

# Strategic Planning for Capacity Building Production and Salt Farmer in Region of Surabaya City East Java Indonesian

Bagiyo Suwasono<sup>a\*</sup>, Ali Munazid<sup>b</sup>, Sapto J. Poerwowidagdo<sup>c</sup>, Ahmad Najid<sup>d</sup>

<sup>a</sup>*Faculty of Engineering and Marine Science, Hang Tuah University, Surabaya 60111, Indonesia*

<sup>a</sup>*Faculty of Engineering and Marine Science, Hang Tuah University, Surabaya 60111, Indonesia*

<sup>c</sup>*Faculty of Social and Political Science, Hang Tuah University, Surabaya 60111, Indonesia*

<sup>d</sup>*Ministry of Coordinating Field Maritime, Jakarta, Republic of Indonesia*

<sup>a</sup>*Email: [bagiyo.suwasono@hangtuah.ac.id](mailto:bagiyo.suwasono@hangtuah.ac.id)*

<sup>b</sup>*Email: [ali.munazid@hangtuah.ac.id](mailto:ali.munazid@hangtuah.ac.id)*

<sup>c</sup>*Email: [spoerwowidagdo@hangtuah.ac.id](mailto:spoerwowidagdo@hangtuah.ac.id)*

<sup>d</sup>*Email: [najidbawean@gmail.com](mailto:najidbawean@gmail.com)*

## Abstract

Currently Indonesian society's view of the activities considered as industrial salt production less profitable and does not require any skill level. Survey activity is conducted in the North Surabaya City. Determination of the strengthening of the model strategy using SWOT-AHP combined method with involving respondents from salt farmers, landless, Department of Agriculture Surabaya. The results showed that the strengthening of the strategic plan which will be progressively is Comparative Advantage Strategy, where the implementation of the plan to strengthen the productivity of salt and salt farmers in the Surabaya City, include: (1) Method innovation of Maduris plus in the production of salt land, (2) salt purification technology innovation of the people through appropriate technology, (3) the ability to diversify the products of salt, including salt, salt of various food, molten salt and the salt industry, and (4) the ability to access working capital through the strengthening of cooperative salt Surabaya.

**Keywords:** production of salt; salt farmers; SWOT-AHP; strengthening strategy

---

\* Corresponding author.

E-mail address: [bagiyo.suwasono@hangtuah.ac.id](mailto:bagiyo.suwasono@hangtuah.ac.id)

## **1. Introduction**

The nature of the salt or sodium chloride is a white crystalline powder with a system or isomeric cuboid, the molecular weight of 58.45 gr/mol, and soluble in water (35.6 g /100 g at 0 °C and 39.2 g/100g at 100 °C). The salt is soluble in alcohol, but insoluble in concentrated Hydrochloric acid, melting at a temperature of 801 °C, and evaporates at temperatures above the boiling point (1,413 °C). Hardness 2.5 scale MHO, the specific gravity of 2.165 g/cm<sup>3</sup>, odorless, non-flammable and low toxicity, and has a hygroscopic nature so that it can absorb water from the atmosphere at humidity of 75% [1].

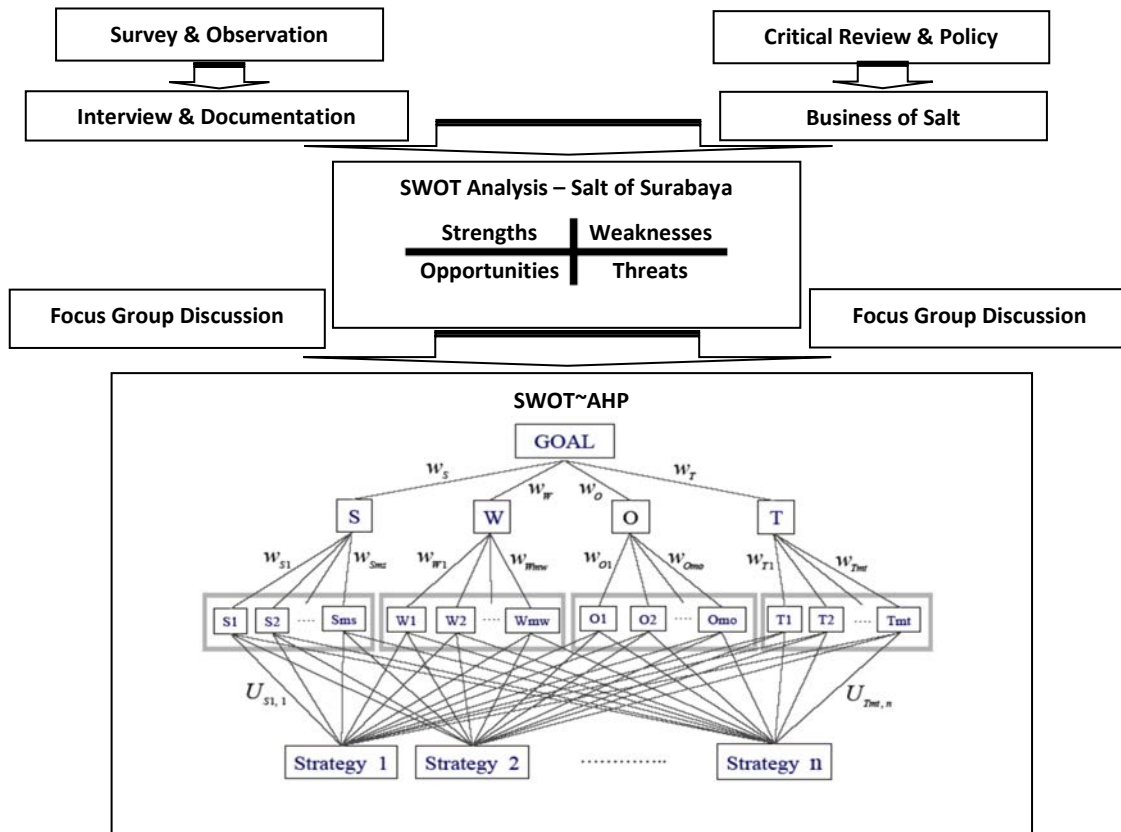
While natural salt according to the Salt Institute [2] will always contain compounds Magnesium Chloride, Magnesium Sulfate, Magnesium Bromide, and other trace compounds, so that the color of salt in addition to transparent crystals can also be yellow, red, blue or purple. Salt widely used in various products and estimated around 14,000 products using salt as an additive

For community development activities salt farmers Surabaya East Java Indonesia through joint venture group (KUB) will require a method of processing and more advanced equipment to help accelerate the process of production and post-harvest. In addition, the general public views on current conditions indicate that salt production is regarded as unfavorable industry because it does not require any skill level. This view of the fact; there is growing especially when associated with the processing of sea water into the salt by salt farmers with conventional evaporation technology with little use of scientific principles that qualified. This custom is based on the state of nature and relaxation to produce a product that has not reached the provision of quality and inequality results obtained. This is a challenge for us all, how to change people's habits salt farmers of control that is natural to be controls that apply scientific principles in the context of production and post-salt products.

## **2. Materials and Methods**

Applied research that using SWOT (acronym of strength, weakness, opportunity, and threat) and AHP (acronym of analytic hierarchy process) analysis technique. Location of the research are in 4 (four) districts (Asemrowo, Benowo, Pakal, and Tandes) in the Surabaya City and the focus of research in the Village District of Benowo Romokalisari with consideration will reach 360.70 Ha of land area, the presence of sea water source, and the ease access from the main road.

On the other hand, AHP is an analytical tool with multi-criteria decision that uses mathematical methods both qualitatively and quantitatively to analyze complex decision problem [3]. Application of AHP in SWOT analysis method can help decision maker to select alternative and strategies that have been provided from the results of SWOT analysis [4]. In order to improve performance of the use of SWOT analysis, AHP method can be combined with SWOT analysis [5,6], so that a new hybrid method that provides objective weighting can be obtained.



**Figure 1:** Conceptual framework

According to Osuna [7] that the combination of factors SWOT-AHP is a hierarchical structure for the use of the strategic planning process based on SWOT studies, as well as the use of quantitative techniques to estimate the efficiency of an ideal strategy for each of the proposed strategy.

### 3. Results and Discussions

#### 3.1. Land area

Surabaya is one of the buffer salt producers in East Java, while the largest salt producer in Madura Island, represented by Sampang and Sumenep. The salt produced in the Surabaya City in production by the local community with the dominant land management that varies 1 to 5 Ha and some are managing to 10 Ha.

Based on Figure 2 and Table 1 shows that the vast expanse of salt land for the District of Benowo (represented by the Village of Tambak Osowilangun of 398.04 Ha and Romokalisari of 360.70 Ha) has a land area that is large enough, i.e. 976.58 Ha with a total production of salt reach 55,109.51 Tons, whereas the lowest in the district of Tandes represented Village of Buntaran with a land area of 51.65 Ha.

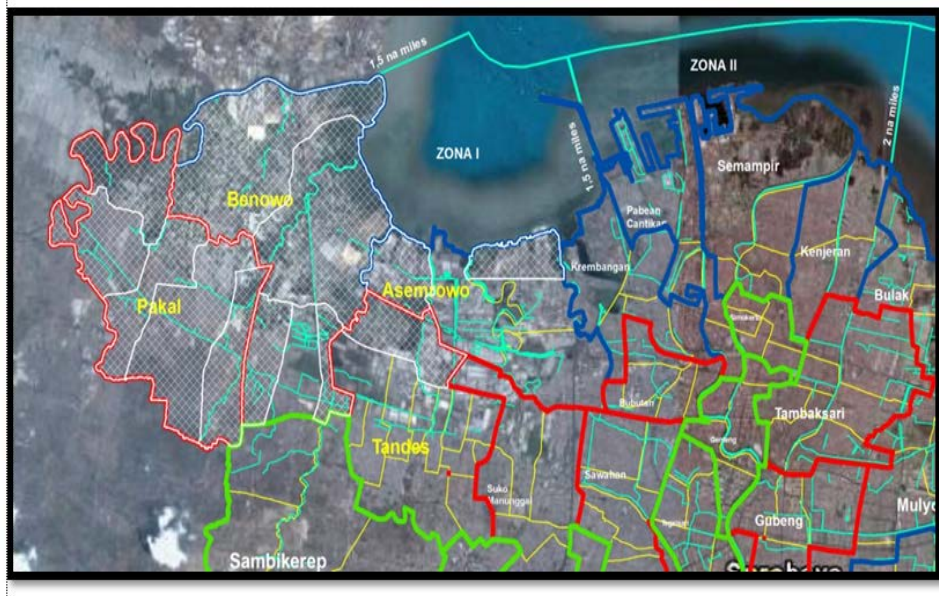


Figure 2: GIS: Salt of Surabaya City - Indonesian

Table 1: Land area salt and salt resources raw materials in 2011

No	District	Kind of Land	Village	Area (Ha)	Raw Material
1	Pakal	<ul style="list-style-type: none"> <li>Alluvial</li> <li>Deposition from silt the river</li> </ul>	Pakal	113.19	River
			Sumberejo	61.29	River
			Tambakdono	101.48	River
			Babat Jerawat	73.71	River
			Benowo	19.94	River
<b>Sum-1</b>			<b>369,61 Hectares (14,712.27 Tons Salt)</b>		
2	Benowo	Instead of volcanic ash	Tambak Osowilangun	398.04	Seawater and River
			Romokalisari	360.70	Seawater and River
			Sememi	107.25	River
			Kandangan	110.59	River
<b>Sum-2</b>			<b>976,58 Hectares (55.109,51 Tons Salt)</b>		
3	Asemrowo	Alluvial	Tambak Langon	84.80	Seawater and River
			Kalianak	7.54	Seawater and River
<b>Sum-3</b>			<b>92,34 Hectares (3.649,78 Tons Salt)</b>		
4	Tandes	<ul style="list-style-type: none"> <li>Alluvial</li> <li>Instead of volcanic ash</li> </ul>	Buntaran	51.65	River
<b>Sum-4</b>			<b>51.65 Hectares (4,208.93 Tons Salt)</b>		
<b>Total (sum 1~4)</b>			<b>1,490.19 Hectares (77.693 Tons Salt)</b>		

Source: Department of Agriculture Surabaya and GIS of salt

Conditions of land management status of salt in the Surabaya City showed that 86% of the salt land management is a form of rent from investors who have mastered the salt lands in the Surabaya City, whereas for ownership of property rights only live 14%.

Embankment on the channel conditions and salt land people in the city of Surabaya is strongly influenced by the results of the salt that has been produced. In the primary water channel showed as many as 27% of farmers stated damaged by conditions due to silting and backfill process undertaken by investors, while the channel of secondary, tertiary and Embankment in good condition (damage  $\leq$  10%).

To access the situation of land salt product distribution to the paved main road still had access between 200 meters and 1,000 meters at 43%, whereas only 6% of land that is less than 100 meters. This caused the high cost of transporting crops to shelters.

### ***3.2. Capital enterprises***

There are two main sources of capital in the salt business people in the city of Surabaya, namely Equity (58%) and loans from collectors (38%), very little salt Farmers associated with banking in terms of capital adequacy. Loans to collectors are an alternative of first choice when farmers are not able to provide their own capital. Facts on the ground that shows loans to collectors do not bear interest as the Bank, but the payback will be done when there is a salt that has been harvested. Harvested salt purchased by collectors as well as a capital loan payments.

### ***3.3. Salt production***

By using traditional production methods shows the level of salt production capacity of 2011 - 2013 in the city of Surabaya ranged between 69.000 Tons per Ha (3 months for one season) – 141.000 Tons per Ha (5 months for one season). These variations indicate that the longer the period of the dry season, the higher production capacity and productivity levels of salt. On the other hand there is no touch to the strengthening of technology and scientific principles to the production process in the salt lands in the city of Surabaya.

For the quality of salt produced by Salt Farmers are 2 Quality and Quality 3. It is known that 51% of farmers choose to produce quality salt 3, and 48% of farmers choose to produce quality salt 2. This is because the buyer salt Surabaya people do not distinguish quality the resulting salt. That addition to producing quality salt 3 production quantities of salt more than manufacture quality 2 or 1.

Sack needs to be very important because of the salt that has been harvested should be immediately transferred into a sack, where 71% of the salt farmers get the sack by buying the collectors. It is associated will be capital, where the salt farmers with their own capital will buy into a retail store or directly to the factory sack, while farmers whose capital is borrowed from collectors will buy a sack as a form of loans are bound morally.

For salt farmers have a storage warehouse will be able to resist for not sell the salt and put off until prices rebounded for resale. Current conditions only about 35% salt farmers who have a storage warehouse.

### ***3.4. Cycle price***

At harvest time, the amount of salt production will be very abundant and followed by a decline in the price of salt people. Based on the salt harvest in 2009 that which begins on the first Sunday of August to the second

week of November with a total of 16 weeks, the production of salt ponds area of 4 ha (3 Mantong) in the Village of Romokalisari increased from 3.9 tons in the first week and 30.9 tons at the end of season salt. While the price of salt in contrast to the production cycle, where the highest salt price reached IDR 400/kg that which was in the beginning of the production season and every week there is a decrease with increases in the price of salt production. While the price of salt tends to be stable at around IDR 250/kg in the second week of September until the end of the production season salt.

### 3.5. Climatology

In general region of Surabaya City has a tropical climate characterized by two seasons, the dry season and the rainy season. Prolonged drought, strong winds, low humidity and high temperatures are elements that greatly affect the cycle time of preparation, process, and post-salt products folk.

Criteria of Month of Wet and Dry (according to the criteria Mohr) is a wet month with rainfall > 100 mm, the Moon Damp with rainfall between 60-100 mm, and the Moon Dry with rainfall <60 mm. As for the land needs enough salt in Surabaya using climatological data from the Meteorology and Geophysics – Perak Station I; means of weather information in region of North Surabaya. Weather information is presented in Table 2.

**Table 2:** North Surabaya weather information

No	Item Pengukuran	2012	2013	2014 (Estimasi)
1	Rainfall < 60 mm	June~October 5 months	August~October 3 months	July~November 5 months
2	Max Humidity	82 ~ 89%	88 ~ 92%	97 ~ 100%
3	Min Temperature	22,5 ~ 25,5 <sup>o</sup> C	23,5 ~ 25 <sup>o</sup> C	20 ~ 24 <sup>o</sup> C
4	While Irradiation	205~245 hours	220~240 hours	200~280 hours

Source: Meteorology and Geophysics – Perak Station I

### 3.6. Farmers of salt

In the management of production processes in the area of Surabaya salt, salt farmers commonly referred to as the *Juragan* is not working on his own land, but aided by a tenant in local parlance referred to as *Mantongan* with revenue-sharing system. The pattern of results that is applied is 2/3 and 1/3 right salt farmers landless rights. The proportion is calculated based on the contributions of each party and sharing the risk of failure.

Important contribution in the salt business people in the city of Surabaya is the presence of tenants (*Mantongan*) skilled and diligent, which mostly comes from the area Sumenep. Tenants will conduct the production process in a salt land with family (wife and or children). Skills make salt obtained hereditary so the child brings with it not fall into the category of the labor force to work the land in the introduction of salt.

The tenants work from several villages in the district of Kalianget. Among them are Marengan Laok Village, Kertasada, Karanganyar Village, Village of pinggir Papas, Kalimoo village and village of West Kalianget. The majority of tenants from the village of Marengan Laok; reached 49%, District of Kalianget of Sumenep. The

tenants began to come to Surabaya at the beginning of the dry season between May and June. Working as tenant's salt until the end of the dry season between October and November.

### **3.7. Actor salt business people**

The economy of salt in Surabaya will always move with the transaction made between salt actors that the business sector in the field of salt people still alive to this day. The transactions that have occurred able to provide income to approximately 100 heads of household Cultivators from Madura, hundreds Farmers salt in Surabaya, hundreds of Factory Workers, Transport Workers and others. Each actor contributes in particular in relation intertwined and affect. Each of these actors be able to work the draft that the overall transaction. The quality of interaction between actors is crucial how the People's Salt Production Center in Surabaya can be operated so that the efforts to empower farmer's salt cannot be separated from the other actors around the center of the salt.

The results of the calculation of forecast data salt business transaction value of the broadest masses of salt land management ranging from 1 to 5 hectares in area of Surabaya. The values of transactions in the People's Salt Production Center in Surabaya City area are as follows:

- Transactions with Buyer Salts (Surabaya collectors, collectors outside Surabaya, and Salt Plant) reached up to IDR 15.6 billion.
- Transactions with Suppliers Salt (Cultivators of Madura) reach up to IDR 4 billion.
- Transactions with Support (Labor, Salt Saprotam Providers, and Factory Sacks) to IDR 1 billion to IDR 1.5 billion.

In terms of expenses to cover the needs of sacks (35%), salt land lease (18%), and the cost of transporting salt by bike to get to the collecting point (21%) is the dominance of the largest budget. The proportion of this expenditure is based on salt production enterprises with total area of salt to 4 ha (3 *Mantongan*) for one season in the Village Romokalisari.

### **3.8. SWOT identification**

#### **a. Strengths**

- More than 60% water channel conditions (primary, secondary, and tertiary) and the embankment is in good condition.
- Use of technology-tarp-threaded filters in the process of making salt with Maduris Plus.
- Method is able to achieve a production capacity of 55.5 to 134.7 Tons/Ha/Season.
- 58% of venture capital business salts derived from their own capital.
- Transactions salt business people engaged in a range of 1 billion to 15.6 billion in a single season.
- 71% of the people acceptable salt distribution collectors of the Surabaya City.

b. Weaknesses

- Availability of seawater as a raw material salt people who are less clean and salinity values tend to decrease.
- The land area of salt there is a downward trend from 2010 to reach 2,237 Ha, in 2011 reached 1,500 Ha, and in 2012 reached 2,178 Ha.
- The majority of salt production technology using methods Maduris and most tenants are from Sumenep Madura.
- 85% of the management of a salt land lease from investors and use the salt production system for results (2/3: 1/3).
- Salt production capacity of the people there is a downward trend in 2011 reached 78,000 Tons, and in 2012 reached 35,000 Tons.
- The quality of the people most of the salt products are in the range of Quality III (NaCl <85%).
- 43% of land within the salt to the collecting point range of 200 meters to 1,000 meters.
- 65% no salt storage shed for the people.

c. Opportunities

- The salt products are always needed by the human body (250 grams per year) and various types of industries.
- The salt products are used as an additive in a wide variety of products and derived products is estimated around 14,000.
- Strategic Issues PUGAR: Intensification / Land Revitalization salt, Processing Technological Innovation and Institutional Strengthening.

d. Threats

- Indonesian imported salt reaches 55% of the national requirement of salt.
- The presence of anomalous weather until 2014 in the dry season cause salt build time people tend to be less than 4 months.
- The dominance of collectors on the marketing of salt people.
- The difficulty of access to capital from Cooperative, Bank Government and private banks.
- The price of salt tend to be stable in the range of USD 250, - / kg at the time it reaches the peak of harvest.



**3.9. SWOT – AHP analysis**

a. Parameters of strength

**Table 3.** Matrix factor: strength for strengthening model

<b>STRENGTH</b>	Channel & Embankment	Technology innovation	Production Capacity	Business Capital	Salt Collector	<b>Local Priorities</b>
	0.0930991	0.490271	0.183810	0.14876177	0.084057	
Revitalization	0.1570557	0.249310	0.157055	0.17862044	0.178620	0.207306
Innovation	0.5936336	0.593633	0.593633	0.11252383	0.112523	0.481622
Empowerment	0.2493105	0.157055	0.249310	0.70885572	0.708855	0.311071

- Contribution of strength
  - Developing technological innovation reached 49%..
  - Strengthening Maduris plus method for production capacity reaches 18%.
  - Increased business capital reached 15%.
  - Improved channel and embankment reach 9%.
  - Association of Surabaya City folk salt collectors reach 8%.
- Priorities of model
  - Innovation model 48%.
  - Empowerment model 31%.
  - Revitalization model 21%.

b. Parameters of weakness

**Table 4:** Matrix factor: weakness for strengthening model

<b>WEAKNESS</b>	Sea water	Land Area	Maduris Plus	Lease Land	Production Capacity	Salt Quality	Access Way	Salt Storage	<b>Local Priorities</b>
	0.0154	0.4430	0.04052	0.2292	0.07986	0.09638	0.0282	0.06716	
Revitalization	0.1047	0.6300	0.12430	0.1125	0.63698	0.10472	0.1047	0.63698	0.418339
Innovation	0.2582	0.1514	0.35856	0.7088	0.10472	0.25828	0.2582	0.10472	0.295736
Empowerment	0.6369	0.2184	0.51713	0.1786	0.25828	0.63698	0.6369	0.25828	0.285924

- Contribution of weakness
  - The addition of salt land area reaches 44%.
  - Increase ability to lease land for 23% salt.
  - Improving the quality of salt folk reaches 10%.
  - Using Maduris method for production capacity reaches 8%.
  - Construction of a salt storage sheds reach 7%.
  - Improved weakness Maduris method reaches 4%.
  - Shorten access collecting point the way to reach 3%.
  - Determination of the salinity of seawater resources reaches 2%.

- Priorities of model
  - Revitalization model 42%.
  - Innovation model 30%.
  - Empowerment model 29%.

c. Parameter of opportunity

**Table 5:** Matrix factor: opportunity for strengthening model

OPPORTUNITY	Food & Industrial	PUGAR & KKP	Diversified	Local Priorities
		0.280833111	0.584156411	
Revitalization	0.178620449	0.35218891	0.178620449	0.280011578
Innovation	0.70885572	0.088746044	0.70885572	0.346614677
Empowerment	0.112523832	0.559065046	0.112523832	0.373373745

- Contribution of opportunity
  - The existence of activities PUGAR & KKP reached 58%.
  - The emergence of a variety of food and industrial reached 28%.
  - The emergence of a wide range of diversified salt products reached 14%.
- Priorities of model
  - Empowerment model 37%.
  - Innovation model 35%.
  - Revitalization model 28%.

d. Parameter of threat

**Table 6:** Matrix factor: threat for strengthening model

THREAT	Salt Import	Dry Season	Salt Business	Ventura Capital	Price of Salt	Local Priorities
		0.41043	0.295803	0.20958	0.0306	
Revitalization	0.09361	0.700710	0.17862	0.5978	0.1786	0.311008
Innovation	0.62669	0.202119	0.11252	0.0829	0.1125	0.349154
Empowerment	0.27968	0.097169	0.70885	0.2874	0.7088	0.338863

- Contribution of threat
  - The need for salt imports reached 41%.
  - Anomaly dry season reaches 30%.
  - The dominance of collectors in the salt business reached 21%.
  - Fluctuations in the price of salt reached 5%.
  - The needs for venture capital increase of 3%.

- Priorities of model
  - Innovation model 35%.
  - Empowerment model 34%.
  - Revitalization model 31%.

e. Strategies of model

**Table 7:** Matriks SWOT for strengthening model

<b>Criteria</b>	Strength	Weakness	Opportunity	Threat	<b>End</b>
<b>Sub Criteria</b>	0.58110	0.12288	0.22505	0.07094	<b>Priorities</b>
Revitalization	0.20730	0.41833	0.28001	0.31100	0.25696
Innovation	0.48162	0.29573	0.34661	0.34915	0.41899
Empowerment	0.31107	0.28592	0.37337	0.33886	0.32397

- Contribution of SWOT
  - Strength factor 58%
  - Opportunity factor 23%
  - Weakness factor 12%
  - Threat factor 7%
- Priorities of model
  - Innovation model 42%
  - Empowerment model 32%
  - Revitalization modele 26%

f. Resume

The results approach SWOT-AHP method showed that progressive strategies that should be done by the Surabaya City Government is "Comparative Advantage Strategy", where this strategy providing a faster development of the implementation plan of strengthening the productivity of salt and salt farmers in the Surabaya City, which include:

- Technological innovation in the production of salt land through methods Maduris Plus.
- Technological innovation salt purification of the people through Appropriate Technology.
- Ability salt product diversification, including salt, salt variety of food, liquid salt and salt industries.
- The ability to access capital through Strengthening Cooperative Salt Surabaya.

### 3.10. Implementation of Maduris plus method

Implementation activities Maduris Plus methods in salt land Romokalisari District of Surabaya in the period 2014 [7] are as follows:

- Productivity salt crystals capable of achieving  $\pm 75$  Tons per Ha.
- Physical appearance cleans white salt crystals.
- The content of NaCl ranging from 85.54% to 88.95%.



**Figure 3:** Maduris Plus – LDPE, Romokalisari, Surabaya City, October 2014



**Figure 4:** Maduris Plus – HDPE, Romokalisari, Surabaya City, October 2014

Based on the results of research in the field of salt Romokalisari and Regulation of Director General of Foreign Trade [8], then Romokaliksari salt crystal products in the category of Product Quality  $\pm 2$  with a selling price of IDR 550, - per kilogram.

#### 4. Conclusions

1. Activity improvement, repair and construction of dots folk salt storage shed.
2. Activity improvement, repair and manufacture of channels and dikes as the location of a source of raw materials salt lands in northern coastal areas of the Surabaya City.
3. Socialization and technology development land with methods Maduris Plus salt through multilevel system and the use of HDPE plastic material or other material capable of absorbing the sun's heat in the evaporation land with concentrations between  $15^0$  to  $20^0$  Be.
4. Socialization and hygienic salt purification technology development of small-scale industries as salt product diversification efforts of the people to meet the various needs of a variety of food and industrial salt.

#### Acknowledgements

DP2M research support from the Higher Education - Ministry of National Education in the Framework of Implementation of Multi-Year Research Program Grant Scheme MP3EI Research Fiscal Year 2014 ~ 2016, and Bappeko Surabaya City Agriculture Office along with the Strategic Planning Work Scheme Strengthening Productivity and Farmers Salt in Surabaya Year Budget 2014.

#### References

- [1] Anonim, (1993), *Sodium Chloride in Chemical Index*.
- [2] Salt Institute, "About Salt", Internet: [www.saltinstitute.org](http://www.saltinstitute.org), Nov 23, 2012.
- [3] Saaty, T.L. (1980), *Analytic Hierarchy Process*, McGraw-Hill, New York.
- [4] Saaty, R.W. (1987), The analytic hierachy process and SWOT analysis - what it is and how it is used, *Mathematical Modelingi*, 9, pp.161-178.
- [5] Kurtilla, M., Pesonen, M., Kangas, J., and Kajanus, M. (2000), Utilizing the analytical hierarchy process (AHP) in SWOT analysis a hybrid method and its application a forest-certification case, *Forest Policy and Economics*, 1(1), pp.41-52.
- [6] Osuna, Edgar Elias, and Aranda Alvaro. (2007). Combining Swot And Ahp Techniques For Strategic Planning. *Economic Journal*. Instituto de Estudios Superiores de Administración (IESA) Avenida IESA, San Bernardino, Caracas – Venezuela
- [7] Suwasono, B., Munazid, A., and Saptu, JP., 2014, Technology of Salt Purification Gradually with Using of Fluid Flow to Meet the Needs of Salt Consumption and Industry in East Java, DP2M research support from the Higher Education - Ministry of National Education, Scheme MP3EI Research Fiscal Year 2014.
- [8] Regulation of the Director General of Foreign Trade No. 02/DAGLU/PER/5/2011 Pricing Sales at Farmer Salt.