Asian Journal of Social Science and Management Technology
ISSN: 2313-7410
Volume 4, Issue 6, November-December, 2022
Available at www.ajssmt.com

Feasibility Study and Factors Influencing Salt Industry Production

Muhammad Kasnir[1], Muhammad Ikhsan Wamnebo[2], Kamil Yusuf[3], Harlina[4]

[1,2,3,4]*Faculty of Marine Science and Fisheries, Universitas Muslim Indonesia, Makassar*

ABSTRACT:

Background and Objective : Salt demand for industry and consumption has been a major problem for the world. Several producers such as Australia, India, New Zealand, Germany, and Indonesia have been supplying salt to meet world demand. However, Indonesia itself still imports 3,989 million tons salt and keep rising about 10 % per year. Technology and innovation for salt production are urgently needed.

Methods and Materials: This study aimed to investigate the dissemination level of Ulil Filtered Technology (TUF) and geo-membrane technology and factors influencing salt production in Pangkep. Purposive sampling was performed for data collection. Regression analysis was applied. Revenue cost analysis (R-C ratio) was performed by using Gie formulation (1981). Break Event Point analysis (BEP) was applied according to sigit formulation (1979), and Pay Back Period (PBP) analysis was used based on Sagana formulation (2008).

Results showed that salt farmers, who unfamiliar with TUF and geo-membrane technology ranged from 6.71 to 9.62%, fairly know (36.53 - 37.76%) and know to use TUF and geo-membrane technology (53.85 - 55.53%). Cost and technology significantly affected the salt production, including area and number of labors. The business feasibility study showed that Revenue Cost Ratio (1.98), Break Event Point (IDR 4,735,276), and Pay Back Period (1.9 years), respectively.

Conclution : The dissemination of technological innovation both TUF and geo-membrane on salt farming is adequately understood and familiar by Pangkep community. In addition, Initial capital, land, labor and technologies significantly affect the salt production. Furthermore, salt farming is feasible to be developed in Pangkep regency.

Keywords: Salt, production, adoption, innovation and technology

1. INTRODUCTION

Farming economical salt can be done to almost all beaches due to difference in salt concentration and climate. However, salt farming is still unpopular among local people of Indonesia. Furthermore, local salt is found to be lacking of calcium and magnesium. For example, the quality of Indonesian salt is very low particularly NaCl content which is less than 97%. Indonesia is known as salt producer alongside Australia, India, New Zealand and Germany. However, Indonesia still imports 3,989 million of salt to meet their daily demands both Industry and consumption.(BPS, 2014).

On the one hand, National salt production decline gradually from year to year. On the other hand, population growth and industrial development increase steadily. National salt production is estimated 3.165.600 tons per year. However, it does not meet the demand in terms of quantity and quality. To overcome this, the

government through the Ministry of Marine Affairs and Fisheries has launched a program of National Sufficiency in Salt (KKP, 2015).

Consumption salt consumption groups include household consumption, food industry, cooking oil industry, salting and fish preservation industries, industrial salt demand groups, among others for petroleum, textile and leather industry, industrial salt CAP (Chap Alkali Plant) used for basic chemical processes of making soda and chlor, and pharmaceutical salts. National Standard of Indonesia (SNI) for salt consists of salt consumption and industrial (Pusriswilnon BRKP, 2006 ; Jaya et al, 2016; Day and Underwood, 1990; Mani et al, 2012; Rahaman and Jeyalakshui, 2009; Lamma et al, 2012). Both salt industry and consumption demands are 3.878 million tons and increasing about 10% per year. Meanwhile, domestic production only reached 1.2 million tons. Although Indonesia has potential to be a largest producer for salt due to it has two seasons only, Indonesia is unable to meet their daily consumption.

Pangkep is known as salt producers with Jeneponto and Takalar in south Sulawesi. Their combined salt production only produces about 37,000 tons per year with productivity 3-5 tons per ha (DKP, 2016). Meanwhile, the local demand for salt in the South Sulawesi is estimated at 67,000 tons per year. Therefore, technology is urgently required to increase salt production as well as its quality.

Ulil Filter Technology (TUF) can be applied for increasing the productivity as well as the quality of local salt. TUF uses filters between the plots and there are threads in large containers and small shelters to produce clean salt. The quality of salt is good and contains levels of NaCl of 97.10% (Kasnir, 2013). This technology can produce 3-4 tons of salt per plot. TUF production has reached above 80 ton/ha per season with the current production condition without TUF only reach 50 ton/ha per season. Therefore, the application of TUF is absolutely suitable to increase salt production.

The purpose of this study was to investigate the level of technology adoption (TUF and Geo Membrane) and industrial salt product and factors influencing production level and feasibility of local salt industry.

2. MATERIALS AND METHODS

Location

This study was conducted in Bungoro Sub-district, Pangkep Regency, South Sulawesi, Indonesia.

Data collection

Observation and direct interview using the questionnaire were applied to respondents. Purposive sampling was performed for respondents which was in accordance with government policy for marine and fisheries, Office for Management of Regional Revenue, Finance and Assets (BAPPEDA), Environment agency, Office of Public Works - Human Settlements and Spatial Planning, traders, employers and salt farmer. Respondent was also determined by cluster and randomized with 10% precision according to Akdon and Ridwan, (2007) with equation as follow:

$n = N/Nd^2 + 1$

Where:

n = Total sample

N = Total population

Data Analysis

Regression analysis was performed for statistical analysis (Kutner, Nachtsheim and Neter, 2004).

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 \ldots + b_aX_a$$

Y = Total Production

X_1 = Initial cost

X_2 = Area

X_3 = Labor

X_4 = Technology

a = Constanta

b = Regression coefficient

The economic index of local community in Bungoro District was observed using equation as follow:

1) Revenue cost ratio (Gie, 1981)

$$\text{RC ratio} = \frac{\text{Total profit}}{\text{Total cost}}$$

2) Break Event Point (Sigit, 1979)

$$\text{BEP} = 1 - \frac{\text{Fixed cost}}{\text{Variable cost}}{\text{Total sales}}$$

3) Pay Back Period (PBP) (Sagana, 2008)

$$\text{PBP} = \frac{\text{capital investment}}{\text{profit}} \times 1 \text{ year}$$

3. RESULT

Levels of understanding

The level of understanding of community in Bungoro District related to technology which used for producing salt by Ulil Filter Technology (TUF) and geo-membrane from total sample as follows:

Table 1 Percentages of understanding level for Ulil Filter Technology (TUF)

Level of understanding			Total
Do not know	Adequate	know	
9.62	36.53	53.85	100

Table 2 Percentages of understanding level for geo-membrane

Level of understanding			Total
Do not know	Adequate	know	
6.71	37.76	55.53	100

Salt Production

Based on analysis factors affects the salt production in Bungoro district, Pangkep regency can be seen in Table 3.

Table 3 the results of multiple regression analysis are related to factors influencing salt production in Pangkep regency

Dependent Variable	Independent Variable	coefficient regression (b)	T value	Probabilities significance
Salt Production (Y)	Constanta	-16,0056	-11,0049	0,00000
	Initial capital (X1)	1,501769	15,61753	0,00000**
	Area (X2)	-0,01961	-0,36339	0,718633tn
	Total labor (X3)	-0,14253	-2,1543	0,038614*
	Dummy Technology (X4)	1,061439	11,62926	0,00000**
F value		126,3218		Prob. Sig. : 0,00000**
R^2		0,9387		

*) Significant level 5%

**) Significant level 10%

Source: Primer data, 2017

Feasibility Study

Based on the result of economic analysis of salt management business in Bungoro District, Pangkep Regency can be seen below:

1) Revenue cost ratio (Gie, 1981)

$$\text{R/C ratio} = \frac{12.832.500}{6.863.517} = 1.87$$

2) Break Event Point (Sigit, 1979)

$$BEP = \frac{3.490.675}{1 - \frac{3.372.342}{12.332.500}}$$

$$= 4.735.276$$

3) PBP = $\frac{24.363.517,32}{12.832.500,00}$ x 1 year

= 1.9 year

4. DISCUSSION

The understanding level

The level of understanding of the community in producing salt with TUF was generally adequate and understood (Table 1). There was only 9.62% respondents did not know to use the TUF. It indicates that the process of dissemination of TUF was running well. Conversely, the table 2 showed that the level of understanding of the community in salt farming using geo-membrane technology is generally adequate and understood. However, 6.71% only respondents did not understand to apply the TUF. It shows that the process of dissemination of TUF was successful.

The result showed that the community has generally combined the use of TUF and geo-membrane in salt farming. However, uncertain weather conditions and initial capital are the major problem. Particularly, geo-membrane price is very expensive (IDR22,000 per meter).

Factors influencing salt production

The regression model based on the Cobb-Douglas was applied due to production purposes (Hjkova and Hurnik, 2007; Husain and Shahidul, 2016; Favour, Agboola, 2017). The Cobb-Douglas production is considered effective in rational production stage whose elasticity of production is between zero to one. Furthermore, the estimation results in a regression coefficient indicate the magnitude of elasticity. The magnitude of the elasticity shows the level of returns to scale (Hansen and Knowles, 1998; Susantun, 2000; Hansen and Knowles, 1998).). The result of Normality test (Figure 1) from all samples showed that the dots which close to diagonal line indicated that the data for residual value is normally distributed.

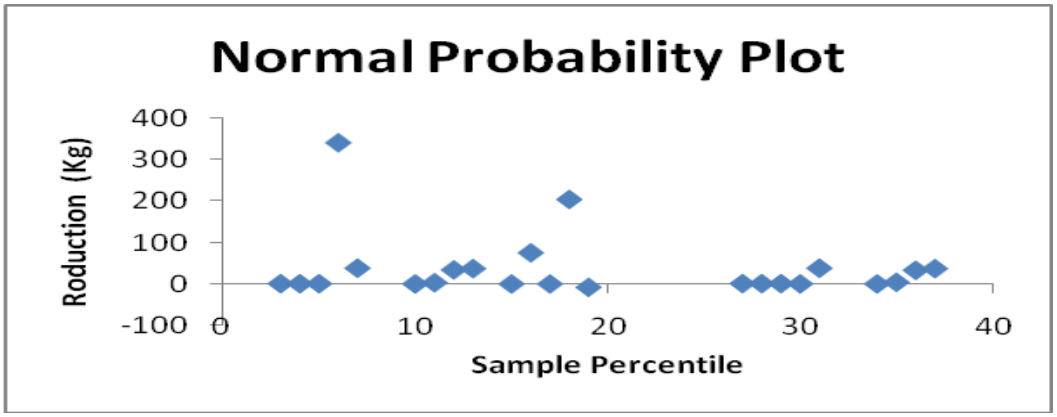

Figure. 1. Test Normal Probability Spot

The model is the variable of salt production (Kg) as the variable Y (dependent variable), and the variable X1 = working capital (IDR), X2 = land area (ha), X3 = number of labor, X4 = dummy Technology 1 = using TUF and Geomembrane; 0 = not using technology) as dependent variable. The summary of regression result using MS Excel 7.0 software is presented in Table 3. Based on Table 3, the salt production regression equation in Pangkep Regency as follows:

Y = -17,0056 + 1,5017X1 - 0,0196X2 – 0,1425X3 + 1,0614X4

The result of multiple linear regression equation related to regression coefficient value showed that b1 of 0,5017, indicating that the increase of 1 percent work capital in salt production leads to increase production of salt by 0,5017 percent. In addition, b2 of -0.0196 indicated that the increase of farming area by 1 percent lead to a decrease in salt production by 0,0196 %. b3 of -0.1425 showed that the increase of labor by 1 percent, the increase the production of salt by 0.1425 percent. b4 of 1.0614, indicating that there was difference in salt production between the use of TUF and geo-membranes and without technology. These results showed that the average salt productivity from salt farming production was higher by using TUF and Geomembrane than those which did not apply TUF and Geo-membrane technology. The constant value 17,0056 showed that the initial production of four influencing factors was not analyzed by the this equation model.

T test analysis

The t test result showed that the factors influencing the salt production as follow: (a) t test factor for labor factor indicated that the t value was 15,61753 and probability significance 0,000 indicated that labor significantly influence to the increase of salt production in Pangkep. The increase of labor, it increases the salt production. (b) the t.value for technological factor was 11.62926 and probability significance 0,000. It suggested that technological factors significantly effects on increasing salt production. (c) The t value for land farming was -0,3634 and probability significance 0,718 indicated that there was no significant effect on salt production. However, at the level of confidence 90% (significant level 0.1), the land factor significantly affect the increase in salt production. This is in line with a probability significance value greater than the real level (significant levels of 0.01 and 0.05). (d). the t value for labor was -2,1543 and probability significance was 0,038 indicated that the number of labor has significant effect on the production of salt. This is in accordance with the probability significance 90%. It shows that the increase of labor lead to decrease the level of salt production. (e). The t value for landlord factor of salt farming was 11,62926 and probability significance 0,0000 indicated that there was a significant difference in salt production between the owner of the land compared to the production of salt obtained from the profit-sharing scheme.

The simultaneous test results showed that the F value was 126,3218 with probability significance 0,0000 indicated that labor, land, labor, land ownership status or salt business had a very significant effect on salt production in Pangkep Regency. The factors were studied in determining the amount of salt production was 0.9387 (93.87%), while the remaining 6.13 % was determined by other factors.

Business analysis

The analysis of R-C Ratio for profit was IDR12.832.500 from 38 samples in Bungoro Pangkep regency. Moreover, the total cost of 38 samples was IDR6.863.517. Therefore, the analysis of R-C ratio was 1.87. According to Gie, (1981), if R-C Ratio> 1, economically feasible to be developed, it can be concluded that salt industry in Bungoro District is feasible to be developed.

The average of fixed cost of the sample was IDR3,490,675 with an average variable cost of IDR3,372,842 and the average total sales was IDR12.832.500. It can be concluded that the salt business in Bungoro Pangkep reaches its break event point at IDR4.735.276 with sale price about IDR300 per Kg (IDR 15.000 per 50 kg). Therefore, the salt farming must produce salt IDR4.735.267/IDR300=15.784 kg or 15.8 tons (316 packs).

From 38 samples, only three samples experienced delay in production due to land preparation. In addition, 35 samples can exceed from BEP in running their business. Therefore, three samples were considered experiencing financial loss and 35 samples successfully attained profit.

The investment value for salt business in Bungoro district Pangkep Regency including land investment, fixed cost and non-fixed cost. Fixed costs are the payment of land and building tax (PBB) and profit sharing by salt farmers who do not own salt land and employee wages, while variable costs are derived from land preparation costs, purchase equipments, windmill repair and repair of storage warehouse. After calculating the average of the land price, fixed costs and fixed costs obtained investment value of IDR24.363.517,32. Average sales value in 1 year is IDR12.832.500. Therefore, the payback period (PBP) was 1.9 years. This shows that the salt business in Bungoro in Pangkep District reaches a payback period (PBP) of 1.9 years or in 2 salt season cycles, given that the salt business is not done throughout the year, but only in the dry season every year.

5. CONCLUSION

The dissemination of technological innovation both TUF and geo-membrane on salt farming is adequately understood and familiar by Pangkep community. In addition, Initial capital, land, labor and technologies significantly affect the salt production. Furthermore, salt farming is feasible to be developed in Pangkep regency.

6. RECOMMENDATION

Further studies on the ecological, economic, socio-cultural, legal and institutional aspects are recommended.

7. ACKNOWLEDGEMENT

Many thanks to Directorate of Research and Community Service (DP2M) Directorate General of Higher Education. Central of Research and Community Service of Muslim University of Makassar. Lastly, Thanks to Bajiminasi Salt Community for their cooperation.

8. EFERENCES

1. Abdurrahman, 2003. Sustainable Development in Indonesia's Natural Resource Management, Denpasar, Bali.
2. Abdul Malik, 2014. Final Report of Village Assistance Force People's Business Empowerment Program, Jeneponto.
3. Ahmed N, Johri S, Sultan P, Abdin MZ, Qazi GN, 2011. Phylogenetic Characterization of Archaea in Saltpan Sediments. Indian J Microbiol 2011, 51: 132-137.
4. Akdon and Riduwan, 2007. Formulas and Data In Statistical Analysis mold Go to Bandung. Alfabeta.
5. Ali.Q, Ashfaq. M and Tariq. MIK, 2017. Resource Use Efficiency and Return to Scale Analysis in Off-Season Cucumber Production in Punjab, Pakistan. Sarhad Journal of Agriculture. Volume 33. 1}: 47-52, http://dx.doi.org/10.17582/journal.sja/2017.33.1.47.52.
6. Burhanuddin. 2001. Strategy Development of Salt Industry in Indonesia, Kanisius, Yogyakarta.Buys Ballot, Win World. 1995, UK.
7. Central Bureau of Statistics, 2014. Distribution of Indonesian Salt Trade Badan Pusat Statistik Republik Indonesia Number of Publication: 06130.1409.

8. Charles, 2001. Capture Fisheries System, ecological sustainability sustainability socioeconomic sustainability community sustainability. Jakarta.
9. Djamali R.A. 2007. Sustainability Evaluation and Optimization of Lemuru Fish Resource Utilization (Sardinella Lemuru Bleeker 1853) in the Straits of Bali. Graduate School of Bogor Agricultural University, Bogor.
10. Dahuri, Rochmin, et al. 2004. Integrated Coastal and Marine Resource Management, Jakarta.
11. Day, R.A. and Underwood, AI. 1990. Quantitatif Analitical Chemistry, 4 th Edition, Prentise Hall Inc, Engwood Cliff, New York.
12. Fauzi, A, 2004. Natural Resource Economics and Environment, Theory and Applications. Gramedia Pustaka main, Jakarta.
13. Favour. IO, Agboola. BO. 2017. Power of Some Tests of Heteroscedasticity: Application to Cobb-Douglas and Exponential Production Function. International Journal of Statistics and Applications e-ISSN: 2168-5215 2017; 7(6): 311-315 doi:10.5923/j.statistics.20170706.06.
14. Hansen, P. And , Knowles, P. (1998) "Human capital and returns to scale", Journal of Economic Studies, Vol. 25 Issue: 2, pp.118 123, https://doi.org/10.1108/01443589810202120,
15. Hjkova, D and Hurnik, J. 2007. Cobb-Douglas Production Function: The Case of a Converging Economy. Finance a úvČr - Czech Journal of Economics and Finance, 57, 2007, no. 9-10. UDC: 519.866;330.11;330.35 JEL Classification: O47, E23.
16. Hutabarat and Stewart, 2000, Introduction to Oceanography, Jakarta.
17. Husain. S and Shahidul, MS. 2016. A Test for the Cobb Douglas Production Function in Manufacturing Sector: The Case of Bangladesh. International Journal of Business and Economics Research. Vol. 5, No. 5, 2016, pp. 149-154. doi: 10.11648/j.ijber.20160505.13.
18. Kaneko Y, et al., 2012. Hindawi Publishing Corporation International Journal of Polymer Science. Volume 2012, Article ID 453821, 2 pages doi: 10.1155 / 2012/453821,
19. Kabilan Mani, Bhakti B Salgaonkar, Deepthi Das and Judith M Bragança, 2012.
20. Community solar salt production in Goa, India Journal Aquatic
21. Biosystems. http://www.aquaticbiosystems.org/content/8/1/30.
22. Kanvagh P, Pitcher TJ. 2004. Implementing Microsoft excel software For Rapfish: A Technique for the Rapid Appraisal of Fisheries status. Fisheries Center Research Reports 12 (2): 1-76.
23. Kuncoro. 2003. Research Methods for Business and Economics. Jakarta: Erland.
24. Nuraeni 2012, Statistical Analysis and Spatial Data, Jakarta.
25. Pitcher and Preikshot, 2001. RAPFISH A Rapid Appraisal Technique to Evaluate the Sustainability Status of Fisheries.Fisherie Center, University Of British Coulombia.
26. Rahaman AA, Jeyalakshui R: Integration of Artemia in Indian salt works economic opportunities. In Proceedings of the 2nd International Conference on the Ecological Importance of Solar Saltworks (CEISSA2009): 26–29 March 2009. Merida; 2009:51–56.
27. Rangkuti, F.1999, SWOT Analysis Techniques Dissecting Business case Reorientation Concept of Strategic Planning for Facing Century 21, PT. Gramedia Pustaka Utama, Jakarta.
28. Richard Arnold Johnson, Dean W. Wichern, 1992. Applied Multivariate Statistical Analysis, Prentice Hall.
29. Samadi, 2007. Business Analysis, Yogyakarta.
30. Susilo, 2003. in Hamdan, 2007. Building Fishery Resources, Jakarta.
31. Mottershead R.A. 2006. Solar Salt - Optimizing Production in India, China and Australia to Meet the Demand in Asia, In: International Conference on Salt 2006, Ahmedabad January 2006.
32. Sedivy V.M., International Seminar on Membrane Cell Technology, Vadodara 1988, The Processing of Solar Salt Feedstock for Membrane Cell Chloralkali Plants - not mentioned in the text.
33. Mani K, et al. 2012. Community solar salt production in Goa, India. AQUATIC Journal Bio-systems, 8:30 Doi: 10 1186 / 2016-9063-8-30 http://www.aquaticbiosystems.org/content/8/1/30.
34. Mani K, Salgaonkar BB, Braganca JM. 2012. Culturable halophilic archaea at the beginning and final stages of salt production in a solar saltern of Goa, India. Aquatic Biosystem, 8:15.
35. Marine and Fisheries Ministry. 2015. Indonesian Salt Productionhttp://statistik.kkp.go.id/sidatik-dev/index.php?m=3&id=3.

36. Jaya.P, Retno Hartati, Widianingsih. 2016. Production of Salt And Bittern In Salt Ponds. Journal of Tropical Marine March 2016 Vol. 19(1):43–47.
37. Korovessis NA, Lekkas TD, 2009. Solar Saltworks' wetland function. Global NEST J 2009, 11: 49-57.
38. Salgaonkar BB, Kabilan M, Braganca JM: Sensitivity of Haloarchaea to eubacterial pigments produced by Pseudomonas aeruginosa SB1. World J Microbiol Biotechnol 2011, 27:799-804.
39. Nayak SS, Gonsalves V, Nazareth SW: Isolation and salt tolerance of halophilic fungi from mangroves and solar salterns in Goa-India. Indian J Geomarine Sci 2012, 41: 164-172.
40. THYS, A., 2003. Sustainability and impact aspects of exploitation of marine salt, magnesium and bromine. Journal of Coastal Research, 19 (4), 912-918. West Palm Beach (Florida), ISSN 0749-0208. Journal of Coastal Research, Vol. 19, No.4, 2003.
41. Pusriswilnon BRKP, 2006. Guidebook: Integrated Enterprise Development of Salt and Artemia, Research Center for Marine and Non-Biological Resources, Marine and Fishery Research Agency, Ministry of Marine Affairs and Fisheries.

INFO

Corresponding Author: Muhammad Kasnir, Faculty of Marine Science and Fisheries, Universitas Muslim Indonesia, Makassar.

How to cite this article: Muhammad Kasnir, Muhammad Ikhsan Wamnebo, Kamil Yusuf, Harlina, Feasibility Study and Factors Influencing Salt Industry Production, Asian. Jour. Social. Scie. Mgmt. Tech.2022; 4(6): 206-113.