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The Perceptions and Risk Reduction Strategies of Small-Scale Salt Farmers on Madura Island

(Persepsi dan Strategi Reduksi Risiko Pada Usaha Tani Garam Rakyat di Pulau Madura)

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ABSTRACT

Salt farming is considered a risky venture due to the influence of both internal and external factors. Therefore, this study aimed to describe farmers' perceptions regarding the causes, opportunities, and impacts of risks to develop a risk reduction strategy for salt farming in Madura Island. The study used a multistage sampling method to obtain 120 respondents and was conducted in three regencies: Sampang, Pamekasan, and Sumenep. The first objective was analyzed using the descriptive method, while the second was designed using the Kountur method. Farmers' perceptions showed that seawater quality, wind and temperature, rainfall, soil porosity, price volatility, marketing channels, government policies, capital constraints, and human resource quality could cause risks in salt farming. Several risks were perceived to significantly impact salt farming, such as government policies, partnerships, marketing channels, prices, and capital availability. Therefore, some recommendations to improve the risk reduction strategies included the use of horizontal axis windmills, revitalization of groups and partnerships, and capital strengthening through the effectiveness of the PUGAR (Empowerment of Smallholder Salt Businesses) policy by the development of standard procedures for the timely and targeted distribution of the aides.

Keywords: perception, risk, salt, strategy

ABSTRAK

Usaha tani garam tergolong usaha yang penuh risiko, baik yang berasal dari internal petani maupun bersumber dari kondisi eksternal. Penelitian ini bertujuan mendiskripsikan persepsi petani terhadap sumber, peluang, dampak risiko, serta merumuskan strategi reduksi yang dapat dilakukan pada usaha tani garam di Pulau Madura. Studi dilakukan pada tiga kabupaten, yaitu Sampang, Pamekasan, dan Sumenep, dengan 120 responden yang menjadi sampel, yang diambil dengan memanfaatkan metode *multistage sampling*. Tujuan pertama dianalisis dengan menggunakan metode deskriptif, sedangkan tujuan kedua didesain dengan menggunakan metode Kountur. Hasilnya menjelaskan bahwa menurut persepsi petani, sumber risiko usaha tani garam dapat berasal dari kualitas air laut, angin dan suhu, curah hujan, porositas tanah, harga garam, saluran pemasaran, kebijakan pemerintah, keterbatasan permodalan, dan kualitas sumber daya manusia. Beberapa risiko yang dipersepsikan memiliki peluang dan dampak besar dalam usaha tani garam meliputi kebijakan pemerintah, kemitraan, saluran pemasaran, harga garam, dan permodalan. Strategi untuk mengurangi risiko adalah menggunakan kincir angin dengan prinsip sumbu horizontal, revitalisasi kelompok dan kemitraan, serta penguatan permodalan melalui pengefektifian kebijakan Program Pugar dengan pembuatan standar prosedur penyaluran bantuan supaya tepat waktu dan sasaran

Kata kunci: garam; persepsi; risiko; strategi

INTRODUCTION

Indonesia is a maritime nation well-known for producing several superior commodities, including salt. However, household and industrial salt products are imported due to high demand. According to the Central Statistics Agency (2020), the demand has increased over the last five years. The average increase was 232,946 tons/year. Meanwhile, production tends to fluctuate and is less than demand, as seen in Table 1.

One of Indonesia's most significant contributors to salt supply is East Java Province, where Madura Island has the highest production rate. This island accounts for about 82.47% of the total salt produced in the East Java province. However, salt farmers on this island continue to express their dissatisfaction with several issues, including 1) The low level of salt productivity below the threshold of other regions, such as West Nusa Tenggara, which produces 134.81 tons per hectare, while Madura Island produces only around 70–80 tons per hectare (Ministry of Marine Affairs and

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Table 1 Salt Demand and Production in Indonesia in 5 Years (2016−2020)

Year	Demand (ton)	Production (ton)	Import (ton)
2016	3,532,887.00	118,000	1,389,144.00
2017	3,729,334.00	1,100,000	1,176,510.80
2018	4,011,883.00	2,719,256	1,172,805.60
2019	4,162,502.00	2,852,000	1,567,104.70
2020	4,464,670.00	1,256,496	1,854,670.00

Source: BPS (2020).

Fisheries 2020); 2) The fluctuating price of salt received by farmers due to inefficient marketing channels and price taking by farmers (Suherman *et al.* 2011; Fauziyah 2014; Widiyastutik *et al.* 2016); 3) The low human resources for salt reduction (Prasetyo 2016; Astuti *et al.* 2020); and 4) The low impact of PUGAR (Empowerment of Smallholder Salt Business) issued by the government (Ihsannudin 2016; Deliarnoor *et al.* 2015).

The various challenges encountered in salt farming on Madura Island pose certain risks that farmers must bear. According to Kountur (2008), 'risk' is the possibility of an event causing harm. Each farmer's distinctive perception and response to the various risks encountered gives rise to the uniqueness of their risk reduction strategy, which can arise from various conditions, depending on their perception. Additionally, Darmawi (2014) explained that various factors, including (1) can cause risk) physical factors, such as natural disasters and fires; (2) economic factors, such as inflation and price fluctuations; and (3) social factors. According to previous studies by the Board (2011), Sarwar (2013), Asravor (2018), Kinfe *et al.* (2014), Obalola & Ayinde (2018), Bishu *et al.* (2018), Rabihah (2020), and Islam *et al.*(2021), the agricultural sector faces several risks. The risks include (a) Production risk involving uncertainty in the process, (b) price or market risk, which describes the unpredictability of input or commodity prices, (c) financial risk associated with borrowing from moneylenders and other limited financial institutions, and (d) institutional risk involving uncertainties in government policies, such as tax increments and the limited use of chemicals. Therefore, each business owner must manage risk appropriately by managing resources effectively.

Kurniati (2015) explained that the risk-reduction strategy of farmers is associated with their decision-making during cultivation activities. Subsequently, other previous studies by (Saptana 2010) analyzed risk reduction based on a variety of models, including identifying risk reduction before (ex-ante), during (interactive), and after (ex-post) the occurrence of a risk. Fauziyah (2011) conducted a similar study on a farming business in Polagan Village and discovered that ex-ante risk reduction strategies were implemented using hybrid varieties and certified seeds. The ex-post strategy was accomplished by increasing capital through savings and borrowing from the Farmers Association (Gapoktan). According to (Hasan *et al.* 2016), production and price are important factors that must be considered in risk reduction. According to Kahan (2008), farmers can manage risk in five stages: (1) the identification of potential sources of risk, such as prices, pests, and diseases, as well as productivity and labor, (2) the identification of the potential impacts of risk on income and crop production due to changes in price and weather, (3) the implementation of various alternative strategies, such as packaging, controlling pests and diseases, developing production plans, and utilizing new technologies, (4) an assessment of the consequences of each strategy implemented, and (5) an assessment of the trade-off between the costs incurred to manage the risk and the gain realized from risk reduction.

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Fauziyah (2020) demonstrated that risk reduction can also be accomplished in corn farming using the Kountur method. According to Kountur analysis, one way to mitigate risk in corn farming is to revitalize farmer groups through various programs, such as the validation of bargaining positions in price determination, stock reduction of traded inputs, implementation of integrated Pest and Disease Reduction (IPM) and re-intensifying the cooperation system. The proposed strategy by Fauziyah (2020) was consistent with previous studies by (Hayran & Aykut 2015; Iskandar, 2021; and Obalola & Ayinde 2018). Therefore, this study aimed to describe farmers' perceptions regarding the causes, opportunities, and impacts of risks to develop a risk reduction strategy for salt farming on Madura Island.

MATERIALS AND METHODS

The study was conducted in November 2021, using purposive sampling on Madura Island as the focal point of salt production in East Java Province. The samples were 120 salt farmers from Sampang, Pamekasan, and Sumenep regencies. The distribution of the samples in each regency can be seen in Table 2.

Determining the number of samples in each village is different, adjusted to the large number of salt populations in the area. The Kountur Method was used to analyze the primary data collected through structured questionnaire interviews. Respondents assessed five risks: production, market, institutional, human resources, and financial risks. In the first objective, salt farmers were asked to reveal their perceptions of the risk probability and impact of salt farming, which was assessed using a Likert scale of 1 to 5. A value of 1 indicated a low-risk probability and impact, while 5 indicated a high-risk probability and impact. Table 3 shows a detailed representation of this data. The value of salt farmers' perceptions of risk can be calculated using the formula in equations (1) and (2).

$$\text{Probabilitas} = \frac{O + 4M + P}{6} \ldots\ldots\ldots (1)$$

$$\text{Impact} = \frac{O + 4M + P}{6} \ldots\ldots\ldots\ldots (2)$$

Source: Kountur (2008).

Where:
O = The optimistic value
M = The most likely value (the value that occurs frequently)
P = The pessimistic value

The formula above were used to obtain non-biased study data. The most likely value was multiplied by four because it can be trusted and generally represents the value of a person considered an expert in various events. The analysis results can be used to map salt risk (Figure 1). The second purpose (risk reduction strategy) was carried out based on the results obtained from the risk mapping. Two strategies will be offered, including prevention and mitigation.

RESULTS AND DISCUSSION

Salt Farmers' Perception of Source, Probability, and Impact of Risk

Several types of risks associated with salt farming on Madura Island include production, market, institutional, human resource (HR), and financial risks. Production risks in salt farming can be sourced from the quality of seawater used, wind and temperature at the production site, rainfall levels, and soil porosity. According to salt farmers, production risk has a significant impact (average impact value above 4; a low probability of occurrence on average. It may be due to certain factors, such as the quality of the seawater used, the wind and temperature at the production site, the amount of rainfall, and the porosity of the soil. Low water quality can cause salt products to turn yellow or

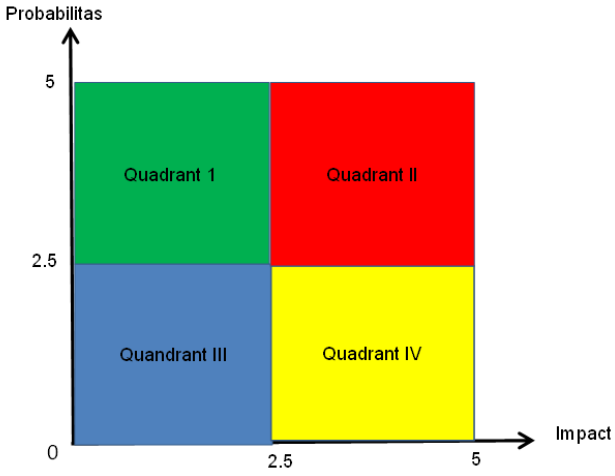

Figure 1 Risk mapping by contour.

Table 2 Number and distribution of study samples

Regency	Sub-district	Selected village	Sample (person)
Sampang	Sreseh	Marparan	20
		Disanah	20
Pamekasan	Galis	Lembung	10
		Polagan	10
		Konang	10
		Pandan	10
Sumenep	Kalianget	Karanganyar	15
		Kertasada	10
		Pinggir Papas	15

Table 3 Weight of probability and impact of risk

Probability	Weight	Impact	Weight
Very high	5	Very high	5
Big	4	Big	4
Moderate	3	Moderate	3
Low	2	Low	2
Very low	1	Very low	1

Source: Kountur 2008.

brown due to seawater and river water mixing during long rainy seasons when these water channels do not flow and leave a dirty sewerage pool behind. There is also an increased porosity since the salt crystals formed are extremely fine particles, especially when the wind pressure is low when clearing new land. Additionally, this can damage the nursery ponds since it causes them to absorb water and soften. Table 4 indicates salt farmers' perceptions of risk probability and impact based on the analysis results.

Market risks can arise from the price of salt and marketing channels. According to the perception of salt farmers, it has a significant impact and a high probability of occurrence on average due to the high fluctuations of the salt price received by farmers, which affects their low income. Also, this price fluctuation is caused by imported salt, which is becoming more prevalent since it is cheaper than smallholder salt. According to (Moqoddas & Subari 2020), the price of salt is influenced by the amount of production, the level of consumption, and the price of imported salt. The amount of salt produced and the cost of imported salt harm the price of salt, whereas the amount of salt consumed positively affects the price of salt. The marketing system is also subject to market risk due to the lack of price information by farmers, oligopoly or cartel market structures, and the classification of salt farmers as price takers (Dewan 2011, Suherman *et al.* 2011, Fauziyah 2014, Prasetyo 2020). Additionally, farmers perceive two other sources of market risk that pose a minimal impact on salt farming, including the demand and competition for salt farming. Co-salt farmers face no competition since the market can absorb any salt produced due to the high demand. However, competition comes from production partners, who compete for the resources needed to facilitate processing. Institutional risks arising from government salt policies, partnerships, and limited financial institutions significantly impact salt farming and are perceived as high-risk. These results are consistent with (Astuti *et al.* 2019), which stated that the institutional perception of salt commodities included the availability of financial institutions, farmer relationships with salt marketing actors, cooperatives and salt companies, extension workers, and farmer groups. Therefore, salt farming falls into the category of sustainability. Farmers viewed the government policy on salt imports negatively since the quality of smallholder salt was insufficient to compete with imported salt. Meanwhile, some salt farmers have not formed a partnership with the salt processing industry since they believe that the partnership prevents them from freely selling their products. Farmers can also not collaborate with industries due to their dependence on middlemen, who provide them with business capital loans.

The risks associated with human resources included a lack of formal education and a labor shortage, which were perceived to have a significant impact and a low probability of occurrence. Labor is relatively difficult to come by in salt farming areas since most salt farmers are over 49, with an average of 21 years of experience. Lastly, financial risk can arise due to the availability of capital and financial records. Financing difficulties are a common source of risk for farmers due to the high dependence on middlemen, who are then compensated for salt sales during the harvest season.

Salt Risk Reduction Strategy

Risk reduction is a strategy aimed at minimizing the impact or loss. This strategy can be determined using risk mapping based on the probability and impact of these risks. Salt farming risks can be mapped using the probability and impact values shown in Figure 2. The risks are depicted in three quadrants in the diagram, which include quadrants 2, 3, and 4. Quadrant 2 consists of risks with a high probability and impact, such as government policies on imported salt, a scarcity of farmers who participate in the partnership with the salt processing industry, the presence of unfavorable wind and temperature conditions, the presence of unfavorable marketing channels, low and fluctuating salt selling prices, and the availability of capital owned by salt farmers. Meanwhile, quadrant 4 consists of risks with a low probability of occurrence

Table 4 Perceptions of probability and impact of salt farming production risk on Madura Island

Risk type	Source of risk	Risk probability	Impact
Production	Seawater quality	2.33	3.67
	Wind and temperature	3.00	4.33
	Rainfall	1.67	4.33
	Soil porosity	2.33	3.00
Market	The selling price of salt	3.00	3.67
	Local salt request	1.67	1.67
	Competition in salt farming	1.67	1.67
	Marketing channel	3.00	3.67
Institutional	Government policy on salt	3.67	3.67
	Partnership	3.00	3.67
	Limitations of financial institutions	1.67	3.67
Human resources	HR quality	1.67	2.33
	Lack of labor	1.67	3.67
Finance	Availability of capital	3.00	1.67
	Financial records	2.33	3.67

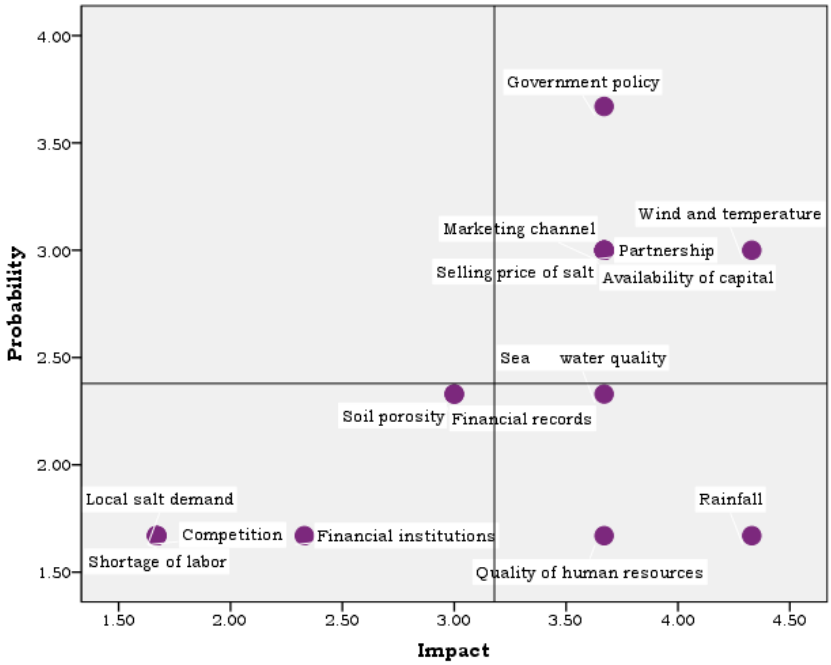

Figure 2 Map of salt farming risks on Madura Island.

and high impact, such as seawater quality, rainfall, and the low quality of human resources. There are also low probability and impact risks in salt farming, which are in quadrant 3, such as local salt demand, financial records and institutions, salt farming competition, and labor shortages.

The risk reduction strategy that can be implemented in salt farming is a preventive strategy, which includes shifting the source of risk from quadrant 2 to quadrant 4 by lowering the probability of risk occurrence. According to Kountur (2008), risk reduction strategies can be implemented through the following methods: (1) the development of systems and procedures, (2) the development of human resources, and (3) the installation or repair of physical facilities. Furthermore, preventive risk reduction can be accomplished through several ways in salt farming, including 1) The wind pressure is not high enough to move the windmill in the salt field due to the blades' weight, leading to an inefficient water transfer to salt land. However, this condition can be overcome by increasing the number and quality of windmills in salt fields. The results showed that 77.5% of salt farmers own only windmills. Also, (Setiawan *et al.* 2015) proposed a method for repairing wind turbines based on the horizontal axis principle, which can provide up to 88.59m3 of seawater per day; 2) Salt farmers require capital in the form of finance and equipment, such as rakes, water pumps, geomembrane plastic, windmills, salt storage baskets. According to a previous study by (Rosyidah 2020), salt production requires additional facilities and infrastructure, such as water pumps, windmills, geoisolators, scavengers, baumemeters, wheelbarrows, and others. Meanwhile, the government provided an incentive through the PUGAR program, an alternative method to provide geoisolators and other salt production facilities. According to (Kurniawan *et al.* 2014), the information about the implementation of the PUGAR program was not adequately communicated to KUGAR (Smallholder salt Business Groups) until the aid disbursement process. Also, the incentive provided by the government for PUGAR decreased after the salt farmers harvested the salt since the provisions were no longer needed at the time. Therefore, the farmers started purchasing and repairing the salt reduction tools of other individuals in order to construct salt land infrastructure. According to (Aryani & Azyzia 2020), the PUGAR program could have been more effective in increasing salt productivity since the aide distributor was usually not punctual. However, Sinaga *et al.* (2020) stated that government assistance can be used to mitigate capital risk. The sustainability of PUGAR can be enhanced by developing standard operating procedures for the distribution of aides in order to maximize its use and increase salt productivity; and 3) Another strategy that can be implemented to mitigate the risks associated with market channeling and salt commodity prices is the strengthening of the bargaining power of farmers through cooperatives and the optimization of farmer groups or partnerships, which was consistent with a previous study by (Sinaga *et al.* 2020) on the salt commodity in Klungkung. Obalola and Ayinde (2018), Iskandar (2020), and Fauziyah (2020) proposed similar approaches for mitigating such risks in onion, dairy, red chili, and corn farming. However, the established salt farmer groups do not perform their expected role and function. Most of these groups were formed to fulfill the requirements for geoisolator assistance. According to Hermanto *et al.* (2011), the farmer groups have not succeeded since they were formed based on technical interests, do not consider social capital, provide individual guidance (only to

administrators), and frequently ignore group performance. Therefore, optimizing the role of groups is a strategic solution to counter the marketing competition from middlemen. Several strategic steps can be taken to revitalize farmer groups, including (1) promoting and guiding farmers to enable their collaboration in the economic field, (2) developing farmer groups through an increase in the facilitation of assistance, access to capital, bargaining power, facilitation and coaching for group organizations, and farming efficiency and effectiveness, and (3) facilitating capacity building. Therefore, Field Agricultural Extension Officers oversee technical efforts to strengthen farmer groups (PPL). However, NGOs and other organizations deemed capable of assisting with the development of farmer groups can also help develop farmer groups.

CONCLUSION

Based on the analysis results, salt farmers perceive the risk of salt farming as coming from production activities, markets, human resources, institutions, and finance. Identified sources of risk include wind and temperature, rainfall, soil porosity, salt price fluctuations, marketing channels, government policies on salting, partnerships, capital institution stability, labor shortages, and financial records. Furthermore, the perceived risk sources that have a high impact are temperature and wind, marketing channels, government policies, partnerships, salt prices, and capital. The recommended strategies are revitalizing groups/cooperatives and partnerships, repairing windmills using the horizontal axis principle, and providing capital assistance through the sustainability of the PUGAR program by improving the timely and targeted disbursement of funds.

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