



Business Risk Management Strategy in Adaptation of Beef Cattle Businesses to the Impact of Climate Change in Sumenep District

Faisol Ali E¹, Budi Hartono², Nanang Febrianto³

¹Student, Faculty of Animal Science, University Brawijaya, Jl. Veteran Malang 65145 East Java, Indonesia

^{2,3}Lecture, Faculty of Animal Science, University Brawijaya, Jl. Veteran Malang 65145 East Java, Indonesia

ABSTRACT: This study aims to determine the mitigation strategies of farmers in Sumenep district in their strategic management when facing climate change. Climate change greatly affects livestock activities in Sumenep district in various factors, extreme weather changes can harm beef cattle farming in terms of selling value. Increased temperature causes stress in cattle. Drought can reduce forage and water availability. Dry conditions inhibit the growth of grass and other feed plants, forcing farmers to look for alternative feeds such as hay or commercial animal feed. Extreme climate change that occurs gradually over three months, twice the normal time and the following three months, facing extreme climate change that has an impact on the health of livestock in Sumenep District and the selling price of cattle that does not match the expectations of farmers. Research was conducted to outline strategies in business adaptation using the SWOT method to determine priority options from the general micro and macro impacts, the following knowledge aims to determine strengths, weaknesses, opportunities and threats. The right strategy in handling beef cattle business adaptation will minimize losses of farmers due to climate change and mitigation of greenhouse gas emissions from the livestock sector.

KEYWORDS: Adaptation, Beef Cattle, Climate Change, Management Strategy, SWOT.

INTRODUCTION

The global livestock production system is under great pressure. The increasing demand for animal protein from livestock products is largely due to population growth, urbanization, rising incomes and changing diets (Thornton, 2010; Delgado, 2003). Livestock production systems operate in a wide range of environmental conditions, causing livestock production to be increasingly affected by climate change. A quarter of the global economic impact of climate extremes is experienced by the agricultural sector, of which livestock is a subsector that suffers major damage and total losses (FAO, 2015). In 2016, the livestock sector experienced the lowest annual increase in meat production (1%) (FAO, 2016). The future of the livestock sector is projected to experience scarcity of essential resources for production, especially land and water, due to climate change (Weindl et al., 2015). Climate change has caused a decline in livestock productivity by directly suppressing livestock adaptive response mechanisms, altering the spread and prevalence of animal diseases (Bett et al., 2017), and causing heat stress and animal welfare problems (Morignat et al., 2014). In addition, climate change causes feed scarcity and poor forage quality (Giridhar et al., 2015). Research on the impacts of climate change and its adaptation on livestock systems is essential for the development of the livestock sector and all stakeholders that depend on it.

The livestock sector employs 1.3 billion workers and is the livelihood of around 900 million poor people worldwide (World Bank, 2015). Food from livestock provides about 14% of total calories and 33% of total protein in the diet of the world's population (FAO, 2016). The livestock sector has strong potential in resilience to climate change as it tends to be more resilient than crop-based farming systems (Prasad and Sejian, 2015). However, to improve livestock resilience to climate change, a better understanding of how climate change affects the livestock sector is needed (Descheemaeker et al., 2016). Effective policies and programs require livestock sector-specific data on climate change characteristics and impacts (Seo et al., 2009; Thornton and Gerber, 2010). The impacts of climate change on different livestock systems vary widely (Seo et al., 2010; Rust and Rust, 2013). Understanding these differences is essential for formulating policies and work programs (Thornton and Herrero, 2014). Sharing perceptions and knowledge about climate change impacts and adaptation at different scales of livestock systems is important to identify common concerns that can foster collaboration between different livestock production systems, as well as to identify areas most affected by climate change (Herrero et al., 2015).



MATERIAL AND METHODS

This study was conducted on Madura Island because it is an island with extreme weather that can be felt by most people. Sumenep district was purposively selected because it has the largest beef cattle population in East Java. Madura has four districts namely Bangkalan, Sampang, Pamekasan and Sumenep, while Sumenep district was purposively selected. Determination of the number of respondents, namely risk mitigation on climate change, used Proportionate Stratified Random Sampling. Respondents were divided into two parts: macro respondents included the Livestock Service Office, BMKG, BPBD and Farmer Group Association. Respondents were taken from each stratum based on region, while micro respondents included farmers with proportional distribution to obtain samples. Sampling was conducted in two stages. First, respondents were selected from the highest total cattle population in Sumenep district, Batuputih, and the lowest total population in Sumenep district, Kalianget (BPS Sumenep, 2022). The second stage was to divide the number of respondents in each farm area with an indigenous Madurese cattle breeding program in Lenteng. The third stage is the area with the smallest population in Sumenep district, namely Kalianget sub-district. The next stage is Proportionate Stratified Random Sampling to get each of the three sub-districts twenty-five beef cattle breeders as respondents and has represented breeders in Sumenep district. (Eukarista, 2015).

Business Environment Analysis

The business environment consists of the internal environment and the external environment.

1. Internal environment, the internal environment is the company's strengths and weaknesses in the functional areas of the business, including management, marketing, finance/accounting, production operations, and management information systems.
2. External Environment Analysis (Umar, 2008) explains the external environment is a process carried out by strategic planning to monitor the external environment sector in determining opportunities and threats for beef cattle businesses. SWOT Analysis IFE Matrix and EFE Matrix

The IFE (Internal Factor Evaluation) and EFE (External Factor Evaluation) matrix consists of columns, weights, ratings and a total value which is the product of the weights and ratings. The weight and rating columns are filled in according to the value which is the result of grouping internal and external factors based on their level of importance. The IFE matrix is used to determine the strengths and weaknesses of the company. The EFE matrix is used to identify the company's external factors.

Madurese Cattle Farming

Madurese cattle exhibit a number of distinctive advantages, involving a number of important aspects. One of the main advantages is its very high adaptability to tropical climate conditions. Research by (Amam et al, 2019) revealed that Madura cattle are able to adjust well in an environment geographically characterized by high temperatures and high humidity. Madura cattle also have strong resistance to ticks, as revealed by the study. Such adaptability is a critical aspect in ensuring the health and productivity of Madura cattle, making them a superior choice for livestock rearing in the tropics. The adaptability of Madura cattle is not only limited to climate, but also includes hot and dry environmental conditions. Research by (Dwiyanto et al, 2013) that Madura cattle have a tendency to easily acclimatize in environments that tend to be dry and hot. The adaptability of Madura cattle makes it a very viable option for areas with such climatic characteristics. Not only that, Madura cattle also show admirable adaptability in environmental conditions that have limited feed resources. According to research by (Henry, et al. 2018), the feed requirements of Madura cattle are not as much as other beef cattle varieties. The existing advantages become an important factor in the development of Madura cattle.

Data Analysis

SWOT analysis is an evaluation assessment of internal factors, namely the strengths and weaknesses of an organization, as well as an assessment of external factors, namely opportunities and threats from the environment (Griffin, 2004). IE (Internal External) Matrix Analysis according to Rangkuti (2016), there is an IE (Internal-External) matrix which is divided into 6 quadrants, namely:

TOTAL SCORE IFAS		TOTAL SCORE EFAS		
		Strong	Average	Weak
TOTAL SCORE EFAS	High	I Growth	II Growth	III Shrinking
	Medium	IV Stability	V Steady Growth	VI Shrinking
	Low	VII Growth	VIII Growth	IX Liquidation

Figure 1. IE Matrix Source: Rangkuti (2016)

SWOT matrix is a decision-making tool to determine logically executed strategies that optimize strengths and opportunities, but at the same time minimize the weaknesses and threats of a business. (Setyorini, et al 2016). Formulate business unit opportunities and threats as well as its internal strengths and weaknesses

- Build a SO (Strength Opportunity) strategy by combining internal strengths and external opportunities.
- Build a WO (Weakness Opportunity) strategy by matching internal weaknesses with external opportunities.
- Develop an ST (Threat Strength) strategy by combining internal strengths and external threats.
- Develop a WT (Threat Weakness) strategy by combining internal weaknesses and external threats.

RESULTS AND DISCUSSION

Livestock Conditions in the Regency of Sumenep

The condition of beef cattle farming in Sumenep district requires a comprehensive understanding of a number of important aspects that reflect the general situation and sustainability of the beef cattle sector. In order to conduct an in-depth analysis of these conditions, a thorough introduction to the various factors that have a significant impact on livestock productivity is required. These factors include the size and geographical structure of Sumenep district, which may affect the availability of land for beef cattle farming, and the availability of natural resources that influence the dynamics of beef cattle enterprises. A thorough understanding also involves considering the agricultural and livestock institutions in Sumenep district, including local government policies that may impact on beef cattle farming strategies and sustainability. Market aspects are the main focus of this analysis, such as market penetration, market development and product development (beef cattle) with special attention to policies and program implementation that support animal welfare, prevent the spread of diseases that can harm livestock productivity and obtain a better market system.

Table 1. Strength Collaboratin Score

No	Internal Strategic Factors (Strength)	Weight	Rating	Score
1	Existence of Farmer Groups	0,07	4	0,28
2	Moral support from family (Farm Management)	0,08	3	0,24
3	Farmers' skills in utilizing community waste	0,08	4	0,32
4	Training Programs from Educational Institutions	0,07	3	0,21
5	Adequate Water Quality and Quantity	0,09	3	0,27
6	Adequate feed quality and quantity	0,09	4	0,36
Sub Total		0,48		1,95

Source: Primary Data Processed (2024)

Table 2. Weakness Collaboratin Score

No	Internal Stratetgic factors (Weakness)	Weight	Rating	Score
1	The low intensity of farmer group meetings	0,07	2	0,12
2	Absence of Business Output institutions	0,06	2	0,14
3	Information technology innovation	0,07	1	0,12
4	Feed technology innovations	0,09	1	0,06
5	Resource support from local government	0,07	2	0,14
6	No recording has been done	0,07	1	0,06
7	Implementation of preventive measures (hygiene and sanitation)	0,08	2	0,14
Sub Total		0,51		0,79
Total		1		2,51

Source: Primary Data Processed (2024)

Based on the results of the evaluation analysis of internal factors, it shows that the Strengths factor has a score of 1.95 and the Weakness factor with a score of 0.79. This figure shows that farmers in the Sumenep district have strong internal strengths, and there are low weaknesses that need to be anticipated. The comparison is directly proportional to the research of internal factors by Haryono and Nugraha (2020), namely Analysis of Strategy Management and Marketing Strategy of Ground Coffee Agroindustry (Case Study of Ground Coffee Agroindustry Cap Gunung Betung) with a strength score of 1.89 and a weakness score of 0.54 then the analysis of internal factors of business risk management strategies in the adaptation of beef cattle farming business during climate change in Sumenep District has a greater strength value and a smaller weakness value.

Table 3. Opportunities Collaboration Score

No	Eksternal Strategic Factors (Opportunity)	Weight	Rating	Score
1	Diversification of feed types	0,09	4	0,36
2	Feed additive usage	0,08	3	0,24
3	Agricultural waste is abundant	0,08	4	0,32
4	Artificial Insemination Technology	0,07	3	0,21
5	High meat demand	0,08	3	0,32
6	Import restrictions	0,07	4	0,28
7	Livestock Insurance Scheme	0,07	3	0,21
8	Lack of Partnership	0,07	4	0,28
Sub Total		0,61		2,14

Source: Primary Data Processed (2024)

Table 4. Threat Collaboration Score

No	Eksternal Strategic Factors (Threat)	Weight	Rating	Score
1	Fluctuating feed prices	0,07	1	0,07
2	Market information system	0,09	2	0,18
3	Market stability (price fluctuations)	0,09	1	0,09
4	Land function change	0,07	2	0,14
5	Farmer institutionalization weakened	0,07	2	0,14
Sub Total		0,39		1,26
Total		1		3,40

Source: Primary Data Processed (2024)

Based on the results of the evaluation analysis of external factors, it shows that the Opportunity factor has a score of 2.14 and the Threat factor with a score of 1.26. This figure shows that farmers in the Sumenep district have opportunities from a larger external environment and there are threats that are small enough that there needs to be anticipation or preventive steps from beef cattle farmers in Sumenep District.

Matriks IE

The internal external (IE) matrix is the result of the accumulation of internal and external strategic factors combined in the Internal External (IE) matrix. The Internal Factor Evaluation Matrix (IE Matrix) is a strategy formulation tool that can summarize and evaluate the main internal factors in the functional area of a business unit and can also describe in general terms to identify and evaluate the relationship between these areas (David & David, 2017). The IE matrix shows that the position of the beef cattle farming business in Sumenep district is in cell IV. Conditions in cell IV, the strategy that can be applied is Grow and Build (grow and develop). Strategies that can be applied are intensive (market penetration, market development, and product development) or integration (backward integration, forward integration, and horizontal integration).

Table 5. Recapitulation of Internal Factor and External Factor Scores

		Total weighted IFE score		
		Strong	Average	Weak
		3,0-4,0	2,0-2,99	1,0-1,99
Total weighted EFE score	High 3,0-4,0	I	II	III
	Medium 2,0-2,99	IV	V	VI
	Low 2,0-1,99	VII	VIII	IX

Source: Primary Data Processed (2024)

The appropriate strategy to be applied to the company's position in cell 4 involves an intensive strategy, which includes market penetration, market development, and product development, or an integration strategy, which involves forward integration, backward integration, and horizontal integration. Market penetration involves increasing market share through more intensive marketing. Market development involves the introduction of products or services into new territories. Product development is an attempt to increase sales through the improvement or modification of products or services. Forward integration involves increasing control over distributors or retailers, while backward integration involves increasing control over suppliers. On the other hand, horizontal integration is a strategy to increase control over competing companies (Agustin, 2022).

Cartesius Diagram

The preparation of Cartesian Diagrams based on internal (strengths and weaknesses) and external (opportunities and threats) analysis on Business Risk Management Strategies in Adaptation of Beef Cattle Business during Climate Change in Sumenep District. Internal analysis is carried out by creating an IFAS (Internal Factors Analysis Summary) matrix and an EFAS (External factors Analysis Summary) matrix. After the value of the IFAS and EFAS matrices, it can be seen the position of the beef cattle business based on the IFAS and EFAS matrix values on the SWOT analysis diagram with adjustments based on the IE matrix diagram. Furthermore, the total score of each factor can be detailed, strength 1.95, weakness 0.79, opportunity 2.14, threat 1.26. So it is known that the difference in the total score of the strength and weakness factors is (+) 1.16, while the difference in the total score of the opportunity and threat factors is (+) 0.88. The Cartesius diagram of SWOT analysis of Beef Cattle Farming during climate change in Sumenep district can be seen in the following figure:

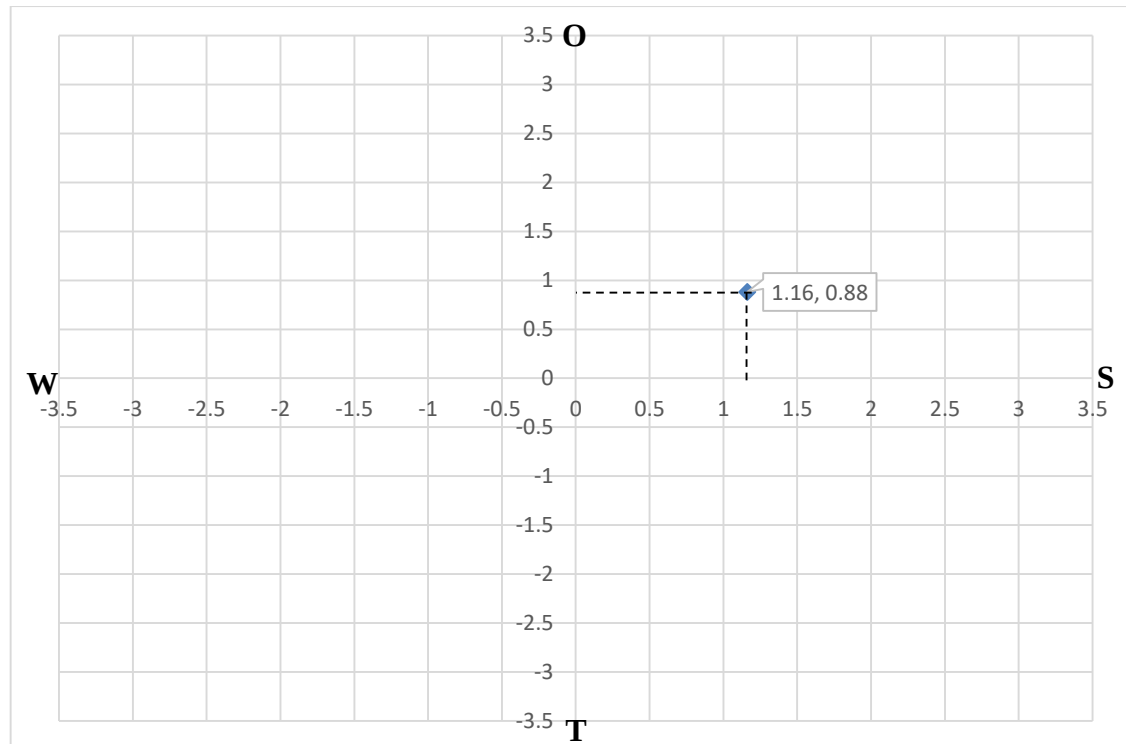


Figure 1: Cartesian SWOT Diagram of Business Risk Management Strategies in Adapting Beef Cattle Businesses to Climate Change.

Source: Primary Data Processed (2024)

The SWOT matrix is a tool for designing business unit strategies that can show the internal strengths and weaknesses of beef cattle businesses that can be adjusted to the external threats and opportunities of beef cattle business units (Istiqomah and Andriyanto, 2017). Meanwhile, according to Setyorini, et al (2016), the SWOT matrix is a decision-making formulation tool used to determine strategies based on logic to maximize the strengths and opportunities of a business, while simultaneously minimizing weaknesses and threats. The matrix assists businesses in formulating strategies that take advantage of their existing assets and opportunities, while reducing the impact of internal weaknesses and external threats, while the results of the cartesian diagram calculation prioritize the S-O strategy.

S-O Strategy

SO (Strengths-Opportunities) strategy is a strategy that uses strengths to take advantage of opportunities. This is in accordance with Marlius and Putra (2018), that the SO strategy relies on utilizing strengths to take advantage of available opportunities. Under favorable circumstances, organizations/companies have strengths and opportunities, allowing them to use these strengths to take advantage of existing opportunities. The following SO strategy is generated through the SWOT matrix:

- Animal husbandry training from educational institutions or agencies related to import restrictions and high demand for meat.
- Animal husbandry training from educational institutions or institutions related to the utilization of agricultural waste as animal feed.
- Farmer groups enter into partnerships with educational institutions or related extension institutions to penetrate the market in the research area (Sumenep) using diversified types of feed, the use of feed additives with adequate quality and quantity of forage.
- Utilizing IB technology from sub-district enumerators to cope with high demand for meat with livestock insurance programs from educational institutions to minimize losses such as mortality and beef cattle diseases.



Elaboration of S-O Strategy

- a. Livestock training from educational institutions or agencies related to import restrictions and high demand for meat, This needs to be done so that farmers in Sumenep district can increase production volumes without having to worry about competing with farmers who use livestock types other than Madura cattle. Beef cattle farmers in Sumenep district will be motivated to develop feed innovations and efforts to support the increase in the selling value of beef cattle, which in fact Madura cattle have a small bone size.
- b. Livestock training from educational institutions or institutions related to the utilization of agricultural waste as animal feed, The majority of abundant agricultural waste is currently still used as fertilizer for plants, while feed for beef cattle still depends on additional forage. This results in less efficient time and feed management. Therefore, the role of relevant educational institutions is needed to evaluate the availability of this agricultural waste and utilize it for the welfare of farmers in Sumenep District.
- c. Farmer groups in Sumenep district are establishing strategic partnerships with relevant educational institutions or extension services to develop and enter the local market more effectively. This collaboration focuses on diversification of feed types and the use of feed additives that aim to improve the quality and quantity of available forage, by expanding feed options and improving nutritional value. c. Farmer groups in Sumenep district establish strategic partnerships with relevant Educational Institutions or Extension Agencies to develop and enter local markets more effectively.
- d. Utilizing Artificial Insemination (AI) technology to address the high demand for beef cattle and integrating it with insurance programs is an effective approach to increase productivity and stability of livestock enterprises. IB technology enables the improvement of cattle genetic quality, which can produce offspring with higher productivity, faster growth, and better disease resistance. Thus, IB technology can help meet the growing demand for beef cattle markets with superior quality livestock.

CONCLUSION

Based on the findings that have been obtained in the field as well as the analysis that has been reported, the conclusion of the research is Based on the research conducted, the Business Risk Management Strategy in Adaptation of Beef Cattle Business includes market penetration, market development and product development such as increasing production volume by utilizing abundant agricultural waste and forming partnerships with beef cattle businesses such as culinary in tourism areas to maintain consistent demand for meat. Farmers in Sumenep district have not fully managed risks related to animal health, operations, feed management and finance to reduce losses. Moral family support is an important aspect in starting a beef cattle farming business, which cannot be done or relied on by only one person. Farmers in Sumenep district need farmer group members who are in charge of accessing beef cattle market information to support the sustainability of the farming business. Risks that need to be improved for experienced farmers include animal health control, feed management, financial management (production and financial records) to minimize losses for farmers in Sumenep district. Weather patterns in Sumenep district over the past two years are divided into three periods. January to March experienced normal weather, while April to June experienced extreme drought that affected the agriculture and livestock sector, especially water availability. July to September the weather returns to normal, and October to December is the rainy season. This pattern has a significant impact on agricultural activities, livestock and community welfare in Sumenep district.

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