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Empowerment of Farmer's Salt Smallholder and their Welfare

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Abstract

Efforts to fulfill salt self-sufficiency target and improve quality of smallholder's salt must be able to increase farmers' income. Many policies have been implemented to achieve it, including empowering them through table salt technology. The study aims to analyze: 1) implementation of PUGAR, 2) impact of PUGAR on the farmers' welfare, and 3) factors that influence farmers' production in Pasuruan Regency. Primary data were collected from 40 farmers who were selected by simple random sampling. Data were analyzed using simple and multiple linear regression. The results showed that implementation of PUGAR was accepted by all salt processing communities and well implemented. There are four things that are very important for farmers: extension policy of PUGAR, the program is carried out on target, appropriate to regulations, and compatible to existing resources. PUGAR was perceived by farmers as being able to improve their welfare. The better farmers' perception, the more prosperous they will be.
Factor that had a significant effect on salt production is only number of table salts. Age, education, number of family members, experience, amount of fuel, number of workers, length of salt production process, and price of salt had no effect on salt production. Limitation of the study is that welfare of salt farmers was just not measured, because it uses their perceptions with a Likert scale. Other researchers can measure welfare of farmers using equivalent variation (EV) and complementary variation (CV) in order to know quantitative changes in welfare.

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INTRODUCTION

Salt production in Indonesia was concentrated in Java (10,231 Ha) and Madura (15,347 Ha) (Hakim, 2020), traditionally processed, and must be reprocessed because of low quality (Amien & Adrienne, 2020; Arkanullah, 2019; Batafor, 2020). Salt quality can be improved through improved crystallization technology (Wiraningtyas et al., 2019; Sumada et al., 2018; Rismana & Pengkajian, 2014, Rodrigues et al., 2011). In addition to quality improvements, it can also increase productivity from 60-70 tons to 120-125 tons per hectare per year (Mufliha, 2019, Suwasono et al., 2015). It indicates that technology is one of the important factors to produce quality salt production, so that farmers can receive a reasonable price with optimal quantity. If it was successfully realized, then farmers will get a more decent income, then their welfare will also increase.

Farmers in Pasuruan Regency produce salt traditionally, depending on the sun during production process, location of salting is on the beach with very limited facilities and infrastructure. They tend to quickly switch to fishing if there is a decrease income from salt. In addition to the amount of production, price is also a determinant. Setyaningrum et al., (2015) found that distribution and marketing of salt has not been efficient, so farmers' price is much lower than consumers' price. Although the business is feasible (Nahib et al., 2013; Widiarto et al., 2013; Safril & Arida, 2018), inexpensive price of salt will reduce attractiveness for farmers to produce it. This situation resulted in higher salt imports and could disrupt trade balance (Pudjiastuti et al., 2013; Pudjiastuti, 2014; Pudjiastuti & Kembauw, 2018). Moreover Bappebti (2019) and KPPU (2020) also mention that salt is a very important commodity because it is used to meet household consumption and industry.

One of government's effort to increase productivity and quality of smallholders' salt is PUGAR (Program Pengembangan Usaha Garam Rakyat) since 2011. Focus of the program is on increasing job opportunities and farmers' welfare (Hidayaturrahman et al., 2017). The program has been able to increase empowerment of farmers (Amanda & Buchori, 2015) and salt production (Salim & Munadi, 2016; Rusdi, 2018), although efforts still need to be made to improve marketing and prices (Izzaty & Permana, 2011; Sari, 2018), expansion targets (Ihsannudin, 2013), institutional improvement (Ihsannudin et al., 2018), technological improvement (Deliarnoor et al., 2018), salt import control (Pangestu, 2018), protection of salt prices (Prastio, 2019). The results of this empirical study show that farmers need a stimulus to be more empowered and prosperous (PT Garam, 2018), so that they will be sustainable (Suryati & Hatimah, 2018, Astutik et al., 2019).

Smallholder salt farmers in Pasuruan Regency are located in Bangil, Kraton and Lekok District, which are also areas for brackish water cultivation in the fish and shrimp ponds. The area has been the target of PUGAR since 2014, because there has been a lot of shifting from salt business to fish and shrimp farming. The main reason is that the business no longer brings prosperity to the farmers.

Previous studies found that there is an asymmetry of information to farmers about implementation of PUGAR to the process of disbursing aid (Kurniawan et al., 2014). Baekhaki et al. (2018) stated that there were mixed responses from salt farmers in Bogor regarding program corporatization. On the other hand, Kurniawan (2016) reveals that ability of farmers to increase their income through PUGAR is highly dependent on their education, age, and experience, as well as technology. Farmers' incomes also tend to fluctuate and vary depending on seasons and prices in Bangladesh and Thailand

(Hossain et al., 2006), land ownership (Zakki & Sayyida, 2015), production facilities (Mun'im, 2016), applied technology (Bramawanto, 2017), land ownership, number of family members and education (Azizi et al., 2017; Hidayah et al., 2017; Rikah & Kusumaningsih, 2018), managed pond area, capital and labor (Karim et al., 2019), salt quality in Ethiopia (Kumma et al., 2018), profit sharing system (Gani & Gitayuda, 2020), capital structure, human resources, technology (Wulandari et al., 2021).

The research's novelty is to evaluate implementation of PUGAR as well as to identify the factors that influence production of salt farmers in Pasuruan Regency that had not been studied before. The assumption is that production will reflect income (welfare) because data collected is cross sectional. The aims of this study are 1) to describe implementation of PUGAR, 2) to analyze impact of PUGAR on welfare of farmers, and 3) to analyze factors that influence production of farmers in Pasuruan Regency. The third objective is carried out because salt production is assumed to be a proxy for the farmers' welfare.

RESEARCH METHODS

The research was conducted in Raci Village, Bangil District and Gerongan Village, Kraton District, Pasuruan Regency because they are in a topographical area and are directly adjacent to the same sea waters. Population is salt farmers in Raci Village and Gerongan Village, there were 255 farmers. Sample size was determined by the slovin formula where the precision (e) is 15%:

$$n = \frac{N}{1+N(e)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

$$n = \frac{255}{1+255(0,15)^2}$$

n = 37,84 exactly enough to be 38 farmers.

A questionnaire was prepared for 40 farmers with the consideration that if there is incorrect information, minimum sample of 38 farmers is fulfilled yet. They were selected by simple random sampling.

Primary data were collected from farmers using a research instrument (questionnaire). Questionnaires that have been distributed after confirmation with respondents (interviews), editing, and compilation. Prior to analysis, the data validity and reliability were tested to ensure that questionnaire produced accurate data. Validity is indicated by $r_{arithmetic} \geq r_{table}$ for n = 40 and an error rate of 5%. Reliability is indicated by Cronbach's Alpha > 0.600.

The first research objective was achieved by using descriptive analysis. Implementation of policies and farmers' welfare was explored from farmers' perception on 10 statements which were measured by a Likert scale. Those scale includes: 5 = agree (SS), 4 = agree (S), 3 = undecided, 2 = disagree (TS) and 1 = strongly disagree (STS). Description of objective achievement was based on data tabulation and compilation.

The second research objective was achieved using descriptive analysis and simple linear regression, where Y = farmer' welfare, X = policy implementation (PUGAR), a = constant, b = regression coefficient, u = standard error. Mathematically, the relationship between two variables can be stated:

$$Y = a + bX + u \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

The third research objective was achieved using multiple linear regression analysis, which is mathematically expressed as:

$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + e$ ..... (3)

where: Y = salt production, X_1 = age of the farmer, X_2 = education, X_3 = number of family members, X_4 = experience, X_5 = amount of fuel, X_6 = number of workers, X_7 = length of process, X_8 = price of salt, X_9 = number of table salts, D = dummy variable, where D = 0 (before PUGAR implementation), and D = 1 (after PUGAR implementation), and e = standard error. Regression analysis begins with classical assumption test (normality, multicollinearity test and heteroscedasticity) to ensure that the model is BLUE, followed by identifying suitability of the model based on the coefficient of determination. Data were normally distributed based on the Kolmogorov-Smirnov Z criteria > 0.05. Multicollinearity assumption test uses tolerance and variance inflation factor (VIF) with alpha/tolerance > 10% and VIF < 10. F test and t test to analyze factors that have a significant effect on the amount of salt production.

RESULTS AND DISCUSSION

PUGAR Implementation in Pasuruan District

Data collected were valid and reliable with product moment correlation. Validity of data was indicated by $r_{arithmetic} \geq r_{table}$ (0.3120) for n = 40 and α = 5%. Reliability was indicated by Cronbach's Alpha of 0.738 for PUGAR implementation and 0.765 for farmers' welfare, because the parameter is > 0.600.

Implementation of PUGAR in Pasuruan Regency was carried out in various stages. As already stated, the program was not given to farmers individually, but through farmer groups. Perception of farmers about implementation of PUGAR presented in Table 1 shows that it was perceived well by farmers.

Table 1. Farmer' Perception about PUGAR Policy Implementation

No	Statement	Score	Criteria
1.	Prior to the PUGAR socialization, initial communication and coordination had been carried out with farmers	4.200	Good
2.	Formation of PUGAR groups to facilitate coordination and coaching	4.175	Good
3.	Need of facilities and infrastructure as proposed by PUGAR recipient members based on priority	4.075	Good
4.	PUGAR is a government program that can be easily implemented	3.525	Good
5.	Becoming a member of PUGAR is a form of self-awareness in order to increase production and quality of salt	3.725	Good
6.	Next government policy regarding PUGAR is highly expected	4.575	Very good
7.	PUGAR policy supported by local government	4.400	Very good
8.	PUGAR implemented according to target	4.275	Very good
9.	Implementation of PUGAR according to regulation	4.550	Very good
10.	Implementation of PUGAR according to existing resources	4.025	Good
	$\boldsymbol{Grade\ score = \frac{Cumulative\ Amount}{Number\ of\ Respondents}}$	4.153	Good

Generally, farmers perceive well for all statements related to the implementation of PUGAR, meaning that it was accepted by the whole salt processing community and well implemented. There were four items that very important for farmers, i.e. the next

policy from PUGAR was highly expected by farmers, achieving targets, implemented according to regulations, and in accordance with existing resources. Thus, implementation of it takes into account a technology that was currently done by farmers. The study was supported by Ihsannudin et al. (2016) who found that salt land certification efforts to support access to capital are the right empowerment strategy for farmers.

Impact of PUGAR on the Farmers' Welfare

Farmers' welfare were measured by their perceptions about policies, regulations, training, counseling, financial assistance, increased production, increased salt quality, increased income, easy administrative access, easy access to capital, easy access to marketing. Their responses were presented in Table 2. As implementation, farmers perceive well and strongly about their welfare, especially because: 1) they benefit from coaching and training about geomembrane technology, 2) there was assistance with salt production facilities and infrastructure (production roads, machinery and equipment, pumps, geoisolators, etc.), 3) increasing salt production, 4) increasing salt quality, 5) expanding job opportunities both from within and from outside the family.

A new technology adopted by farmers has been able to be applied due to socialization followed by training. Even though, at first, farmers experienced problems in implementing it, they were able to overcome it because of the group's role and sustainable government assistance. Government also provides facilities and infrastructure for salt production that were used collectively or individually, making the farmers feel motivated. Increasing in salt production and quality has made farmers more confident to involved in the program. The factors will determine income of the business, provided that there is an alignment to farmers in it marketing. Otherwise, farmers will remain in a weak position because market price is an important incentive for them. High salt production, while the price is very low, will cause low income for farmers as well. It is a trigger for farmers to leave the business.

Table 2. Perception of Farmers about Welfare

No	Statement	Score	Criteria
1	PUGAR members benefit from coaching and training	4.850	Very good
2	Farmers receive support for salt production infrastructure and facilities (production roads, pumping machines, geoisolators, etc.)	4.600	Very good
3	PUGAR increases salt production	4.875	Very good
4	PUGAR improves salt quality	4.750	Very good
5	PUGAR expands job opportunities	4.350	Very good
6	PUGAR increases the farmers income	4.200	Good
7	Farmers' skills and knowledge in managing salt increased	4.175	Good
8	Management of capital assistance can be accessed easily	4.075	Good
9	PUGAR improves the bargaining position of farmers against traders	3.525	Good
10	PUGAR makes it easy to market their products	3.725	Good
	$\boldsymbol{Grade\ score = \frac{Cumulative\ Amount}{Number\ of\ Respondents}}$	4.3125	Very good

These facts are indicators that the PUGAR program has been implemented by Pasuruan Regency government based on applicable regulations and has benefited farming community. However, it is necessary to regulate the people's salt trade system to protect salt farmers. This finding is in accordance with Amanda & Buchori (2015) which showed that PUGAR was able to empower farmers and considered successful in Kaliori District.

Factors Influencing Salt Production

There were nine variables that were tested for their effect on salt production and compared before and after implementation of PUGAR using multiple linear regression. The results have been through classical assumption test (normality, multicollinearity and heteroscedasticity tests). Data were normally distributed based on Kolmogorov-Smirnov Z criteria of 0.181 > 0.05 (before) and 0.20 > 0.05 (after). Multicollinearity assumption test using tolerance and variance inflation factor (VIF) with alpha/tolerance = 10% and VIF = 10 is presented in Table 1. VIF for production factors were < 10 and tolerance factors were above 10%, so it can be stated that there is no multicollinearity among production factors.

Heteroscedasticity is a condition in which there is an inequality of variance from error for all observations and each production factor. Heteroscedasticity test shows that data distribution does not have a certain pattern or spreads irregularly above and below 0 axis on Y axis. Thus, it can be concluded that there is no heteroscedasticity.

Regression model was goodness of fit, indicated by coefficient of determination (R_2) which is close to 1 (0.92). It means that variables in the model were able to explain variation salt production by 92%. The rest (8%) was explained by other variables.

Simultaneously (F test), all variables (age, education, number of family members, experience, amount of fuel, number of workers, length of process, price of salt, number of table salt and PUGAR empowerment program) had a very significant effect on salt production. It was indicated by sig. = 0.000 (see Table 3).

Table 3. Factors Affecting Salt Production

Variable	Regression coefficient	Standard Error	Sig.	Justification
Constant	1.200	2.818		
Age (X_1)	-0.021	0.021	0.321	Not significant
Education (X_2)	-0.164	0.230	0.479	Not significant
Family members (X_3)	0.127	0.137	0.356	Not significant
Experience (X_4)	0.021	0.036	0.562	Not significant
Amount of fuel (X_5)	0.007	0.017	0.693	Not significant
Number of labor (X_6)	- 0.004	0.064	0.949	Not significant
Length of production process (X_7)	- 0.529	0.231	0.025	Significant
Price of salt (X_8)	0.001	0.005	0.906	Not significant
Number of salt table (X_9)	4.979	0.438	0.000	Highly significant
Implementation of PUGAR (D)	5.019	0.794	0.000	Highly significant
$F_{arithmatic}$ = 91.794				
Sig. = 0.000				
R^2 = 0.92				

However, partially (t test), there were three variables that have a significant effect on salt production, i.e. length of process, number of table salts, and implementation of PUGAR. Regression coefficient of the length of salt production process shows a negative relationship, where if the production process is longer, the salt production will decrease. It was a signal for farmers to decrease time of salt production process. Regression coefficient for the amount of table salt shows that PUGAR was able to realize a higher additional salt production of 4.979 tons, if the table salt is increased by 1 unit. The variable had highly significant effect, indicated by a positive regression coefficient and sig. 0.000. Implementation of PUGAR also had highly significant effect and would be able to increase salt production. It was indicated by a positive regression coefficient and sig. 0.000. It was in accordance with the results of several previous studies in Indonesia (Amanda & Buchori, 2015; Salim & Munadi, 2016; Rusdi, 2018) that PUGAR was able to increase farmers' income and production.

On the other hand, seven variables did not have a significant effect on salt production, however there was an interesting phenomenon. The following describes effect of them. **Farmer' age**. The higher age causes salt production to decrease indicating that there was an age limit for workers in the salt production process because it requires a large workforce. In addition, the production process was done in the open space and highly temperatures, cannot be carried out optimally by farmers. It was also an indicator that salt farmers were getting old. However, the existence of PUGAR was able to increase production because of a new technology (geomembrane). **Farmer' education**. Formal education has no significant effect on salt production, it is indicating that salt business does not require formal education. In other words, anyone can enter the salt business. Introduction of new technology in PUGAR basically can also be operated by farmers because of the assistance, monitoring and evaluation. It is expected to maintain sustainability of the program. **Family members**. Large number of family members encourages farmers to increase salt production. In addition, there were also farmers who convert salt land into fish and/or shrimp ponds, so that the business was managed modestly. **Farmer' experience**. Prior to the program, there was a tendency that the longer farmers were involved in the business, the lower production would be. There was a possibility that farmers were tired of pursuing their profession. However, a new technology introduced through PUGAR, management consultants, and other assistance would increase motivation of farmers so that production will increase along with the experience of farmers. **Amount of fuel**. The use of more fuel, will just increase production. Although the effect is not significant, this phenomenon needs to be a concern for program managers that a new technology in the salt production process requires an increase in the production factor. **Number of labor**. The use of these inputs becomes more efficient through PUGAR where the addition of labor will reduce production. It was indicated by a negative regression coefficient. Thus, PUGAR would be said to reduce labor (technology was capital intensive). **Price of salt**. Price and its production which had a positive relationship direction indicated that farmers were less responsive to price increases because of their dependence on the weather. It was in accordance with theory that applies to production processes that depend on nature (Cobweb theorem). It was different from research by Rikah & Kusumaningsih (2018) that productivity, work experience, land area, marketing, and owner education had a significant effect on the income of salt farmers in Rembang.

CONCLUSIONS

Implementation of PUGAR was accepted by the whole salt processing community and is well organized. There were four aspects that very important for farmers, i.e. sustainability policy of PUGAR, the program is carried out on target, according to regulations, and according to existing resources. PUGAR implementation was perceived as good by farmers, while impact on the farmers' welfare was perceived as very good. Factors that had a significant effect on salt production were length of the salt production process, number of salt tables owned by farmers, and implementation of PUGAR. Age, education, number of family members, experience, amount of fuel, amount of labor, and price of salt have no significant effect on salt production.

RECOMMENDATION

Government or other parties with an interest in salt commodities can facilitate farmers in the form of increasing the number of table salt because this factor has a significant effect on the amount of salt production. The limitations of this study related to the welfare of salt farmers were still not measured because it uses perceptions with a Likert scale. Another weakness lied in the number of respondents who were involved only 15% or about 40 people from a total of 255 salt farmers, due to the consideration of corona virus-19 pandemic outbreak so as to minimize movement and direct contact with salt farmers, so the number of respondents was limited. Other researchers will measure the welfare of farmers using equivalent variation (EV) and complementary variation (CV) in order to give better results, but it will take longer time. In addition, evaluation of sustainability of the government program will also be done using rapfish analysis. Other research that needs to be done is related to the salt trade system, which until now is not yet in favor of salt farmers. Government programs in the context of empowering farmers must be more optimal and on target as well as salt import regulations to be reviewed.

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