Alternative based farmer model for increasing red chili production in Bener Meriah, Aceh

Zulkarnain*, L Hakim and M Y Wardhana

Department of Agribusiness, Universitas Syiah Kuala, Jalan Tgk. Hasan Krueng Kanie 3, Darussalam-Banda Aceh 23111, Indonesia

*Email: zulkarnainsjam@unsyiah.ac.id

Abstract. This study aims to understand and model the partnership system in the red chili supply chain in Bener Meriah Regency. This study uses a system dynamics method to build a partnership model in a dynamic and complex red chili supply chain. The subject of this research is a partnership system in the red chili supply chain in Bener Meriah Regency to improve the bargaining position of farmers. The results show that in an equal partnership policy scenario, in the formal partnership model a loan structure for farmers from partners is added and the debt structure is eliminated. Based on the simulation results after the application of an equal partnership policy between farmers and partners, cash, profits and efficiency levels of chili farming increased from before. Through the equal partnership, it is hoped that the standard of living of chili farmers can improve in the future. For equality between chili growers and partners, there needs to be interference and the government's willingness to issue partnership rules with small farmers. Without government intervention, equality between smallholders and partners will be difficult to realize.

1. Introduction

In general, the chili planting area in Aceh reached 8,573 ha with 2017 production reaching 106,840.90 tons [1]. Bener Meriah Regency is one of Aceh's horticultural production centers, especially red chili which in 2014 reached the highest production level of 15,226.90 tons. As a result of price fluctuations, the level of red chili production has decreased until 2017 to 10,191.80 tons. This phenomenon is important to be a concern for local governments to improve the bargaining position of farmers because the commodity of red chili has so far contributed greatly to the local economy. So far, the interest of farmers to plant chili is quite high, but it is often faced with various problems such 1) the characteristics of these two commodities which are easily damaged and rotten, 2) fluctuations in prices are quite high, especially during the main harvest, 3) lack of processing technology and 4) the role of Gapoktan and the government is not yet optimal in coaching.

The low price of red chili can be caused at the time of entering the harvest season which farmers should be able to enjoy high profits, but instead turns into fears of loss. This is often experienced by chili farmers in Aceh. The harvest has not arrived, the price of red chili at the farm level has dropped dramatically. Another risk that is most vulnerable faced by farmers is due to pests and diseases and uncertain price fluctuations. Also, the clarity of commodity specifications desired by consumers is not known by farmers. Product specifications that consumers want are only known by traders, especially
those directly related to consumers. This situation causes the bargaining power of farmers is lower than traders/buyers.

Nowadays there has been a change in the marketing of agricultural products. New actors who have power in the supply chain of agricultural products have emerged. Thus, small farmers need to form farmer's associations with new concepts to deal with market changes [2]. Small farmers to participate in the supply chain, they must join other farmers in a forum, one of which is in the form of cooperatives, then establish partnerships with the private sector. To create a situation where farmers can connect to a dynamic market, farmers need to be continuously trained and must be organized, and must be able to connect with sources of financing [3].

Various programs and policies have been carried out by the government to cope with chili price fluctuations, namely through continuous monitoring of the performance of the existing chili supply chain, and minimizing the obstacles that may occur during the flow of chili from producers to consumers. To overcome the fluctuations in the price of red chilies at the farm level, the government recommends that farmers partner with other businesses in the red chili supply chain. By following the partnership pattern it is hoped that farmers will obtain price certainty and marketing results. The reality on the ground is that some horticultural farmers who have partnered have obtained prices that are not as expected because the prices are determined by parties that are stronger in terms of capital. Partnerships should be carried out with the principles of equal partnership, no party may experience marginalization in the process, and each actor in the supply chain receives fair compensation.

To overcome the above problems, this research needs to be done which aims to design an equivalent partnership model in the red chili supply chain. The partnership model is expected to be one of the proposals for local governments in making policies to improve farmers' bargaining position so that they are equal to partners so that farmers can receive revenue by their sacrifice.

2. Materials and methods

2.1. System dynamics

This study uses a system dynamics approach to build a partnership model in the dynamic and complex red chili supply chain, the behavioral patterns generated by the system with increasing time [4]. The rationale of the system dynamics methodology is system thinking, which is a way of thinking where each problem is seen as a system that is the overall interaction between elements of an object within the boundaries of a particular environment that works to achieve goals.

The subject of this research is a partnership system in the red chili supply chain in Bener Meriah Regency to improve the bargaining position of farmers. Data analyzed were primary data obtained from in-depth interviews with each of the actors in the red chili supply chain. Actors in the red chili supply chain consist of red chili producers, chili farmers cooperatives, chili traders in traditional markets, chili dealers, chili retailers both in the local market and chili retailers in urban areas. Primary data which are the variables analyzed include the purchase price and the selling price of red chili from each actor, product quantity, product quality, production costs, sorting costs, distribution costs (packing costs, packaging costs, loading and unloading), receipts, profits, the ratio of costs and benefits for each red chili supply chain actor. Secondary data were obtained from several institutions related to research.

3. Results and discussion

3.1. Model simulation

The red chili supply chain system in Bener Meriah Regency is complex. To understand this, it is necessary to develop from a general model to a causal model of the red chili supply chain system in Bener Meriah Regency. Through a causal model, the diagram can be explained more specifically about the activities of each actor and the relationships that occur between actors in the red chili supply
chain and can explain the purpose of the study. The causal relationship of the red chili supply chain in Bener Meriah Regency can be seen in Figure 1 below.

Figure 1. The cause and effect model of the red chili supply chain in Bener Meriah Regency.

Based on the results of modeling and simulation of the types of partnerships that exist in the red chili supply chain in Bener Meriah Regency, obtained information for the long term farmers who form a formal partnership with the industry get the highest profit compared to farmers who form non-formal partnerships with chili traders namely dealers and wholesale market traders. However, for the short term, farmers who form a non-formal partnership with the chili dealer who get the highest profit. The benefits of farmers who enter into partnerships in marketing red chili products can be seen in Figure 2.

Figure 2. Benefits of farmers, industrial partners, bandar partners and main market partners.
For the short term, the profits obtained by farmers who form a formal partnership with the industry are smaller than farmers who formally informally partner with the city and the wholesale market, even for the short term, the industrial partner farmers suffer losses. This is because industrial partner farmers must incur higher production costs than farmers in non-formal partnerships, namely the cost to carry out intensive red chili cultivation according to GAP and SOP to produce quality red chili as required by the industry. In addition to incurring greater costs, industrial partner farmers receive payment of the sale of red chili on average for one month, thereby increasing losses to the industrial partner farmers.

3.2. Implementation of equal partnership scenarios for revenue, benefits and efficiency of chili supply chain farming

To develop institutional innovation partnerships in the fresh red chili supply chain in Bener Meriah Regency, namely to position chili farmers as equal to partners, then in the formal partnership model, a loan structure is added to farmers from partners or from banks that work with partners and eliminate the credit structure to change a deferred payment to a cash payment.

Figure 3. Cash of farmer’s industry partners and farmers cash equivalent scenario.

Based on the results of modeling and simulation obtained information that in an equal partnership policy scenario, equal partnership farmers ‘cash tends to go up with a higher trend compared to farmers’ partner industrial cash. This proves that the fairtrade institutional innovation that is there are loan funds to finance the production process causes farmer cash to increase, the adequacy of farmers’ cash is also increasing. With the increase in cash and cash adequacy of farmers, farmers are expected to be able to finance their farming by GAP and SOP so that the productivity of chili plants increases resulting in the acquisition of chili yields increasing both in quality and quantity.

To compare the level of efficiency of red chili farming, the partnership scenario is equivalent to the level of efficiency of the red chili farming industry partner, then the concept of acceptance and revenue (R/C) comparison in each type of partnership is used. Efficiency, according to Soekartawi (2001) is a picture of the best comparison between a business and the results achieved. The efficiency of a business is determined by the size of the results obtained from the business and the size of the costs required to obtain these results. The level of efficiency of ordinary business is determined by calculating the per cost ratio that is the balance between the results of operations with the total cost of production. To measure the efficiency of a farm, the R/C ratio analysis is used. A comparison of revenue and cost (R/C) between industrial partner farmers and member farmers of equal partnership scenarios can be seen in Figure 4.
Based on Figure 4, it can be seen that the R/C of farmers in the equal partnership scenario is higher than the R/C of farmers in the chili processing industry. Thus the existence of loan assistance or bailout funds can eliminate the postponement so that the sale value of chili products produced by farmers is paid in cash. The availability of loan funds causes the efficiency of chili farming in an equal partnership scenario is higher than the efficient level of farming of large red chili farmers in industrial partners.

Revenue is a concept that connects the volume of goods produced with the selling price per unit. Revenue is the ultimate goal of business activities to obtain profits to maintain the continuity of the company and to expand business scale. A company can benefit both in the short and long term.

Based on Figure 5, it can be seen that the profits of farmers in the equivalent partnership scenario are higher than the profits of farmers in partnership with industry. In an equal partnership scenario, the
existence of loan funds and bailouts from partners that causes farmers to obtain cash receipts plays a significant role in farmers' profit-making. Acceptance of delayed payment is very detrimental to farmers because it inhibits their use by farmers. An equal partnership scenario can help farmers to get sales results on time.

One of the goals of future development, especially in the field of food, is food security which is characterized by the liberation of people from the types of food that are harmful to health. The existence of demands from consumers for healthy food products can be used as an incentive for farmers to always carry out the cultivation process under good agriculture practices (GAP) and farmers must certify the chili they produce. In the implementation of chili certification by the cooperative, of course, there are additional costs that must be incurred. The cost of certification will not feel heavy if it is borne by all members of the cooperative farmer.

![Figure 6. Cash from smallholder partners before and after the chilli certification scenario.](image)

In the scenario of chili farmers participating in equal partnership, the certification has been carried out, to get the lowest level of certification that provides certificates for safe consumption of products. Although pesticides are used in the process of chili cultivation, the content of pesticides in chili is within safe limits for consumption. The cost of certification to get the lowest level food safety certificate is around Rp. 25,000,000. If costs are charged to farmers participating in informal partnerships, each farmer is charged around Rp. 250,000. Therefore, in the chili certification scenario, there is a change in the parameters of the chili selling price, because the chili that has been certified is expected to obtain a higher selling price. After all, it is safer to consume. In the scenario of implementing chili certification, the selling price of chili farmers is changed with the same value parameters as the chili HPP that has been demanded by farmers, which is Rp 10,500 per kg. Then the equivalent partner farmer financial model is added to the cost structure of certification.

Based on the results of the simulation obtained information that the equivalent partnership scenario farmers cash has increased. This happens because the revenue received by farmers after the certification process turns out to be higher so that it can cover the costs incurred for the certification process. Thus the food safety certification process for agricultural products, in addition to the future will benefit consumers also benefit farmers as providers of raw materials for processed food products. An increase in profits of equal partnership farmers whose products have been certified can be seen in Figure 7.
Agricultural products that have been certified have a higher quality value than agricultural products that have not been certified, so the commodity selling price is expected to increase, causing the acceptance of chili farmers to increase. The increase in equivalent partner farmers after the certification process can be seen in Figure 8.

The R/C value of equivalent partnership farmers whose products have been certified will increase along with the increase in revenue because the R / C is the ratio of revenue and costs. In Figure 9, it can be seen that the R / C of the chili farms of equal partner farmers who have gone through the process of certification is higher than the R / C of the red chili farms of equal partnership farmers who have not certified the chili they produce. Thus the certification will increase the efficiency of chili farming.
For food production to be sustainable, and community food needs to be met, the government must protect the community and farmers from price fluctuations, such as prices falling during the main harvest, and prices soaring when outside the harvest season.

One way to keep small farms to have a viable business and to increase their incomes is for small farmers to participate in creating added value in profitable processing and marketing activities. The development of the chili processing industry in rural areas is one of the breakthrough steps and alternative solutions to the problem of chili price fluctuations.

### 4. Conclusions
In the non-formal partnership between red chili farmers with Bandar and wholesale market traders, the red chili farmers of Bandar partners receive higher revenues, profits, and R/C than the red chili farmers of the main market traders. This is due to the red chili farmers holding the main market trader partner, their revenue is suspended for one month. It turns out that high prices and the existence of loans cannot increase farmers’ income and profits if they delay paying too long. Farmers lose the opportunity to use their revenues to maximize their income.

Based on the simulation results, with the existence of the loan fund structure to finance the production process and the loss of the postponement structure (receivables), causing revenues, profits, R/C, and cash of red chili farmers to increase. The adequacy of farmers’ cash has also increased. Thus it is hoped that in the future farmers can finance their farming according to GAP and SOP so that the productivity of farmers’ red chili plants increases, which results in the acquisition of red chili yields both in quality and quantity. Increased acquisition of red chili will increase cash, revenue, and profits of red chili farmers.

Based on the simulation results, it was obtained that after certification of red chilies produced by equal partnership farmers, the cash equivalent of the partnership scenario farmers has increased. This happens because the income received by farmers after the certification process is higher than before the certification process, so farmers are able to cover the costs incurred for the certification process. Thus the food safety certification process for agricultural products, especially for the red chili commodity, in addition to the future will benefit consumers also benefit farmers as providers of raw materials for processed food products.
References

[1] B. P. Statistik, Kabupaten Bener Meriah Dalam Angka, Banda Aceh: BPS, 2018.
[2] IFAD, The Power of Partnerships: Forging Alliances for Sustainable Smallholder Agriculture, Rome: Governing Council, 2013.
[3] B. Slobe, A Fair Share for Smallholders, A Value Chain Analysis of The Coffee Sector, Amsterdam: Somo, 2006.
[4] M. Tasrif, Analisis Kebijakan Menggunakan Model System Dynamics, Bandung: Program Magister Studi Pembangunan. Institut Teknologi Bandung, 2006.
[5] Soekartawi, Pengantar Agribisnis, Jakarta: PT. Raja Grafindo Persada, 2001.