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Risk Analysis of Tobacco Farming in Bajang Village, Pakong Sub-District, Pamekasan District

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ABSTRACT

In fact, the magnitude of the economic potential worth of tobacco commodities is not directly proportionate to the conditions encountered by farmers in the field. Tobacco farmers in Bajang Village are faced with many problems that may indicate risks that threaten the sustainability of farming activities. The goals of this research are to: (1) identify the risks faced by farmers in tobacco farming, (2) evaluate the level of risk in tobacco farming, and (3) examine the composition of mitigation strategy for prioritized risks in tobacco farming in Bajang Village. Respondents in this study consisted of key informants and 43 farmers using the Fishbone Diagram and FMEA (Failure Mode and Effect Analysis) analysis methods. According to the analysis result, there are a total of 15 risks based on five risk sources: production, price and market, finance, human resource, and institutional. Weather and climate uncertainty, price uncertainty, quality and quantity uncertainty, pest and disease attacks, and farmers' lack of insight are the top five risks. Mitigation strategies are presented in an attempt to lessen the impact of risks on tobacco farming.

Keywords*: Fishbone Diagram, FMEA, Risk, Tobacco*

INTRODUCTION

Tobacco is a seasonal plantation commodity with considerable economic potential among Indonesia's diverse industrial crops. Tobacco plays a crucial role in the socio-economic life of society, generating governmental revenues in the form of excise and foreign exchange, providing employment, as a source of income for farmers, laborers, and traders, as well as regional income (Hasan & Darwanto, 2013). Tobacco production in Indonesia will reach 236,900 tons in 2021 (Central Bureau of Statistict, 2022b). This demonstrates that Indonesia is a country with relatively high tobacco productivity in the world. This high productivity is, of course, supported by Indonesia's geographical and climatic conditions, which allow tobacco plants to grow optimally in certain areas with tropical climates.

Madura Island is one of the several sites in East Java Province where tobacco is widely cultivated. Pamekasan District is one of Madura's tobacco-producing areas, with the highest total production compared to the other three districts (Bangkalan, Sampang, and Sumenep). Tobacco production in Pamekasan District will reach 18,965 tons in 2021 (Central Bureau of Statistict, 2022a). This accomplishment is inextricably linked to the high quality of tobacco production in Pamekasan District, which is known for its distinctive taste and scent.

One of the tobacco-producing areas in Pamekasan District is Bajang Village. Bajang Village is a village with the majority of the population making a living as farmers by making tobacco one of the

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main commodities in their farming activities. In tobacco farming, farmers in Bajang Village are often faced with problems that cause risks. Factors that become a problem in tobacco farming in Bajang Village include scarcity and expensive fertilizer prices, tobacco selling prices that always fluctuate, weather and climate changes, plant pest attacks and other problems that may indicate a risk in tobacco farming activities. This condition is in line with the opinion of Mardiana et al. (2022) that farmers in carrying out tobacco farming often experience risks and uncertainties in the form of fluctuations in production and prices which are important sources of uncertainty in businesses in the agricultural sector. Furthermore, Debertin (1986) in Lawalata et al. (2017) stated that generally agriculture is characterized by conditions full of risk and uncertainty, this is because agricultural activities are vulnerable to climate change, pest and disease attacks and fluctuations in the prices of agricultural products on the market.

According to Darmawi (2022) Risk is associated with the possibility of unwanted, or unexpected, adverse consequences (losses). In other words, the possibility already indicates uncertainty. This uncertainty is a condition that causes the growth of risk. Next, Arifudin et al. (2020) believes that any definition of risk includes at least two important aspects, namely the probability/likelihood aspect and the loss/impact aspect. There are several risks that often occur in farming and can reduce farmers' income, namely production risk, price and market risk, institutional risk, human resource risk and financial risk (Sari & Munajat, 2019).

The many problems faced by farmers in running their farming business require a certain management or analysis to minimize the impact or losses received by farmers. According to Febriani (2021) the existence of unforeseen risks necessitates an effective and massive management plan in order to reduce the incidence of larger losses for individuals, companies, and corporate entities. A risk mitigation approach is one effort that farmers can make as an alternative to risk management. Risk mitigation techniques are implemented to address risks that have an impact on the long-term viability of a company activity. Risk mitigation is an attempt to decrease or eliminate the unpleasant or negative consequences (losses) that have happened as a result of a risk. According to Naftaliasari et al. (2015) There are several ways that are included in the mitigation strategy, namely diversification, aggregation and risk transfer. Thus, it is necessary to formulate a mitigation strategy as an effort to reduce the impact of the risks posed.

Risk-related research has been carried out by Al-Pansuri et al. (2022) to identify the risks of red chili farming using the FMEA (Failure Mode and Effect Analysis) method. The results showed that there were 21 risks faced by farmers and based on the calculation of the RPN (Risk Priority Number) value, there were 3 risks that had to be prioritized. The risks that must be prioritized first are fruit rot disease, rainfall caused by the rainy season and price declines due to the main harvest. Similar research was also carried out by Fajriah et al. (2021) to analyze the risk of rice farming using the FMEA (Failure Mode and Effect Analysis) method. The results of the study show that based on the calculation of the RPN (Risk Priority Number) value, there are 5 out of 26 risks that must be prioritized. The risks that must be prioritized are drought, water shortages and restrictions on water from irrigation, pest and disease attacks, uncertain climate change and expensive fertilizer prices.

According to the description above, the researcher wishes to conduct research with the goals of: (1) identify the risks faced by farmers in tobacco farming, (2) evaluate the level of risk in tobacco

farming, and (3) examine the composition of mitigation strategy for prioritized risks in tobacco farming in Bajang Village.

RESEARCH METHODS

This study was conducted in September - December 2022 in Bajang Village, Pakong Sub-district, Pamekasan District. The location was chosen purposively, considering that the majority of people in Bajang Village work as farmers, with tobacco being one of the main commodities. The following consideration is that tobacco producers in Bajang Village must face risks in farming activities that may endanger tobacco farming's long-term viability.

This study relied on primary data gathered through direct interviews with respondents using thorough interview techniques, questionnaires, and documentation. The study's participants were selected purposively and included key informants (agriculture service, extension workers, farmer groups, and collectors) and farmers. The snowball sampling approach was used to determine key informants. Key informants serve as resource persons in identifying the risks of tobacco farming, while farmers play a role in analyzing the risk level of tobacco farming. Farmers who were used as responders were chosen on purposive based on the following criteria: 1) Tobacco farmers with at least ten years of experience; 2) Owners of their own land. The number of farmers is determined using the Lemeshow method with a cause of significance threshold of 15%, taking into account the effort and time involved in data collection. The sample determination is calculated using the Lemeshow formula as follows:

$$n = \frac{z^2 p(1-p)}{d^2}$$

$$n = \frac{1{,}960^2\ 0{,}5(1-0{,}5)}{0{,}15^2}$$

$$n = 42{,}648 \text{ atau } 43$$

Information :
n = Number of samples
z = Standard value = 1.960
p = Maximum estimate = 50% or 0.5
d = Alpha value or*cause of significance*= 15% or 0.15

The Fishbone Diagram and FMEA (Failure Mode And Effect Analysis) were used in this study to analyze data. The risks of tobacco farming are examined in five sources: production risk, price and market risk, financial risk, human resource risk, and institutional risk. The Fishbone diagram is used to analyze the risks associated with tobacco production by identifying possible causes of problems. Fishbone diagram depicts the impact or outcome of a situation with several causes (Monoarfa et al., 2021).

After identifying the risk sources through the fishbone diagram, then to determine the severity of the impact of each risk source an analysis will be carried out using the FMEA (Failure Mode And Effect Analysis) method. FMEA analysis is carried out by determining the value of severity (Severity), chance of occurrence (Occurance) and opportunity for control (Detection). Severity is a quantification of how serious the conditions that occur are caused by each source of risk. The more serious the consequences caused by the source of the risk, the higher the value (Dio Ramadhan et al., 2018). The criteria for determining the value or severity rating are shown in the following in Table 1.

Occurrence is the likelihood or probability or frequency of an error occurring (Noor et al., 2018). Occurrence assessment is based on the frequency of risk events or failures that occur on a farm. The higher the likelihood of a risk occurring, the higher the occurrence value and vice versa.

Table 1
Severity Value

Ratings	Impact Level	Verbal Criteria
1	Very low	No impact on farming (Risk does not have an impact on production results/income and/tobacco farming capital)
2	Low	Little influence (Risk can reduce production/revenue and/capital of tobacco farming by 15%)
3	Currently	Moderately influential (Risk can reduce production/revenue and/tobacco farming capital by 25%)
4	High	Very critical effect (Risk can reduce production/revenue and/capital of tobacco farming by 50%)
5	Very high	Very detrimental (Risk can reduce production/revenue and/tobacco farming capital by >50%)

Source :Gaspersz (2012);Al-Pansuri et al. (2022)

Table 2
Occurrence Value

Ratings	Chance Level	Verbal Criteria
1	Very low	The risk almost never occur
2	Low	Risks are very rare
3	Currently	Risks sometimes occur
4	High	Risks occur frequently
5	Very high	Risks are hard to avoid

Source :Gaspersz (2012)

Opportunity control (Detection) is the possibility to detect an error will occur or before the impact of the error occurs. The assessment given shows how far we can detect the possibility of an error or the impact of an error. This can be measured by how far controls or indicators are available for it (Noor et al., 2018).

Table 3
Control Opportunity Value

Ratings	Detection Level	Verbal Criteria
1	Very high	Definitely detected (Risk fully detectable)
2	High	Most likely detected (75% detectable risk)
3	Currently	Likely detected (50% detectable risk)
4	Low	Low probability of detection (25% detectable risk)
5	Very low	Risk cannot be detected

Source :Gaspersz (2012); (Al-Pansuri et al., 2022)

Based on the values obtained from each criterion in the FMEA analysis, the Risk Priority Number (RPN) is then calculated. The risk priority level (Risk Priority Number) is the result of the multiplication of each level of severity, occurrence and detection (Noor et al., 2018). The results of the RPN calculation can be used to determine the highest risk value. Here is the calculation formula:

RPN = S x O x D

Information :
RPN = *Risk Priority Number*
S = *Severity*
O = *Occurance*
D = *Detection*

The formulation of mitigation strategies is carried out through interviews and literature studies based on field conditions. Literature is taken from sources or journals related to tobacco farming. The mitigation strategy is structured as an effort to control priority risks in tobacco farming in Bajang Village. Priority risks are determined purposively by taking the 5 risks that have the highest RPN values.

RESULT AND DISCUSSION

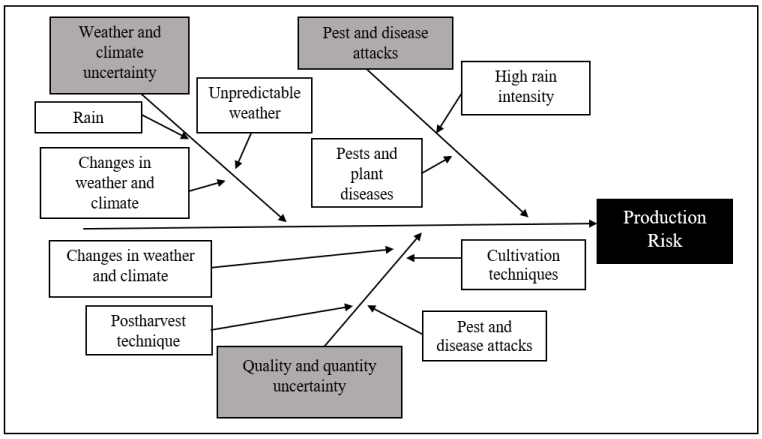
Risk Identification

The starting point in this investigation is to identify risk sources. The aim is to map the risks associated with tobacco production so that the causes of the problems that produce the risks may be easily identified. A fishbone diagram based on five risk sources: production risk, price and market risk, financial risk, human resource risk, and institutional risk is used to identify the sources of risk.

Production Risk

Production risks that occur in tobacco farming in Bajang Village include weather and climate uncertainty, quality and quantity uncertainty as well as pest and disease attacks.

Figure 1. Production Risk



Source: Primary data, 2022

Uncertain weather and climate are factors that greatly affect tobacco farming. Weather and climate uncertainty is a serious challenge for tobacco farmers because it is uncontrollable and difficult to predict. Tobacco is a plant that is very sensitive to changes in weather and climate so that it greatly affects the tobacco produced. This is in line with the opinion of Harlianingtyas et al. (2021) that tobacco plants are plants that are sensitive to environmental factors including climate factors, such as rainfall, humidity, and temperature. For tobacco farmers in Bajang Village, the main problem in tobacco farming in the study year was wet drought. Farmers complained about the rains that fell in May and continued to fall towards the end of the harvest season. This of course can cause tobacco plants to be damaged, rotten and susceptible to pests and diseases. This risk also affects the post-harvest process, namely drying the tobacco, in which generally tobacco is only sufficient to dry for 1.5 days if the weather is hot or a maximum of 2 days. However, if it rains, the drying time can be longer than that time, causing the color of the tobacco to turn black and its quality to decrease.

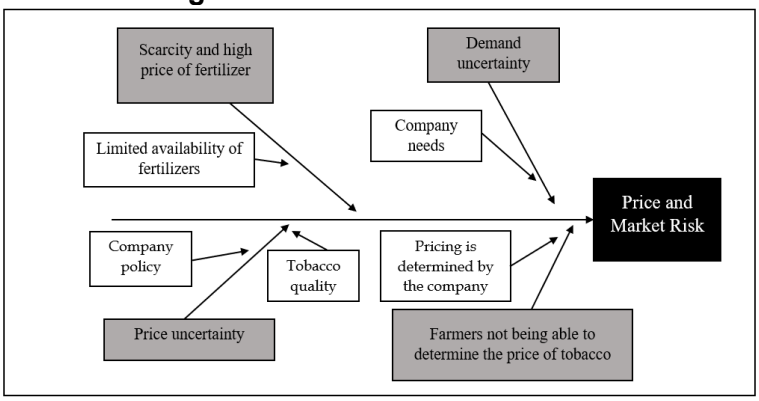
Uncertainty in the quality and quantity of tobacco production can be affected by weather and climate, pest and disease attacks, cultivation techniques and improper postharvest handling techniques. To produce tobacco with high quality is very dependent on the weather. Good tobacco should not be exposed to water so good weather will determine the outcome of the tobacco (Ervina & Sugiarti, 2014). Tobacco plants that are constantly exposed to rain will be damaged, rotten and become susceptible to pests and diseases so that it can have an impact on decreasing the quality and quantity of tobacco. Cultivation techniques which include land preparation, planting, maintenance and harvesting as well as post-harvest techniques namely sorting, ripening, chopping, tobacco drying and packaging also really need to be considered because it will affect production. Tobacco farmers in Bajang Village determine the quality of tobacco based on the aroma, taste, color and texture of the tobacco. According to the farmers, high quality tobacco will have a golden yellow color, strong aroma and taste and a slightly sticky tobacco texture. The most widely cultivated variety is the Bojonegoro variety because it is able to produce more leaves than other varieties, but there are also those who choose the seeds of superior varieties Prancak-95 and Cangkring with consideration of the higher quality of the tobacco leaves.

Pest and disease attacks on tobacco plants is a problem that is often faced by farmers. Siregar (2016) argues that pest and disease (fungi and viruses) attacks can affect tobacco production, both in terms of quality and decreased quantity of tobacco. The intensity of the rain also affects the tobacco plants where the plants will potentially be attacked by pests and diseases which will reduce the quality and quantity of their production. For farmers in Bajang Village, several pests and diseases that most often attack tobacco plants are TMV, leaf caterpillars, armyworms, stem rot, bacterial wilt, londrak and cracker disease. Plants that are damaged by diseases (fungi, bacteria and viruses) that are easily transmitted will be uprooted and discarded to avoid transmission to other plants.

Price and Market Risk

Price and market risks that occur in tobacco farming in Bajang Village include the scarcity and high price of fertilizer, demand uncertainty, price uncertainty and farmers not being able to determine the price of tobacco.

Figure 2. Price and Market Risk



Source: Primary data, 2022

The uncertainty of the selling price of tobacco causes farmers to experience income uncertainty. Farmers in Bajang Village do not have the ability to determine prices, this is because the pricing policy is fully held by the company. The selling

price is decided by the quality of the tobacco; the better the quality, the greater the selling price. Tobacco farmers will receive the maximum price for high-quality production (grade A), but if the quality is poor, they will receive a standard or even the lowest price (Fanani et al., 2015). The Pamekasan District Government has made efforts to protect the selling price of tobacco. The base price for tobacco is decided by deliberation between the KUTP and the Regional Government, as stated in Pamekasan District Government Regulation No. 2 of 2022. Companies are encouraged to purchase tobacco from farmers using the base price as a guideline. This is intended to protect the selling price at the farmer level.

The scarcity and high price of fertilizer causes farmers to have to increase production costs to meet their cultivation needs. Tobacco farmers in Bajang Village said that the availability of fertilizer was limited, causing farmers to experience difficulties in accessing fertilizer. This condition has an impact on fertilizer prices soaring. According to BALITTAS (2018) Limited availability of fertilizers can be caused by the allocation of fertilizers to production centers which are prioritized for food crops or increased fertilizer prices, an increase in fertilizer prices will certainly reduce farmers' profits. Even so, because fertilizer is a basic need in cultivation activities, farmers inevitably have to keep buying it even at a limited cost.

Farmers cannot determine the price of tobacco even with good quality. This is because the price determination policy is fully held by the buyer, which in this case is the company. Farmers cannot know for certain what the selling price of their tobacco is, because even though according to farmers the tobacco they sell is of high quality, the price and quality are always different if the tobacco is already in the warehouse and graded by a grader. In line with the opinion of Mardiana et al. (2022) that the determination of tobacco prices becomes the authority of the company as a price determinant and cannot be negotiated so that farmers have no other choice but to sell tobacco to cigarette companies even at a low price to get their capital back.

Uncertainty in demand can occur because every year the cigarette industry or company has a purchase target that is adjusted to production needs. In meeting this target, the company will open a purchase within a certain period and when the purchase target is met, the company will close the purchase. Announcement of the purchase amount and the implementation of opening or closing purchases must be made in accordance with Pamekasan District Government Regulation No. 2 of 2022, namely at least 7 days before starting and ending purchases by publishing them to the public. Although the company has announced purchase targets and purchase opening and closing dates. Farmers are only able to make estimates regarding the opening and closing times of these purchases and hope that the tobacco can be absorbed. Another issue that arises at the farmers level is when the farmers enters the harvest season while the company has not yet made a purchase and when the company closes the purchase because the target has been reached while the farmers still has tobacco that isn't ready to be harvested.

Financial Risk

The financial risks that occur in tobacco farming in Bajang Village include limited business capital and no keeping financial records. The limited availability of business capital can hamper the sustainability of tobacco farming. The majority of farmers in Bajang Village experience limited capital in tobacco farming because they only rely on limited farming yields from the previous season and personal capital. This capital limitation can certainly hinder the farming

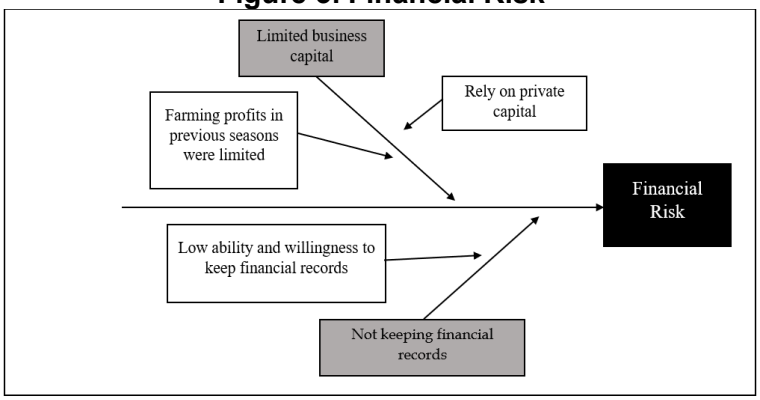
process they run. Finally, farmers meet their capital requirements by borrowing from family and selling or pawning personal valuables such as gold, motorcycles, and livestock.

The majority of tobacco farmers in Bajang Village do not keep financial records and instead estimate their expenditure and profits during the growing season. This is due to the low ability and willingness of farmers to keep financial records. In fact, with the existence of financial records, farmers can find out whether they experience losses or profits. Farmers can also utilize financial data as a reference in the following farming procedure. Thus, financial recording may be done simply and according to each farmer's comprehension.

Human Resource Risk

Human resource risks that occur in tobacco farming in Bajang Village include the shortage of labor, farmers' lack of insight, work accidents dan sick

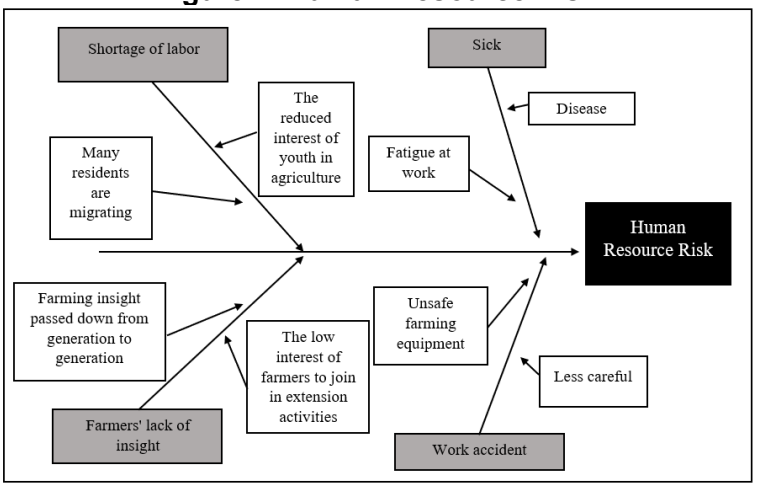
Figure 3. Financial Risk



Source: Primary data, 2022

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Figure 4. Human Resource Risk



Source: Primary data, 2022

Farmers' lack of insight is a factor that can influence tobacco cultivation results. This is because good farmers' knowledge and skills will result in high-quality tobacco output. Farmers' lack of insight is related to farming expertise passed down from generation to generation, the low interest to participate

in extension activities, and farmers are unwilling to be open with the recommended agricultural knowledge. Farmers' insight of unsuitable agriculture includes uneven fertilization, inaccurate cropping patterns, pest and disease management that is not in accordance with IPM (Integrated Pest Management) principles, and still-inappropriate post-harvest treatment. This, of course, leads to inconsistencies in the tobacco production process carried out by farmers using GAP or Good Agricultural Practices.

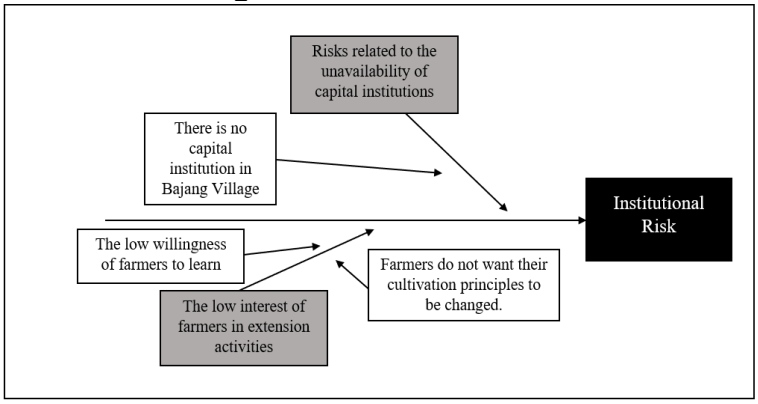
The shortage of labor can be caused by the large number of villagers who migrate and the reduced interest of youth in agriculture. Farmers' farming processes are impeded as a result. Farmers typically solve these issues by instituting a system of mutual cooperation. Even Nevertheless, farmers still experience difficulties in sharing their time in carrying out mutual collaboration with other farmers, resulting in a lot of work on the land being done at night because it conflicts with the mutual cooperation schedule during the day.

Work accidents can be caused by several things, namely agricultural equipment that is not safe and not careful in using agricultural machinery. Accidents that commonly happen to farmers are the farmer's feet being hit by a hoe, his hand being hit by a sickle and his finger being hit by a chopper. Next, the risk of farmers getting sick can be caused by fatigue at work and disease. Diseases that commonly infect tobacco farmers in Bajang Village are fatigue, dizziness, fever and flu. However, according to the narrative of the majority of farmers, this risk does not really hinder the farming process because if the farmer is sick, they only needs 1-2 days of rest and during the recovery period their role will be replaced by another family (children, wife, relatives) to handle field conditions.

Institutional Risk

Institutional risks that occur in tobacco farming in Bajang Village include risks related to the unavailability of capital institutions and the low interest of farmers in extension activities.

Figure 5. Institutional Risk



Source: Primary data, 2022

The relationship between farmers and extension workers is an important factor in supporting agricultural development. The existence of agricultural extension workers plays a role in assisting farmers in correctly and satisfactorily addressing the issues they face in order to raise their level of living. Many farmers in Bajang Village, however, did not participate in extension operations. The reason is due to the low willingness of farmers to learn and do not want their cultivation principles to be changed. As a result, farmers' insights

into tobacco farming do not evolve and are constrained to cultivation expertise passed down from generation to generation. As a result, the production outcomes are not optimal.

There is no capital provider institution can certainly hinder the process of running a farming business. It is known that the majority of tobacco farmers in Bajang Village experience limited capital to run tobacco farming. However, the majority of farmers are not too concerned about this risk because they prefer to use personal capital and borrow from relatives. The consideration is because borrowing from capital institutions will require a lot of requirements.

Tobacco Farming Risk Severity Level

The severity of the risk of tobacco farming is determined through the FMEA (Failure Mode And Effect Analysis) method. Determination of the severity rating is based on the criteria of severity (severity level), occurrence (chance of occurrence) and detection (opportunity for control) the following results are obtained:

Table 4.
FMEA Calculation Results

No	Farming Risk	S	O	D	RPN
1	Weather and climate uncertainty	5,0	5,0	4,3	107,50
2	Price uncertainty	4,5	4,9	4,1	90,41
3	Uncertainty of quality and quantity	4,7	5,0	3,8	89,63
4	Pest and disease attacks	4,0	4,7	3,6	67,68
5	Low insight of farmers	3,7	4,3	3,5	54,95
6	Farmers not being able to determine the price of tobacco	3,0	4,8	3,4	48,96
7	Scarcity and high price of fertilizer	3,7	4,7	2,7	46,95
8	Limited business capital	3,3	4,8	2,2	34.85
9	The low interest of farmers in extension activities	2,8	3,9	2,4	26,21
10	Shortage of labor	2,3	4,7	2,1	22,70
11	Demand uncertainty	1,4	4,9	1,4	9,60
12	Not keeping financial records	1,7	2,3	1,7	6,65
13	Sick	1,4	2,3	1,6	5,15
14	Work accident	1,2	2,3	1,7	4,69
15	Risks related to the unavailability of capital institutions	1,1	2,4	1,0	2,64
	Amount				618,57

Source: Primary data processed, 2022

Weather and climate uncertainty is a major problem in tobacco cultivation, this is because tobacco plants are plants that are sensitive to changes in weather and climate. Weather and climatic changes are risks that cannot be avoided with an opportunity value of 5, the level of impact of losses suffered is greater than 50%, with a severity value of 5, and the level of control over the impact of very modest risks, with a control value of 4,3. According to Fajriah et al. (2021) that climate change is a top risk in rice growing. These results are also consistent with the findings of Al-Pansuri et al. (2022), who discovered that excessive rainfall is a major danger in red chili production. Rain is known to be a indicator of the risk of weather and climate change.

Price uncertainty occurs because it is influenced by uncertain tobacco quality and the determination of the price is fully determined by the company. This of course affects prices which fluctuate. In

addition. The risk of price uncertainty has a severity level of 4,5, where this risk has a critical effect on farmers' acceptance, the level of chance of occurrence is 4.9, where this risk is almost certain to occur and is difficult to avoid, and the level of risk impact control is 4,1, which is the possibility small impact risk can be controlled.

Quality and quantity uncertainty is affected by weather and climate conditions, pest and disease attacks and inaccurate cultivation and post-harvest techniques. This risk will affect the selling price and farmers' income. This risk has a severity level of 4,7 where this risk is very critical and detrimental to tobacco farming, the level of chance of occurrence is 5,0 where this risk is certain to occur and is difficult to avoid and the level of risk impact control is 3,8 which has a risk impact less likely to be controlled.

Pests and diseases attack plants which can indicate a decrease in the quality and quantity of production. This risk has a severity level of 4,0 where the impact of the risk has a critical effect on farming, the level of chance of occurrence is 4,7 where this risk often occurs and is difficult to avoid and the level of risk impact control is 3,6 where this risk tends to be less likely to control. These results are in line with research conducted by Fajriah et al. (2021) that the risk of peast and disease attacks and in the research of Al-Pansuri et al. (2022) that the risk of fruit rot disease attacks is included in the priority risks.

The low insight of farmers is influenced by farming knowledge that has been passed down from generation to generation, they do not participate in extension activities and farmers are unwilling to be open with the recommended agricultural knowledge. This risk has a severity level of 3,7, where this risk has a critical effect on farming, a chance rate of 4,3, where this risk often occurs, and a risk impact control level of 3,5, where the risk may be controlled.

The next potential risk is that farmers not being able to determine the price of tobacco (48,96), scarcity and high price of fertilizer (46,95), limited business capital (34,85), the low interest of farmers in extension activities (26,21), shortage of labor (22,70), demand uncertainty (9,60), Not keeping financial records (6,65), sick (5,15), work accidents (4,69) and risk related to the unavailability of capital institutions (2,64).

Mitigation Strategy of Tobacco Farming Risk

The formulation of risk mitigation strategies in tobacco farming is based on the 5 highest risks, namely weather and climate uncertainty, price uncertainty, quality and quantity uncertainty, pest and disease attacks and farmers' low insight. Strategy formulation is carried out through interviews with respondents and literature studies related to priority risks that are adjusted to field conditions. The structure of the strategy is as follows:

1. Risk of weather and climate uncertainty

Mitigation strategies for the risk of weather and climate uncertainty are carried out through several strategies, one of which is information related to climate forecasts by the Pamekasan District Agriculture Service. This is intended so that farmers can know the climatic conditions during the growing season. Thus farmers can estimate whether the growing season is suitable or potential for tobacco cultivation or vice versa. The strategy carried out by farmers in Bajang Village when it rains is to make high mounds. The tall mounds will quickly drain the stagnant water around the tobacco roots thereby reducing the death of the tobacco. The next strategy is to re-plan the planting period by delaying the planting period but still taking into account the time or cultivation period. This is because the delay in the planting period cannot be too long because if it is too long

it will cause farmers to experience delays in selling their tobacco products.

2. Risk of price uncertainty

The majority of farmers in Bajang Village are independent farmers where the risk of price uncertainty is fully borne by the farmers. So the strategy that can be suggested to farmers to protect the selling price is to establish partner relationships with the cigarette industry or companies. According to Fanani et al. (2015) the existence of partnerships can reduce production risks faced by farmers with technical assistance and capital assistance, besides that price risk can also be reduced due to price guarantees from partners. The next strategy that can be carried out by farmers is to study and know good tobacco quality standards as a basis for knowledge to minimize fraud in the tobacco sales process. Efforts to protect prices are also carried out by the Regional Government of Pamekasan District by setting a basic price determined through deliberations with the KUTP. This basic price must be used by companies in making purchases from farmers.

3. Risk of quality and quantity uncertainty

In the uncertainty of quality and quantity, the strategy that can be carried out by farmers is to pay attention to cultivation and post-harvest techniques so that they are in accordance with recommendations from the Ministry of Agriculture. The next strategy is to maintain soil fertility by balancing chemical fertilizers and organic fertilizers. Soil as a medium for growing tobacco must also be considered because fertile soil will produce high-quality plants. The next strategy is that farmers are advised to continue cultivating superior varieties of seeds with the aim of producing high quality and quantity tobacco. In addition to the several strategies above, farmers must also always be aware of external factors that cannot be controlled such as weather and climate, pest and disease attacks, product price conditions in the market as well as scarcity and changes in input prices as an effort to control the occurrence of risks.

4. Risk of pest and disease attack

Farmers control the risk of pest attacks by applying the principles of Integrated Pest Management. The principle of integrated pest control is suggested to focus on using natural pesticides and utilizing biological agents. However, if the pest attack has exceeded the attack threshold, the use of chemical pesticides is permitted as long as it is in accordance with the dosage (Rakhmawati et al., 2020). Then the way to deal with plant diseases caused by viruses, bacteria and fungi can be done by maintaining garden sanitation, removing infected plants and burning them.

5. Risk of farmer’s low insight

At a low risk of farmers' knowledge, the strategy adopted is to provide counseling and education to improve farmers' abilities in tobacco farming both related to cultivation techniques, post-harvest techniques, knowledge related to quality standards and marketing of tobacco commodities. Counseling and education in Bajang Village is often carried out by extension agencies and other training institutions. However, due to the low interest of farmers to join extension activities, extension activities can be in the form of activities that focus more on field practice or discussions such as demonstration plots.

CONCLUSION

According to the research results, there are 15 risks based on five risk sources: production risk, price and market risk, financial risk, human resource risk, and institutional risk. The FMEA analysis technique was used to calculate the top

five risks: weather and climate unpredictability, price uncertainty, quality and quantity uncertainty, pest and disease attacks, and farmers' lack of insight. The risk mitigation strategies provided is expected to be able to reduce the impact of priority risks on tobacco farming in Bajang Village. The mitigation plan will undoubtedly be optimized with the full support of all parties concerned, including the government, agricultural service, extension workers, and other organizations involved in tobacco production. Farmers, as the primary actors, must be able to absorb as much information as possible and be eager to learn in order to develop the tobacco farming system and get the best results. Given the tremendous potential of tobacco for the Indonesian economy, future study is expected to be able to explore the risks associated with tobacco growing in greater detail, particularly the trade system and government regulations related to tobacco commodities.

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