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Pig Feed Industry Competitiveness (Case Study in Kupang City, East Nusa Tenggara)

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Abstract

The study of the competitiveness of the animal feed industry in East Nusa Tenggara (NTT) is essential since the provincial government of East Nusa Tenggara (NTT) has expressed a strong desire to establish a similar industry on a larger scale. The reasoning is that East Nusa Tenggara (NTT), as a potential livestock development area, requires a sustained and high-quality feed supply. As a result, this research is likely to provide useful information for future attempts to advance similar sectors in the province of East Nusa Tenggara (NTT). The Policy Analysis Matrix (PAM) is a tool for evaluating industrial competitiveness in terms of both financial (competitive advantage) and social/economic factors (comparative advantage). Similarly, depending on the actual conditions encountered by the animal feed industry unit, analyzing the role of the government when policy distortions and market failures arise. The analysis results demonstrate that the pig feed industry at Kupang State Polytechnic has a competitive and comparative advantage, as evidenced by the PCR and DRCR values being less than one, which are 0.9805 and 0.5660, respectively. From a financial standpoint, the established animal feed industry is very sensitive (PCR value > 1) to changes in input prices that raise and reduce output prices, even while the DRCR value grows but remains smaller by one. Based upon the results of the analysis, it can be recommended that at the micro level, policies at the producer level are required to implement management of the supply of raw materials as a buffer stock, taking into account availability and much fluctuating prices owing to seasonal forces while competing with the needs of other sectors. Meanwhile, given the large price disparity throughout seasons and locations of origin of raw materials, the local government must interfere at the macro level through a proportional and applicable raw material price control program.

Keywords: *Competitiveness; Animal Feed Industry; Management of the Supply*

Introduction

East Nusa Tenggara Province (NTT) plays a critical and essential role in the development of national livestock. The acts of transporting cows, specifically to meet national demands, reflect the

intended role. Moreover, while the development of other types of livestock is still limited to satisfying local demands, it does not rule out the possibility of meeting demands outside of the region, including export markets. Pigs are one of the promising livestock types, as they are currently developing at a quick pace, yet product absorption is still limited to fulfill regional needs in NTT.

In comparison to the other provinces in Indonesia, NTT has the highest pig population. According to 2020 livestock and animal health statistics, the population of pigs in NTT was 2,266,222 (26.59%) of the national population of 8,520,947 pigs till 2019. This number has climbed by 7.60 percent each year from 2016, when it was 1,845,408 pigs. This significant increase demonstrates the overall potential of NTT in terms of pork's contribution to meeting regional and national demands.

Given the vast number of consumers, pork is the primary alternative product in NTT when meat prices (beef, chicken, and fish) rise. Based on NTT statistics in figures for 2020, the number of pigs slaughtered at Slaughterhouses (RPH) in NTT was 185,647 pigs up till 2019. When compared to large and small livestock (other than poultry), such as cows, buffalo, goats, and sheep, this number is the largest.

The availability of feed, both in quality and quantity, is a major challenge in pig farming that must be addressed. Pig feed is typically sourced from household waste, eateries/restaurants, and/or agricultural waste, all of which are of poor quality and limited continuity. Alternatively, the other source of feed is industrial feed from outside NTT, which comes at a very expensive cost but is guaranteed in terms of quality. When there is a supply shortfall, the price of feed rises, which reduces demand for feed. In such circumstances, pig production performance suffers both technically and economically.

Kupang State Agricultural Polytechnic manages one pig feed processing factory in Kupang City. The primary goal is to support academic/educational activities, and on a limited scale, it is intended to meet the feed needs of breeders assisted by the educational institution in question. The critical question of this research is to determine if NTT's livestock feed industry, specifically for pigs, is able to compete as an efficient and competitive business unit aimed at securing its long-term viability.

Based on the foregoing background and problems, the goal of this study is to assess the competitiveness and sustainability of the pig feed industry in NTT.

Literature Review

Competitiveness Analysis

The Private Cost Ratio (PCR) and Domestic Resource Cost Ratio (DRCR) are two indicators used to assess competitiveness based on PAM analysis. PCR is a competitive advantage indicator that displays the ability of the system to afford for domestic resource costs while being competitive at private pricing. Meanwhile, the DRCR index is a comparative advantage indicator that illustrates how much domestic resources may be saved in order to generate one unit of foreign currency (Pearson et al., 2005).

The PCR value is the ratio of domestic factor costs to additional output value at private pricing or PCR = C/(A-B). Meanwhile, DRCR is a comparison between domestic factor costs with additional output value at the social price level, or DRCR = G/(E-F). An economic activity (including livestock feed products) is considered to be privately efficient (financially) or has a competitive advantage if the PCR value < 1, according to the interpretation of competitiveness based on the two indicators above. Similarly, it is considered to be socially efficient (economically) or to have a comparative advantage if the DRCR value < 1.

Sensitivity Analysis

To determine whether the present livestock feed industry is guaranteed to be sustainable, a sensitivity analysis approach to price fluctuations for products or production factors that are subject to changes is performed. The analysis is simply a step done to forecast changes in efficiency, competitiveness, and the impact of policy divergences as a result of changes in input and output prices. The following scenarios are likely to occur when using the sensitivity analysis:

a) Sensitivity to changes in input prices, in this instance the key raw materials such as maize and numerous other raw resources that are still competing for other uses.
b) Sensitivity to variations in output pricing, such as the selling price of the feed produced.

Research Methods

Location and Time of Research

The research was carried out in the pig feed industry of Kupang Agricultural Polytechnic. The research lasted for 6 (six) months, from May to October 2021.

Data Types and Sources

Primary and secondary data are the two categories of data. Primary data were acquired from the production cycle of the pig feed industry at Kupang State Agricultural Polytechnic, which included the kind, source, and value of the supplementary raw materials utilized, the manufacturing method, as well as a number of additional costs that must be expended to manufacture pig feed, the major product of the industry.

Reports from government departments and/or institutions, such as the Central Bureau of Statistics, Department of Animal Husbandry, and other relevant reports, are used to compile secondary data. Similarly, secondary data on production activities, consumption, trade (import-export) of the major raw materials for livestock feed, pricing, as well as other relevant types of data are needed to conduct the study of competitiveness of the feed industry in question.

PAM Table Compilation

According to Cafiero (2003), PAM can be viewed as a method of organizing budget data on a representative commodities system. The approach includes gathering, organizing, and analyzing data, as well as assessing the impact of policies and market distortions on the representative commodities system. Policy Analysis Matrix (PAM) technique primarily employs two types of analytical tools: financial and economic analysis (Kadariah, et al 1978; Soekartawi, 1996). This is due to the fact that livestock feed is a market commodity. The financial result or "private return" of the invested money is what is examined in financial analysis. Meanwhile, in economic analysis, the overall benefit of the resources used is taken into account. "Social returns" or "economic returns" are the terms used to describe these outcomes.

The market price (actual price) is the price that occurs and applies in the society and is utilized in financial analysis. In economic analysis, the price utilized is the social price, because the actual/market price does not always convey the social opportunity cost. Social pricing is implemented through adapting to price deviations caused by policies (subsidies, taxes, tariffs, and price policies) or market distortions. This balance happens when the market is in a condition of perfect competition, which is difficult to accomplish in practice. According to Gittinger (2008), the shadow price for tradable inputs and outputs often employs a limit price. For products that are exported or have the potential to be exported, the FOB (free on board) price is applied, which is the price level that applies to the port of export. Meanwhile, for

imported products, the CIF (cost insurance and freight) limit price is employed, which is the price that applies to the port of destination.

The allocation of tradable and domestic inputs can take a direct approach, in which it is assumed that every tradable input, both imported and produced domestically, is valued as a foreign component (Monke and Pearson, 1989). When extra demand for tradable inputs can be met through international trade, this approach is adopted. Non-tradable inputs originating from the domestic market are labeled as domestic components, whereas foreign inputs utilized in the production process of non-tradable products are still classified as foreign components. The following technique is a total approach that assumes each tradable input is sorted into domestic and foreign components. Furthermore, the addition of tradable inputs can be met via domestic production if these inputs are available for domestic production. Thus, domestic production provides an additional supply of tradable inputs. This study employs a total approach to allocate inputs into foreign and domestic components.

Table I-O Indonesia shows the percentage of domestic and foreign components of the inputs utilized in the livestock feed production process. Allocation of domestic and foreign input components from the livestock feed industry, based on the last available table in Indonesia, Table I-O from 2010. Table 1 shows the analytical framework for the methodical implementation of PAM.

Table 1. Policy Analysis Matrix and Competitiveness

Description	**Receipt**	**Cost**		**Benefit**
		Tradable Input	**Domestic Factor**	
Private price (market)	A	B	C	D
Social price (economy)	E	F	G	H
Divergence (transfer)	I = A-E	J = B-F	K =C-G	L = D-H
Efficiency and Competitiveness:				
Private Cost Ratio (PCR)	PCR = C/(A-B)			
Domestic Resources Cost Ratio (DRCR)	DRCR = G/(E-F)			

Sources: Monke and Pearson (1989), Bojnec (2003), Cafiero (2003), modified.

Results and Discussion

Pig Feed Components

Corn, rice bran, fish meal, concentrates, minerals, and extra cooking oil are all domestic factors used in the production of pig feed. Corn is exclusively sourced locally from NTT, whereas other supplementary raw materials, including minerals, concentrates, and fish meal, are sourced from beyond the NTT region. Figure 1 shows the percentages of raw materials for the production of pig feed.

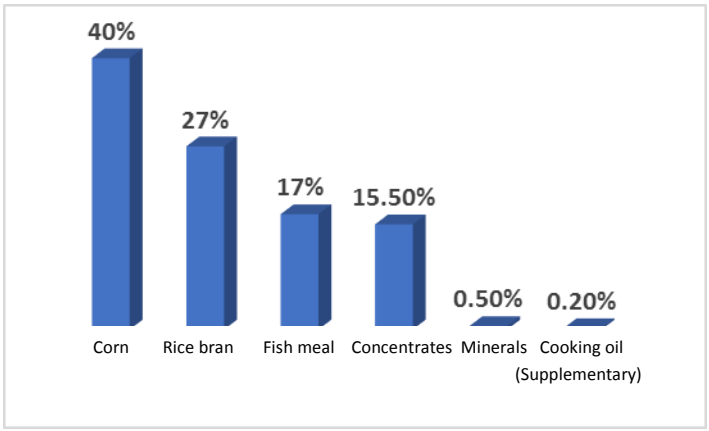

Figure 1. Pig Feed Ration Composition

The majority of corn raw material demand is met within the NTT region, requiring a stock supply program. This is because the consistency of supply at the local level is heavily impacted by factors such as the growing season and harvest time, as well as usage competition with other sectors, resulting in significant fluctuations of corn availability and price in between times.

The majority of the rice bran, fish meal, concentrates, and other raw materials used are sourced from outside the region of NTT. Although rice bran and fish meal are locally accessible, farmers are not used to selling them as feed basic materials. Furthermore, the fish meal processing industry does not yet exist as a means of using catch fisheries products locally when overproduction occurs. Real policies and efforts that may foster the expansion and development of the secondary industry as an integral aspect of sustaining the current primary industry are needed to secure the sustainability of the livestock feed industry in NTT as a form of primary industry.

Input and Output Values

Classification of inputs into tradable and domestic inputs is the first step done. Production machinery, such as raw materials grinders and refiner, mixers, pellet machines, scales, bag packing stitching machines, and several other types of equipment, are all tradable inputs. Corn, rice bran, fish meal, concentrates, and minerals are examples of domestic inputs for pig feed. Labor, power costs, and building and equipment depreciation are all included. The value of inputs and outputs in a year of production, calculated and mapped based on private prices and social prices. Private and social values are estimated based on the current output capacity of the feed industry, as shown in Figure 2.

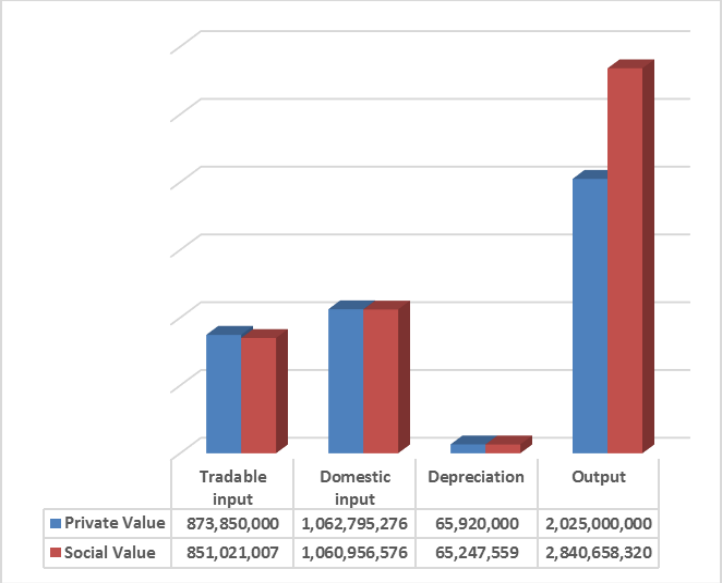

Figure 2. Input and Output values based on private and social prices

Private values for inputs and outputs are determined using actual or market prices at the local level. The social value of tradable inputs is assessed and determined using the foreign components required to manufacture them. The CIF (cost, insurance, and freight) price of the product, adjusted for the import and export value of livestock products, and the current SER (social exchange rate) value, are the social values of the resultant output.

Competitiveness

Financial advantage is measured using the Private Cost Ratio (PCR), a competitive advantage indicator that demonstrates the capacity of the system to afford the domestic resource costs while remaining competitive at private pricing. The PCR is calculated by comparing between domestic factor costs with additional output value to the private price. If a commodity is produced domestically, PCR is used to estimate how much domestic resource costs are sacrificed in order to acquire additional value of one unit of foreign exchange, and it is also a unit of measurement of competitiveness in the real economy. If the PCR value is less than one, it indicates that the produced commodity has a competitive advantage.

The Domestic Resource Cost Ratio (DRCR) is a comparative advantage indicator that illustrates how much domestic resources may be saved to create one unit of foreign exchange. The DRCR compares domestic factor costs to additional output value at social prices. An economic activity with a DRCR value < 1 indicates that the business is economically efficient in utilizing domestic resources or has a comparative advantage. Increasing domestic output makes it more profitable to meet domestic demand. DRCR value > 1 suggests that the economic activity is losing money or is not viable to carry out, implying that the activities are inefficient in their use of domestic resources and that meeting domestic demand is more profitable through imports. The result of DRCR value $= 1$ implies that the economic activities undertaken generate typical earnings.

The level of financial and economic competitiveness for livestock feed products in the pig feed industry in Kupang City is estimated using input and output values based on private and social pricing, as shown in Figure 3.

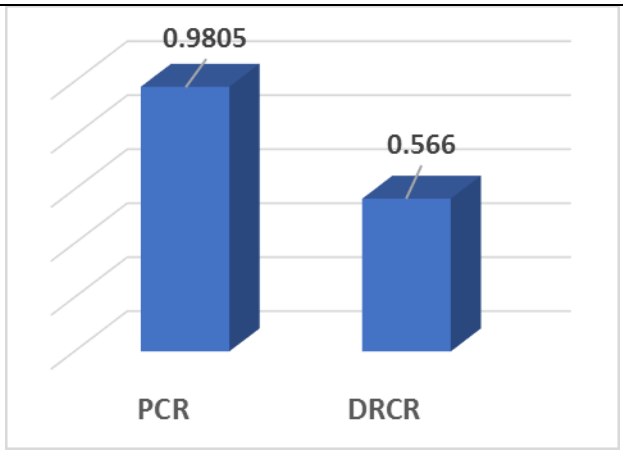

Figure 3. PCR and DRCR Value of Pig Feed in Kupang City

The PCR value is 0.9805, indicating that the Kupang City pig feed industry has a competitive advantage and is financially viable. This number can be used to illustrate that in order to gain an additional unit of foreign exchange, a reduced cost of domestic resources equal to the PCR is necessary. This indicates that the lower the determined PCR value, the more competitive the pig feed industry will be.

The DRCR value for the pig feed industry is 0.5660, suggesting that it has a comparative advantage and is socially viable. To gain an extra unit of foreign exchange, a reduced cost of domestic resources equivalent to the value of the DRCR is necessary. The DRCR value on one side shows that the Kupang City pig feed industry has the potential to be employed as a strategic livestock feed industry, including for import substitution in fulfilling local and national demands.

Sensitivity Analysis

Sensitivity analysis is conducted with the understanding that the raw materials utilized are frequently in low supply and compete for usage with other industries. Corn and rice bran, for example, are frequently subject to price rises, particularly in the off-season. Corn raw supplies, in particular, are frequently confronted with human consumption demand. Table 2 shows the percentage changes in the simulated input and output prices for the purposes of sensitivity analysis, based on the preceding factors and fluctuating prices. The highest and lowest price changes are used to choose and compute the percentage of price changes.

Table 2. Percentage of Increase and Decrease in Input and Output Prices

No	Type of Domestic Material	Changes	Input and Output Values	
			Before	After
A.	**Raw Materials:**			
	Corn	40%	3.250	4.550
	Rice bran	20%	2.500	3.000
	Fish meal	20%	6.250	7.500
	Concentrates	10%	5.000	5.500
	Minerals	10%	8.000	8.800
	Cooking oil	10%	1.500	1.650
	Electricity Cost	10%	1.445	1.589
B.	**Labor :**			
	Production Supervisor	10%	50.000	55.000
	Operator	10%	35.000	38.500
	Administration staff	10%	45.000	49.500
C.	**Output Price :**			
	Private Output Prices fall	10%	7.500	6.750
	Social Output Prices fall	10%	10.521	9.469

The PCR and DRCR values are calculated as indicated in Figure 4 based on the assumption of changes in the input and output values.

Figure 4. PCR and DRCR values due to changes in input and output prices

Financially, the pig feed products manufactured appear to no longer have a competitive advantage in the three value shift regimes that occurred, as shown by the PCR value>1. Meanwhile, economically, despite increases in input prices and decreases in output prices, pig feed products continue to enjoy a competitive advantage, as evidenced by DRCR < 1.

The input price is a critical determinant in guaranteeing the competitiveness and long-term viability of the Kupang City pig feed industry unit. The PCR value increases from 0.9805 (<1) to 1.2051 (> 1) when the input price increases by 10-40% of the original actual price. If the output price falls at the same time, the impact is significantly stronger (PCR value of 1.4623). It causes increased financial losses and, as a result, a reduction of competitive advantage under such circumstances.

Despite changes in input prices that increased or decreased output prices, the pig feed industry that is established still displays comparative advantage/competitiveness from a social standpoint, as demonstrated by the degree of the change in the value of the DRCR. The two variables that arise define an important phenomenon, especially when the raw materials utilized are relatively available locally/domestically, yet pricing remains an impediment that manufacturers are unable to surmount. Raw materials that are proportionally utilized in big amounts (corn, rice bran, and fish meal) are subject to significant fluctuations of price and availability. This circumstance undoubtedly has a significant impact on the viability of comparable operations if they are carried out elsewhere in NTT.

To overcome the challenges and phenomena that have arisen, it is required to integrate the proper policies, both sides of micro- business and macro-regional. Producers at the micro-business level are anticipated to be able to overcome this by supplying raw materials as buffer stock, particularly when there is an oversupply at the farmer level, such as during harvest season. Similarly, there is a mutually beneficial structure for collaboration between industry and farmers as raw material providers.

Conclusion

The following conclusions can be drawn based on the findings of the analysis and discussion of the study conducted 1) The pig feed industry in Kupang City is a competitive business, both financially (actual price level) and economically (economic/social price level), with a competitive and comparative advantage. 2) The pig feed industry in Kupang City is vulnerable to rising raw material prices as well as declining output/product prices from a financial standpoint. In other words, when the price of raw

materials rises but the price of output falls, financial competitiveness suffers significantly. In the meanwhile, it still has a comparative advantage/competitiveness from an economic/social standpoint, notwithstanding the downturn.

The following policy recommendations are suggested based on the preceding conclusions 1) At the micro level, there is a need for policies from industrial units as producers in the management of raw material supply, taking into account availability/supply and pricing that are highly unpredictable owing to seasonal influences, while also competing with the demands of other sectors. 2) At the macro level, given the large price differential across seasons and raw material origin regions, it is vital for the local government to interfere through a proportional and relevant raw material price control policy.

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