam Ubol, 2015) As well as analysis on marketing management condition of a small business on pottery products in the community (Yordchim, Jasuwana & Panthura, 2015), it was found that there were weaknesses on the lack of marketing knowledge, lack of product development design, and very high labor cost. While the obstacles were high competition, available replacement products, decreasing of main raw materials and decreasing buyers. In addition, market became narrower. The entrepreneurs should accelerate pottery product development to serve various use and products should be contemporary with the new generation.

### Limitations and Directions for Future Research

This study is a cross-section research around 2019. If the research result is brought to use in different period, changing environment should be considered. Government and private sectors should coordinate conserving sea salt farming knowledge and made further development for the new generations with accessible media according to behaviors of digital period such as online media and infographic which are modern media coupled with promoting this content into the curriculum in local schools. Moreover, a learning center of sea salt farming should be set up formally. Activities should be organized for sea salt farmers, entrepreneurs in the community, community enterprise entrepreneurs of all business levels: up-stream, mid- stream and down-stream to be able to adapt themselves in implementing business under the concept of modern marketing focusing on targeted consumers consistently with competitive advantages such as the development of various processed products from sea salt. There ought to be dissemination on the difference between sea salt and rock salt to the consumers.

In the future there should be a study of more sea salt products in other aspects such as those in other regions or other targeted groups, etc. The main suggestion focused on a clear marketing dissemination to consumers showing benefit of sea salt which is a natural product.

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