Original Research Paper

SMEs Strategies to Improve the Competitiveness of Dairy Products in West Sumatra Province, Indonesia

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Abstract: Considered a side business, most dairy farms in Indonesia are small-scale farms with low productivity. Farmers tend to sell the milk produced in the form of fresh milk rather than processed products. This condition causes low competitiveness of dairy products and the difficulty of dairy products penetrating the modern market. This study aims to identify factors that determine competitiveness and formulate strategies that can be done to improve the competitiveness of dairy products. This research was conducted on dairy farms in west Sumatra Province, Indonesia. The method used was the survey method. The variables used to identify factors affecting competitiveness were based on Porter's diamond model and Porter's five forces model and alternative strategies were formulated based on Porter's generic strategies analyzed by Analytical Hierarchy Process (AHP). Based on the results of the analysis, the factors that affect the competitiveness of dairy products are human resources, capital resources, technology, competitor advantages, and power of suppliers, thus there are five factors that determine the competitiveness of milk. Based on the research results, the highest factor affecting competitiveness is technology while the lowest value is the power of suppliers. At the actor level, cooperatives play an important role in improving the competitiveness of dairy products. Then the priority strategy that can be chosen to improve competitiveness is to do product differentiation through new product innovation.

Keywords: Dairy Products, Analytical Hierarchy Process (AHP), Porter's Diamond Model, Porter's Five Forces Model

Introduction

Dairy farms in developing countries are mostly small-scale farms with traditional management or combined with agricultural businesses (Alvarez *et al*., 2021), including in Indonesia. The average ownership of dairy cows per farmer is less than 5 heads, this small-scale business will have an impact on the productivity of dairy farming (De Roest *et al*., 2018; Asmara *et al*., 2017; Nugroho, 2011). The small-scale business also results in less efficient dairy farming (Martinelli *et al*., 2022; Beber *et al*., 2019; De Roest *et al*., 2018; Burden and Hall, 2021; Amam *et al*., 2019; Asmara *et al*., 2017). This suboptimal efficiency is a problem for farmers to be able to establish a highly competitive business.

In addition to increasing business scale, business competitiveness is also determined by innovation as suggested by Ahmedova (2015) that to increase competitiveness, innovation is needed. The innovation intended here is post-harvest innovation including product processing, packaging, and marketing processes. Product innovation provides opportunities for companies to grow and develop so that they can expand their marketing areas (Sharma *et al*., 2016).

It was the first research of its kind that analyzed the competitiveness of dairy products by combining the two concepts of Porter's theory, Porter's diamond model and Porter's five forces model, to determine the factors that affect the competitiveness of dairy products. Previous researches use Porter's model for partial competitiveness analysis in the agricultural sector of the livestock sub-sector, as has been researched by (Salman and Al-Omari, 2021; Nyam *et al*., 2022; Papilo and Bantacut, 2016; Radev, 2013).

Porter's diamond model is developed by Porter as a framework related to the competitiveness of domestic companies in the international competitive arena which

then gives value to a country (Porter, 1990; Smith, 2010). Meanwhile, Porter's five forces model is a strategic framework for assessing competitiveness in a particular industry (Porter, 1980; Dulčić *et al*., 2012; Islami *et al*., 2020). These two models were used together to gain a broader perspective on the competition for dairy products produced by small-scale farmers.

In addition, this research was to answer the farmer's question about what to do to improve product competitiveness. The theoretical concept used was Porter's generic strategy concept. According to Porter, strategies allow organizations to gain a competitive advantage from three different bases: Cost leadership, differentiation, and focus (Porter, 1980; Ali and Anwar, 2021; Islami *et al*., 2020). In this study, three generic strategies become the goals to be achieved, thus several alternative strategies are determined to achieve these goals.

Alternative strategies are formulated tailored to the needs of dairy farms to increase the competitiveness of their dairy products. Some of the alternative strategies analyzed are improving production capacity and providing intensive training related to dairy farming and milk processing to farmers (Asmara *et al*., 2017). The next alternative strategy is new product innovation which is expected to increase sales (Ahmedova, 2015; Salman and Al-Omari, 2021; Omar *et al*., 2021), as well as good relations with consumers and promotions to focus on increasing market share.

The Analytical Hierarchy Process (AHP) method was seeded to determine the most influential factors, the influential actors, and priority strategies for improving competitiveness. Based on the explanation above, the research aimed to identify what factors determine competitiveness and formulate strategies that could be used to improve the competitiveness of dairy products.

Materials and Methods

This research was conducted on milk-producing dairy farms in west Sumatra Province, Indonesia. The respondents were the dairy farmers, the Department of Agriculture workers, and the academic staff. Data were obtained by interviews (elite interviewing), after which identification of factors affecting competitiveness was carried out using Porter's diamond model and Porter's five forces model. Furthermore, the people who would be heavily involved in increasing the competitiveness of dairy products were also determined. The last stage was deciding the alternative strategies.

Research Variables

The research variable used was a combination of Diamond Porter's model variables with Porter's five forces model. This variable is used to find out what factors affect the competitiveness of the dairy farming business. There are six variables of Porter's diamond model which include condition factors, demand condition factors, related and supporting industries, industry competition, government roles, and opportunity roles. Meanwhile, Porter's five forces variable includes suppliers' bargaining power, buyers' bargaining power, competition between competitors, the threat of new entrants, and substitute products. These variables and their indicators are presented in (Table 1).

Data Analysis

The first stage of data analysis was determining the factors that have the greatest influence on competitiveness. The analysis used was a Likert scale using a scale of 1-4. Score 4 (very decisive), value 3 (decisive), value 2 (slightly decisive), and value 1 (not decisive).

Table 1: Dimensions and indicators of the study

Model	Dimensions	Indicators
Porter's diamond model	Factor conditions	Human resources (labor), capital resources, natural resources, environment, technology, and infrastructure
	Demand conditions	Number of buyers (quantity) and consumer preferences
	Related and supporting industries	Suppliers and cooperatives
	Industry rivalry	Level of competition and competitive strategy
	Government role	Regulation
	Chance	Business climate
Porter's Five forces model	Bargaining power of suppliers	Supplier power and supplier influence on business
	Bargaining power of buyers	Consumer or buyers influence
	Rivalry among competitors	Old competitors and competitor advantages
	The threat of new entrants	The emergence of new competitors and the impact of new competitors
	Substitute products	The emergence of substitution products and the impact of substitution product
Porter's generic strategic	Improve production efficiency	Improving production capacity and provide intensive training for farmers
	Product differentiation	New product innovation
	Increase sales	Consumers and promotions partnering

The second analysis stage is the Analytic Hierarchy Process (AHP). Was used to analyze the appearing data in this study and this approach was used to identify hierarchical criteria or assess the relative relevance of criteria. We determined the priority weight or proportional relevance of indicators in one variable for each variable. All of Porter's elements which were variables in this study were analyzed using the Analytic Hierarchy Process (AHP) to formulate a strategy to increase the competitiveness of dairy products (Saaty, 2008).

Results

Overview of Dairy Farming Business in West Sumatra Province, Indonesia

Based on the results of the study, it is known that the average scale of a farmer's business is 5 cows per farmer with an average milk production of 127 L per day, or 8.97 L of milk per cow per day. This amount of milk production produced by farmers is lower than the ideal condition which can reach 20 L per head per day. The small population and low livestock productivity cause the development of dairy farming to be slow.

Business Competitiveness

Competitiveness is the ability of a business to survive doing business. The following are factors that affect the competitiveness of dairy products analyzed based on Porter's diamond model and Porter's five forces model.

Factors Influencing the Competitiveness of Dairy Products Based on the Porter's Diamond Model

The initial stage of this research was to identify factors that can affect the competitiveness of dairy products. The first concept used to identify factors that influence the competitiveness of dairy products was the concept of Porter's diamond model which included factor condition, demand condition factors, related and supporting industries, industry rivalry, the role of government, and the role of chance. Respondents' assessment of each of the attributes and sub-attributes of Porter's diamond model is shown in (Table 2).

Based on the results of the analysis of the factors that affected the competitiveness of the dairy processing business using Porter's diamond model, according to respondents, the factors that influenced competitiveness were human resources, capital resources, and technology with an average score of 3.60. The lowest attribute value was the number of buyers and the level of competition with an average value of 2.40, which meant that these two factors were considered by respondents to have the lowest influence on competitiveness.

Table 2: Factors affecting the competitiveness of dairy products based on Porter's diamond model

Attribute	Average score
Factor condition	
Human resources (labor)	3.60
Capital resources	3.60
Natural Resources and Environment	2.60
Technology	3.60
Infrastructure	2.80
Demand condition factors	
Number of buyers (quantity)	2.40
Consumer preferences	2.60
Related and supporting industries	
Suppliers	3.40
Cooperatives	2.80
Industry rivalry	
Level of competition	2.40
Competitive strategy	2.60
Government role	
Regulation	3.20
Role of chance	
Business climate	3.20

Table 3: Factors influencing the competitiveness of the dairy processing business based on Porter's five forces model

Attribute	Average score
Rivalry among competitors	
Old competitors	2.60
Competitor advantages	3.80
The threat of new entrants	
The Emergence of new competitors	2.40
The Impact of new competitors	2.60
Bargaining power of suppliers	
Power of suppliers	3.80
Influence of suppliers on business	2.80
Bargaining power of customer	
Customer influence	2.40
Substitute products	
Entry of substitute product	3.20
Influence of substitutional product	3.60

Factors Influencing the Competitiveness of Dairy Products Based on Porter's Five Forces Model

The second concept used to determine the factors affecting the competitiveness of dairy products was Porter's five forces model. This concept is more directed to competition at the level of the company or

industry. Table 3 showed the results of the respondent's assessment of the attributes of Porter's five forces model.

Based on (Table 3), the attribute that had the highest value was competitor advantage and Power of suppliers with an average value of 3.80. It meant that these two attributes were the most influential factor in determining the competitiveness of milk.

Alternative Strategies to Increase Competitiveness

After knowing what factors influenced the competitiveness of milk, the next stage was to determine alternative strategies to be implemented to increase competitiveness. This stage began with compiling a hierarchy, namely by determining goals, factors, actors, goals, and alternative strategies.

The goal of preparing AHP in this study was to find alternative strategies to increase the competitiveness of dairy products by utilizing some influential factors, namely human resources (F1), capital resources (F2), technology (F3), competitor advantage (F4) and Power of suppliers (F5), respectively. Next, the ones heavily involved in the process of increasing competitiveness were farmers (P1), cooperatives (P2), and the government (P3). The objectives achieved in enhancing the competitiveness of milk were to improve production efficiency (T1), product differentiation (T2), and increase sales (T3). The final stage in preparing this hierarchy was to determine alternative strategies to increase the competitiveness of dairy products. The alternative strategies were improving the production capacity (S1), providing training to farmers (S2), increasing sales through new product innovation (S3), good relations with consumers (S4), and promotion (S5). After all, the data had been collected, the data was processed with AHP. The hierarchical structure can be seen in Fig. 1.

Factors

The factors that affect competitiveness were the combination of the theories of Porter's diamond model and Porter's five forces model. The selected indicators from Porter's diamond model theory were human resources, capital resources, and technology. Meanwhile, the indicators selected from Porter's five forces model were competitor advantage and the power of the supplier. Based on the five factors in (Fig. 1 and Table 4), the priority factor affecting dairy products' competitiveness was technology or (F3).

Actors

The results of AHP processing at the level of decision-makers could be seen in (Fig. 1 and Table 5). Based on the data in (Table 5), the actors who had an important role and had the highest priority were cooperatives with a score of 0.58. The next actor was the farmers with a score of 0.31. The government's role was as a controller and policy maker and regulated everything related to business permits and business traffic. The score for the government is 0.11.
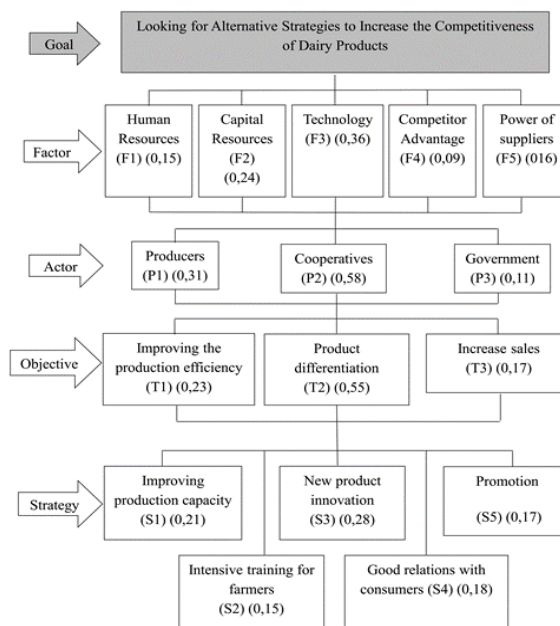

Fig. 1: Structure of AHP on the competitiveness of dairy products

Table 4: Weight and priority of factors affecting the competitiveness of dairy products

Factors	Weight	Priority
F1	0.16	3
F2	0.24	2
F3	0.36	1
F4	0.15	4
F5	0.09	5

Table 5: Weights and priorities of actors in making decisions to increase the competitiveness of dairy products

Actors	Weight	Priority
Farmer	0.31	2
Cooperative	0.58	1
Government	0.11	3

Table 6: Objective Weights for Decision-making on Strategies for increasing competitiveness

Objectiveness	Weight	Priority
T1	0.23	2
T2	0.55	1
T3	0.17	3

Objectives

There were three objectives to achieve in increasing competitiveness. The implementation of alternative strategies was based on Porter's generic strategy. The three indicators that aimed to increase competitiveness were: To improve production efficiency (T1), product differentiation (T2), and increase sales (T3). Of the three objectives, the main objective of improving the competitiveness of dairy products was product differentiation, with a score of 0.55 (Table 6).

Table 7: Weight of alternative strategies for making strategic decisions to increase competitiveness

Strategy	Weight	Priority
S1	0.21	2
S2	0.15	5
S3	0.28	1
S4	0.18	3
S5	0.17	4

The implementation of alternative strategies was based on what was needed to increase the competitiveness of dairy products. Based on the results of data processing, the main goals to achieve were improving the production capacity (S1), providing training to farmers (S2), new product innovation (S3), good relations with consumers (S4), and promotion (S5). Of the five alternative strategies, the main strategic alternative was to improve the competitiveness of dairy products through new product innovation (S3) with a score of 0.28 shown in (Table 7).

Discussion

The amount of milk production in the research location is still low when compared to the milk production of dairy cows in West Java which on average reaches 12 L per cow per day (Sembada *et al*., 2020). Ideally, dairy cows produce 15-20 L per head per day (Yusdja, 2005). Similarly, when compared to the productivity of dairy cows in neighboring countries where (Vu *et al*., 2016) stated that the productivity of dairy cows in neighboring countries, such as Vietnam, reached 18 L per cow per day. Dairy cattle productivity in temperate countries reaches 26 L per cow per day (Haile-Mariam *et al*., 2008).

According to Sudono *et al*. (2003), factors that affect the quality and quantity of milk produced by dairy cows are dairy cow breed, gestation length, lactation period, cow size, estrus, cow age, lambing distance, dry period, milking frequency and milking management. The low productivity of these cattle will impact the ability of farmers to face business competition.

Competitiveness is an important indicator of business development (Harini *et al*., 2017; Islami *et al*., 2020; Porter, 1998). Dairy farming is a prospective business to develop. This is caused by the ever-increasing demand for milk. A business that can survive in this business competition is certainly a business that has competitiveness and can create its market (Hamdilah *et al*., 2021). Porter (1998) explains, that "competition is the essence of success". Competition between similar companies is very sharp, new competitors can enter the industry relatively easily and suppliers and customers can increase their bargaining power (David, 2006).

Based on the results of the study, to improve the competitiveness of dairy products, the most significant factor was the technology possessed by farmers. Technology was needed in the process of cultivation and post-harvest processing. The right technology would increase the efficiency of the dairy farming business and minimize production costs. In addition, technology can increase the added value of products and can increase profits (Eskandari *et al*., 2015; Beber *et al*., 2019; Simões *et al*., 2020; Hochuli *et al*., 2021).

Apart from the factors above, the next factor that also affected competitiveness was the superiority of competitors. Competitors' advantage could be in product, price, service, or promotion. Of course, this situation will affect the market share owned by farmers. Thus, technological advances and the availability of capital owned in producing dairy products should be superior to competitors (Madau, *et al*., 2017; Islami *et al*., 2020; Simões *et al*., 2020). The same thing is concluded in research (Zhou and Tong, 2022) where inputs and production facilities have a significant effect on competitiveness.

The next factor that played a crucial role in increasing the competitiveness of dairy products was the farmers. Their role maximized their effort in producing high-quality milk. However, farmers couldn't do everything by themselves without any support. This was because farmers had limited access to investors, production inputs, and markets. For this reason, an institution such as a cooperative was needed to accommodate them.

Furthermore, the actor that played an important role in improving the competitiveness of dairy products was the cooperative. Cooperatives facilitated farmers in accessing production inputs, providing capital and counseling, and acting as a forum to accommodate and sell livestock products of cooperative members (Amam *et al*., 2019; Martinelli *et al*., 2022). The problem often faced by cooperatives was the lack of human resources. This condition could result in a lack of ability to access markets and capital and establish partnerships with other business entities. In line with the results of research (Zhou and Tong, 2022) liberal trade has a significant and positive effect on competitiveness. Limited access to these potentials was what causes cooperatives to be less able to compete. Therefore, cooperatives had to improve themselves to further improve the ability of their human resources so that they could facilitate their breeder members in increasing the competitiveness of the products produced.

The alternative strategies were determined based on the sub-indicators of Porter's generic strategy. Based on the research results, the main strategy to improve the competitiveness of dairy products was to increase sales through new product innovation. Innovation included product innovation, service innovation, and process innovation. Innovation is defined as a mandatory component of competitiveness. Innovation is a

prerequisite for being successful in a competitive environment. In SMEs, innovation culture is an important construct that can sustain product innovation and foster marketing strategies (Visnjic *et al.*, 2016; Aksoy, 2017).

Reguia (2014) explained that product innovation is the development of new products, the making of changes in the design of current products, or the use of new techniques. Process innovation is the implementation of completely new or significantly improved production or delivery methods. Process innovation is useful for reducing production costs and also for satisfying customers (Hussain *et al.*, 2015). Innovation will make a product unique compared to other products. With this uniqueness, a product will have a better chance to win the competition (Omar *et al.*, 2021; Nyam *et al.*, 2022).

Conclusion

Based on the results of the research that had been done, it could be concluded that the condition factors that affect the improvement of the competitiveness of dairy products were technology, capital resources, competitor advantages, human resources, and power of supplier. Technology had the greatest influence in determining the competitive level of dairy products, while the least of that was held by supplier power. At the actor level, cooperatives played a pivotal role in improving the competitiveness of dairy products. It was also decided that the main strategy to increase the competitiveness of dairy products was to carry out product differentiation through new product innovations.

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Author's Contributions

Rahmi Wati: Conception and design of the study, acquisition data analysis, and manuscript written.

Firwan Tan: Designed the research planned and organized and supervised the research.

Donard Games: Interpretation of data and contributed to the written of the manuscript.

Endrizal Ridwan: Critically reviewed and revised the manuscript.

Ethics

This article is original and has never been published before. The author has also confirmed to all authors involved in this study to read and agree to the contents of this article and that there are no ethical issues involved.

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