
| RESEARCH ARTICLE

Opportunities and Challenges for Katokkon Chili (*Capsicum chinense. Jacq*) Agribusiness as a Highland Endemic Crop: Lessons Learned from Indonesia

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| ABSTRACT

The development of agribusiness involving endemic plants offers both opportunities and challenges due to the fact that these plants are endemic to specific geographical areas. The Toraja highlands are home to the Katokkon chili, an endemic crop with a spicier taste and larger fruit size than regular chili. The community utilizes this unique crop as a source of income. The objective of this study is to identify the application of the Katokkon agribusiness subsystem and to examine the opportunities and challenges inherent to its cultivation. This research uses a mixed-methods approach with a sequential explanatory technique. Data collection was conducted in Rantetayo District, Tana Toraja Regency, involving a total of 58 samples with details of 42 samples of katokkon chili farmers, 6 intermediary traders, 3 wholesalers, and 7 retailers. This was conducted between February and May 2024. The analysis was conducted in three stages. Initially, the agribusiness subsystems were identified. Secondly, the income, marketing margins, and farmer share were analysed. Finally, opportunities and challenges in each katokkon agribusiness subsystem in Toraja were analysed. The findings revealed that, of the five identified subsystems (production input, on-farm, post-harvest processing, marketing, and support), post-harvest processing was not conducted. The average income for farmers is IDR 223,820,571.65 per hectare per month, with an R/C ratio of 9.56. In regard to the marketing of these products, there are three distinct marketing channels. The farmer's share ranges from 50 to 90 percent. The institutions and services that support the operation of the katokkon chili agribusiness are government agencies and farmer groups. There are still opportunities for the development of katokkon, mainly because of its specific characteristics. The main challenge lies in the agribusiness subsystem, namely seeds and processing, and post-harvest subsystems. Overall, katokkon development opportunities can be optimized through government support and other supporting institutions.

| KEYWORDS

Opportunities and challenges, Katokkon chili, Highland endemic crop, Agribusiness system.

| ARTICLE INFORMATION

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1. Introduction

The conventional practices of agriculture depend on two main resources: land and labor (Beckmann et al., 2019; der Ploeg, 2019; Kılıç et al., 2020; Montgomery & Biklé, 2021). In Indonesia, the discourse on land in rural areas generally revolves around the grand narrative that land in these areas is still vast and largely underutilized (van Eekelen, 2020). This narrative, which posits that land is still widely available and has not been optimally managed, has implications for agricultural development policies that are less concerned with land productivity. As a result, structured and planned efforts to improve land use have become a relatively minor issue in agricultural policy (Supriadi, 2008).

A similar argument can be made with regard to the narrative surrounding the topic of labor. The government and society have always relied on the situation that Indonesia is overpopulated, including surplus labor, and therefore, Indonesia is known as a country that produces abundant, inexpensive labor (Moeis et al., 2020). This narrative, in turn, constrains the entirety of the nation

from enhancing the capabilities of its human resources in the agricultural sector. The consequences of this situation are already evident, as evidenced by the declining number of farmers, particularly those engaged in the agricultural production of food crops. Furthermore, the appeal of the agricultural sector for millennials has declined due to a number of factors (Sumartono et al., 2019).

In nations that have developed advanced agricultural techniques, in addition to the traditional resources of land and labor, another resource is capital, particularly in the form of technological innovations such as biotechnology, enhanced animal husbandry, and improved machinery and chemicals (Khan et al., 2021; Seleiman et al., 2020). The fourth resource, namely management, will facilitate future improvements (Collinson, 2019; Skobelev et al., 2019). The management aspect then developed further to make agricultural practices enter a new gate, namely the agribusiness era. Since then, agriculture has always been associated with agribusiness, which provides opportunities for the development of businesses and industries based on the agricultural sector.

The term "agribusiness" encompasses the full spectrum of activities related to the production, distribution, and consumption of food, clothing, and even shelter. It includes all economic activity within the food and fiber system, which includes input supply industries, agricultural production, and post-harvest activities such as commodity processing, food manufacturing, and food distribution. Agribusiness is a complex system that involves various aspects of the production, processing, and marketing of agricultural products. As a system, agribusiness includes pre-harvest, harvest, post-harvest, and marketing activities. Agribusiness activities are not independent but interrelated with each other. The agribusiness formulation is further improved into agribusiness subsystems that include upstream or input, on-farm, harvest and post-harvest, marketing, and support subsystems (Ekowati et al., 2011; Harli et al., 2018). In the context of highland endemic plants, the agribusiness system will involve all stages, from seed production, fertilization, and irrigation to product marketing.

Knowledge of agribusiness subsystems is key to improving the productivity and sustainability of agricultural businesses. By understanding the roles and interrelationships between subsystems in agribusiness, agricultural business actors, including Katokkon farmers in Toraja, can design holistic and integrated strategies to improve the efficiency, productivity, and sustainability of their agricultural businesses. Accordingly, an in-depth understanding of agribusiness subsystems will assist in optimizing the entire production, marketing, and supporting processes of Katokkon farming to achieve success in the development of agribusiness.

As it is known that agribusiness is a system developed to empower agricultural sector activities, it requires the seriousness of all parties to develop agribusiness subsystems in various agricultural sectors consistently. The upstream or input subsystem is the first step that determines the progress of agricultural activities. The upstream subsystem involves industries that produce agricultural inputs such as seeds, fertilizers, pesticides, medicines, and agricultural machinery (Harli et al., 2018). This subsystem is important to ensure the availability of quality inputs to support optimal Katokkon production. The on-farm subsystem is also a crucial part of agribusiness, which includes crop cultivation, maintenance, and farm management activities. In this context, an in-depth understanding of Katokkon cultivation techniques and sustainable farming practices can help improve the productivity and quality of Katokkon.

The agribusiness subsystem delivers an understanding that farming activities provide long-term benefits. One of the efforts made is to develop endemic plants. Preserving endemic plants such as Katokkon chili will provide benefits such as biodiversity, ecosystem development, genetic resources, cultural identity, food and medicine, local economy, and landscape maintenance. In addition, endemic plants can also be indicators of environmental health and climate change; therefore, preserving them can help in better environmental monitoring (Liao et al., 2023; Tesfay et al., 2024).

The challenge of developing endemic plants lies not only in how to make these agricultural activities have an economic effect on community income and sustainability, but more than that, how the community wants to develop them towards a more effective and sustainable agribusiness. Endemic plants that have localistic characteristics are plants that have long been known by the community, so cultivation skills do not seem to be an issue. Endemic plants are known to be adaptive to the environment in which they grow, and therefore, endemic plant seeds are widely available in the region. Even though endemic plant seeds are available, it does not mean that the existence of these plants will automatically be sustained. The case of the Purwaceng plant (*Pimpinella prutjan*, Molk), which is one of the icons of the Dieng Plateau Tourism Area, shows a drastic decline in population numbers. Even though the government has tried to elevate it into a welcome drink in various tourism activities in Dieng. The decline in the population of this endemic plant is due to the fact that the local community is not too interested in cultivating it. In contrast, the popularity of the endemic Red Fruit (*Pandanus conoideus*, Lamk) plant has made this endemic plant from Papua sought after by many people and certainly has a positive impact on the income of local communities in Papua (Fadilah et al., 2023; Renyaan et al., 2020; Sari et al., 2022; Tondok et al., 2023).

Discussions on agribusiness subsystems, the position of endemic plants from the aspect of sustainability, and their prospects will be used to see the opportunities and challenges of agribusiness of endemic highland plants (Katokkon) in South Sulawesi. Sustainability aspects can be seen from ecological sustainability and economic sustainability supported by the strong desire of local communities to protect and make their endemic plants a treasure that is valuable and not destroyed by time. Efforts to protect endemic plants carried out by academics include seeing opportunities and challenges in the community. This research was conducted as an academic contribution to the sustainability of endemic plants. The formulation of the objectives of this research is to identify the Katokkon agribusiness subsystem and identify opportunities and challenges in the production of this endemic highland plant. The use of a mixed-methods approach with a sequential explanatory technique, combining income analysis, agribusiness subsistence analysis, and opportunities and challenges analysis, is believed to be new, so with all academic confidence, this research also shows its novelty position among other similar studies.

2. Method

Katokkon chili is an endemic highland plant in Toraja. Therefore, this study was conducted in an area where the endemic plant is located and cultivated by the community. Observations showed that Katokkon is spread throughout the Tana Toraja Regency and people in Rantetayo Sub-district use this plant as one of their sources of income. Therefore, this study was conducted in Rantetayo Sub-district in February-May 2024. Respondents involved totaled 58 samples with details of 42 samples of Katokkon farmers, 6 intermediary traders, 3 large traders, and 7 retailers.

This research used a mixed method approach with a sequential explanatory technique. Information obtained from Katokkon farmer respondents was used to analyze the agribusiness input, on-farm, harvest and post-harvest, marketing, and the existence and support of supporting institutions. Information on the marketing subsystem was obtained from farmers and traders. Information on opportunities and challenges for Katokkon development was obtained from farmers, traders, and actors involved in the support subsystem. The analysis was conducted in three stages, namely identifying agribusiness subsystems, analyzing farmers' income marketing margins, and ending with the calculation of farmer share, and finally analyzing opportunities and challenges in each Katokkon agribusiness subsystem in Toraja. Quantitative data were used to analyze the income, marketing margin of each institution, and farmer share of each marketing channel. Quantitative data were used to analyze local people's perceptions of the opportunities and challenges of Katokkon agribusiness development. To complement the analysis, qualitative data will also be obtained from several informants who are not respondents but have a good insight into the prospects of these endemic plants.

3. Result and Discussion

3.1. Katokkon: A Description of Agribusiness Subsystem of Endemic Highland Crops

Research shows that the agribusiness system approach is a framework that includes various elements that are interrelated and interact in the process of production, distribution and marketing of agricultural products. As a framework, the agribusiness system cannot stand alone, but the system must be interrelated between supporting elements (subsystems), for example, in Brazil, Philippines, and Indonesia (Almeida et al., 2020; Artini et al., 2019; Preciados et al., 2022; Solano-Gaviño & Siche, 2024). Research on how agribusiness systems should be developed shows that this is an integrated and holistic approach. Without one of the subsystems working properly, it is certain that the agribusiness system of the commodity will not perform well. Research conducted on cloves shows that the agribusiness systems approach can be used to assess the competitiveness of these commodities (Santoso, 2019). Furthermore, there is research highlighting the potential of highlands for the development of improved shallot seed production. The implications of this research suggest that highlands have characteristics that favor the growth of certain crops, such as endemic shallots (Palupi et al., 2016).

This section first looks at the demographic characteristics of the actors in the agribusiness subsystem before discussing the agribusiness subsystem in more detail. These are the Katokkon chili farmers and the traders involved in the various marketing channels. Demographic characteristics in this study are the age and education of farmers and traders, which can be viewed in Figure 1.

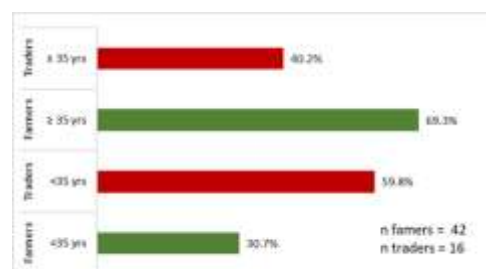


Figure 1. Age of Farmers and Traders

As illustrated in Figure 1, the proportion of farmers in the age group above 35 years is 70 percent. In contrast to the farmers' group, the traders' group exhibits a less pronounced age-related disparity. The small proportion of young Katokkon farmers (30 percent) indicates that there is a reluctance of young or millennial farmers to take up agriculture. This is despite the fact that this sector provides an opportunity to increase farmers' household income. Conversely, the younger age category has a greater proportion of traders (60 percent) than the older age category. This indicates a proclivity for the younger age cohort to pursue a career in trade in comparison to the agricultural sector.

Another demographic aspect shown in this study is the educational level of farmers and traders (Figure 2). The education level of Katokkon farmers is relatively higher than that of traders. Another demographic aspect shown in this study is the education level of farmers and traders (Figure 2). The education level of Katokkon farmers is relatively higher than that of traders. Some farmers have a bachelor's degree (20 percent), but most of them have an elementary or junior high school education (51 percent). The traders, on the other hand, only have primary and junior high school education, with the largest percentage having primary school education (56 percent). In the in-depth interviews with highly educated farmers, it seems that they are the ones who realize the good prospects of Katokkon farming. Those with tertiary education also said that Katokkon farming is much less demanding than coffee farming, so by cultivating Katokkon, there is still time left for other activities. Highly educated farmers are also farmer group leaders or community leaders. They are expected to set an example for the better development of Katokkon with their higher education.

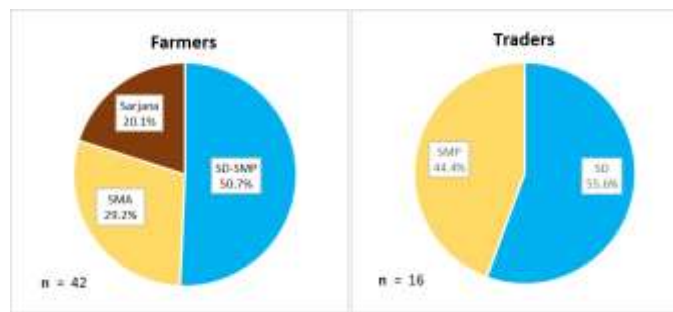


Figure 2. Educational Level of Farmers and Traders

In the preceding section, the demographic characteristics of Katokkon farmers and traders were described. The introduction of personal capabilities, represented by age and education, becomes important when the discussion continues on the agribusiness subsystem. This is because the drivers of the various subsystems lie in the human aspects, which in this case are farmers and traders (Figure 1 and Figure 2). Following the discussion of demographic aspects is a discussion of each subsystem of the Katokkon agribusiness.

3.2 Subsystem Input; Procurement of Production Facilities and Infrastructure

After discussing the demographic characteristics of farmers and traders involved in the agribusiness system activities of the endemic Katokkon crop, the next section will describe each subsystem in Katokkon farming in the highlands of Toraja. The production process of Katokkon farming is systematically described. It is confirmed that the availability of facilities and infrastructure plays a supporting role in the production activities properly. The facilities and infrastructure for the production of Katokkon farming in Madandan Village, Rantetayo District, Tana Toraja Regency are:

1. The land used by farmers in Katokkon cultivation is fertile and well cultivated. This is supported by the geographical conditions of Madandan Village, which is in the highlands where the temperature and humidity are high, which is one of the factors that affect the optimal growth of Katokkon chili plants.
2. The seeds used in Katokkon farming are super local Katokkon seeds and jumbo Katokkon seeds. Farmers get seeds from farmer shops and from the Agriculture Office of Tana Toraja Regency, which are distributed through farmer groups. In the process of seeding Katokkon, the first thing to do is to sow the chili seeds into the planting medium for approximately 20 days before being transferred to the land for planting.
3. The farming tools used are complete, but there are still many tools that are easily damaged.
4. The fertilizers used by farmers are organic fertilizers and also inorganic fertilizers consisting of booster, compaction, POC, regular NPK, Za, and Sp 36. Manure is produced by farmers themselves by utilizing livestock manure, and inorganic fertilizers are obtained from farm stores.
5. Pesticides are used to prevent the spread of pests in Katokkon crops. Pesticides used by farmers are fungicides.

6. Labor in Katokkon farming activities comes from close relatives, family members, or farmer groups. This is used by farmers to minimize farming expenses. In 1 hectare of land, about 15 workers are needed. At harvest time, farmers need extra labor to help harvest and sort the chilies.

The upstream subsystem is often referred to as the input subsystem. This subsystem includes two aspects, which are natural resources and industry. The natural resource aspect is the land owned by the farmers, including the characteristics of the highlands that produce endemic Katokkon crop. On the other side, the industrial aspect is related to seeds, fertilizers, pesticides, medicines, and agricultural machinery (Santoso, 2019). In order to support optimal Katokkon production, this subsystem is important to ensure the availability of quality inputs.

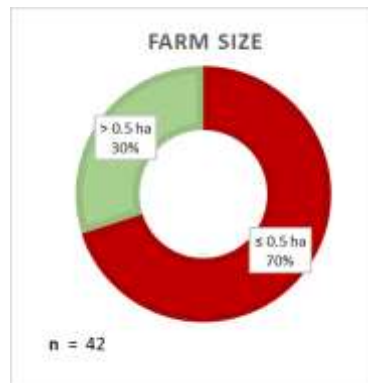


Figure 2. Farm Size of Katokkon Farming

The land is an essential input for agricultural activity. It is essential because land cannot be substituted by anything else. The amount of land used for agriculture is closely related to the amount of seed used. Land and seeds are complementary. The more land used, the more seeds are required for the farm. Figure 3 and Figure 4 show the land size for Katokkon farming and the types of seeds used. The land area for Katokkon farming in Toraja shows that despite the large areas of land available, most farmers only cultivate half a hectare (70 percent). The small amount of land used to cultivate this endemic crop will, in turn, result in low yields. With the uniqueness of the highlands, farmers should be more eager to cultivate the Katokkon crop. The limited land for Katokkon is different from the limited land in rice farming, which requires a lot of water from irrigation (Azuz et al., 2023). Katokkon only requires land suitability that is topographically located in the highlands. Therefore, from the aspect of land suitability, farmers should be able to expand their land to develop Katokkon farming.

In the context of the input subsystem, there is a complementary link between land and seeds. As an endemic crop, Katokkon is difficult to grow elsewhere, so the seedlings developed by both farmers and other institutions remain based on the suitability of highland growing conditions. This study found that the Toraja (highland) community has developed Katokkon seedlings into two types: super local seedlings and jumbo seedlings (Figure 3). Super local is characterized by a spicier taste compared to jumbo seedlings. Jumbo seedlings, as the name implies, have a larger size than the super local Katokkon. In later development, farmers planted more jumbo Katokkon (60 percent). The reason why farmers choose the jumbo seedlings is because their large size has an impact on the unit weight of production in the same land area, thus providing an opportunity for greater income.

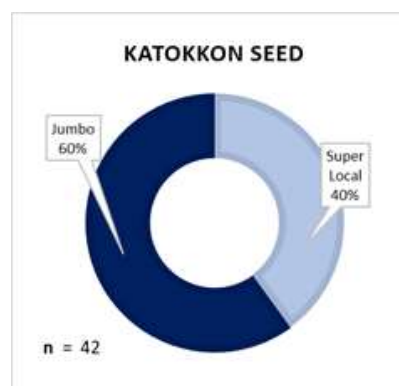


Figure 3. Katokkon Seed

What happens to the 40 percent of farmers who continue to choose Super Lokal seedlings? In-depth interviews revealed that farmers continue to plant Super Local Katokkon because it does not require much additional fertilizer and is resistant to disease. Super Local Katokkon does not require much time and money for plant maintenance. Farmers said that the steep and hard-to-reach planting locations made it difficult for them to always go to the farm to take extra care of the Katokkon. What the two types of Katokkon (super local and jumbo) have in common is their unique characteristics in terms of shape and flavor. Katokkon has a strong spicy flavor a unique shape like bell peppers, and is rich in important health nutrients such as vitamin C, carotenoids, and capsaicin. This is why local farmers still cultivate Katokkon as a source of income for their households (Tammu et al., 2021; Wätjen et al., 2021).

Fertilizers are used when the nutrients contained in the land are insufficient for optimal plant growth. Fertilizers can be organic and chemical fertilizers. In relation to chemical fertilizers, rice farmers use large amounts of fertilizer, and they are privileged to receive a subsidized fertilizer policy from the government. This is different from Katokkon farming, which does not have a subsidized chemical fertilizer policy. Therefore, farmers cultivate Katokkon by relying on chemical fertilizers purchased at non-subsidized prices and using organic fertilizers derived from animal manure. The advantageous thing is that most farmers keep livestock, so livestock manure can be used as organic fertilizer to support Katokkon growth.

3.3 On-farm Subsystem

In the context of Katokkon farming, a series of production processes are carried out that result in the production of chili products, with the output expressed in kilograms. Farming activities begin with the process of plant cultivation, which is influenced by various factors, one of which is the geographical condition of the planting location. The land in the highlands is very suitable for Katokkon farming. The production process is also influenced by several factors including the land size factor. The average land area of Katokkon farmers in Madandan Village, Tana Toraja, is 1 ha. The amount of land area managed by farmers can affect the amount of production costs, revenue, and farm income.

Based on the results of data analysis, the total cost incurred by farmers during chili farming in Katokkon amounted to Rp 26,132,258.54 ha/season. The revenue obtained by Katokkon farmers is IDR 249,952,830.19 ha/season, with the total production of Katokkon farming of 7.930 kg/ha and the selling price of IDR 32,400/kg. The income or profit obtained by farmers from Katokkon farming in Madandan Tana Toraja Village is IDR 223,820,571.65 ha/season.

The value of the R / C ratio on Katokkon farming in Madandan Village, Tana Toraja, is 9.56. This means that every expenditure of Rp. 1.00 in Katokkon farming activities, will provide revenue of Rp. 9.56 and, and farmers get a profit of Rp. 8.56. The R / C ratio value is greater than 1 (> 1), so it can be concluded that Katokkon farming in Madandan Village, Rantetayo District, Tana Toraja Regency, is profitable.

3.4 Harvest and Post-Harvest Subsystem

The first post-harvest handling of Katokkon is the transportation of Katokkon from the field or harvesting location to the collection and sorting place. Furthermore, the Katokkon is collected indoors by spreading it on a dry floor covered with tarpaulin. Then, the sorting process is carried out by separating chilies that are rotten or affected by diseases/pests with good and healthy chilies. Sorting is grouped by fruit size because, generally, local consumers prefer small Katokkon while outside consumers prefer large Katokkon. Sorting is also done based on the maturity level of the katokkon chilies. Perfectly ripe chilies are separated for immediate sale, and chilies that are still ripe or half ripe can be stored for a maximum of two days as stock inventory.

Katokkon storage is done by spreading Katokkon on a dry floor covered with tarpaulin. This method of spreading avoids the accumulation of fruit so that it does not quickly deteriorate or rot. Packaging using plastic sacks is done before Katokkon is transported for sale. In this subsystem, there is no processing of Katokkon into chili powder or chili sauce packaging due to the lack of processing industry in Rantetayo Sub-district, especially Madandan Village. Farmers directly sell fresh Katokkon chilies. There are only a few households that process Katokkon, which is a small portion of their production, into dried chili powder, but only for personal consumption, not for commercial use.

3.5 The Marketing Subsystem

The marketing system for Katokkon commodities in Tana Toraja is carried out by attending the market day mechanism. A market day is a day when the number of traders and visitors to a market is greater than a normal day. Market days rotate every day of the week and involve 6 traditional sub-district markets, which are sorted as follows: Makale Market, Rembon Market, Rantepao Market, Ge'tengan Market, Rantetayo Market, and Sangalla' Market. The Tana Toraja Regency Market Management Agency uses a market day system to optimize the performance of markets in various sub-districts.

The Katokkon marketing channel is the distribution channel through which Katokkon starts from farmers until it finally reaches consumers. This study found that the Katokkon marketing channel in Madandan Tana Toraja Village consists of three marketing channels, namely channel I: farmers who sell directly to consumers, channel II: farmers sell to intermediary traders then intermediary traders sell to retailers and finally to consumers, and channel III: farmers sell Katokkon to intermediary traders then to large traders then to retailers and finally to consumers. In the process of distributing Katokkon, there are marketing costs incurred by each marketing institution.

The marketing margin of Katokkon is analyzed to determine the profit obtained by the marketing institutions involved and also to determine the amount of share received by farmers (farmer's share). Marketing efficiency can be known using the percentage value of marketing margins and farmer's share. A marketing channel is considered economically efficient if the marketing channel has a relatively low marketing margin percentage value and a farmer's share percentage value of more than 50%.

This study shows that in marketing channel I, there is no marketing margin because there are no intermediary institutions involved, so the value of the farmer's share is 100%. In marketing channel II, the marketing margin value is IDR 3,500/kg with a marketing cost of IDR 643.69/kg, a marketing profit of 2,856.31/kg, and a farmer's share value of 90.14%. While in marketing channel III, the marketing margin amounted to IDR 5,500/kg with a marketing cost of IDR 1,047.83/kg and, a marketing profit of IDR 4,452.17/kg and a farmer's share value of 84.51%. The percentage of marketing margin in marketing channel I was 9.86%, and in marketing channel II, it was 15.49%.

With reference to the value of marketing costs and the value of the farmer's share, the whole Katokkon marketing channel is classified as efficient. The marketing costs incurred in each marketing channel are still relatively low, where the lower the marketing costs incurred, the more efficient the marketing will be. The farmer's share value of each marketing channel is also above 50%. The results of the data analysis show that the most economically efficient marketing channel is marketing channel II. The percentage of marketing margin is 9.86%, with a farmer's share value of 90.14%. This value is higher than the farmer's share value of marketing channel III.

3.6 Support Subsystem

The agribusiness process, starting from the upstream subsystem, on-farm subsystem, harvest and post-harvest subsystem, and marketing subsystem, requires one other subsystem to support a series of Katokkon agribusiness activities. The subsystem is called the supporting subsystem. This study found that in Katokkon's agribusiness activities, there are several supporting institutions as follows:

1. Government institutions such as the Dinas Pertanian Tana Toraja Regency, which distributes production facilities for Katokkon farmers, and also the Agricultural Extension Agency which provides counseling for farmers on various information and technical farm management.
2. Financial institutions such as Banks and Koperasi Unit Desa provide assistance to farmers in the form of initial capital to run Katokkon farms.
3. Farmer Groups which are a forum for information for farmers and also a means of distributing donations from the local Agriculture Office.
4. Marketing Institutions consisting of collecting traders, wholesalers, and retailers who play a role in the Katokkon distribution process to consumers.
5. Transportation services that function as transportation that carries the production of Katokkon to the next distribution place. Transportation services that are often used by Katokkon farmers in Madandan Village are box cars, pick-ups, or trucks. The problem with this transportation is that the cost is quite expensive. Therefore, some Katokkon farmers prefer to sell their crops to intermediary traders.

3.7 Katokkon: Opportunities and Challenges

Endemic plants are always related to the location where they grow, including highland endemics such as Purwaceng, Katokkon, Coffee, and typical highland flowers. Due to geographical restrictions, the distribution of these plants is localized to the area. This condition, on the one hand, provides optimal growth opportunities because competitors are limited to that area (Rusmin, 2017). Limited competitors provide a great opportunity to develop optimally. Coffee plants that grow in the highlands cannot be planted in other areas. This causes the coffee population and production to be controlled by only coffee farmers in the highland area. The same is true for Katokkon, where it can optimally support the economy of Toraja highland farmers due to the lack of competitors.

In fact, although coffee and Katokkon are both plants that can only grow well at high altitudes, coffee is more developed than Katokkon. The argument that can be given for this fact is that coffee has entered the industrial stage, even as a diplomatic instrument (Alfirahmi, 2019; Nurhasanah & Dewi, 2019), and the post-harvesting process is running well, and the risk of rotting

can be avoided. The strengths of coffee, such as the harvesting and post-harvesting processes being well established and its spread having entered the industrial process, have not been followed by Katokkon.

The Purwaceng plant, which is an icon of the Dieng plateau, is highly developed because the local government provides strong support that accompanies the development of tourism in Dieng. Likewise, red fruit plants are typical of Papua. When the covid takes place, the Papuan red fruit plant is believed to increase the body's endurance, which, with its strength, people can survive the covid attack. Red fruit found momentum to be widely recognized at that time. And until now, the red fruit plant has entered the pharmaceutical industry (Gunawan et al., 2021).

Katokkon cannot be equated with Purwaceng as a welcome drink icon in the context of tourism. But Katokkon can expand its market to meet the needs of the food industry. In Indonesia, during Lebaran or Christmas, the price of chili always increases sharply. In addition, instant noodle factories require chili supplies that cannot be met by domestic production. This fact provides insight into the opportunities that can be obtained in Katokkon agribusiness activities as a highland endemic crop.

The challenge is to make Katokkon more developed by referring to the agribusiness subsystems. An examination of the Katokkon agribusiness subsystem shows weaknesses in the input, harvesting and, post-harvesting, and support subsystems. In another articulation, the analysis of the katokkon agribusiness subsystem has shown various weaknesses, and in the agribusiness view, all challenges must be overcome to obtain optimal development opportunities. Thus, Katokkon as a highland endemic crop is very prospective to be developed.

4. Conclusion

The study of Katokkon agribusiness is based on tracing what is happening in each agribusiness subsystem. The advantage of tracing these subsystems is that it can easily find out which subsystems are not working optimally and what causes them. This research found that of the five subsystems in the Katokkon agribusiness, the weak point is the narrow land area that characterizes agriculture in Indonesia. Another thing that does not work well is the post-harvest process. In this process, farmers only sell Katokkon in its simplest form, which is the production of Katokkon without processing. The lack of processing into a long-lasting powdered product means that Katokkon is only seen as an ingredient to complement dishes. In fact, the potential for Katokkon to fulfill the needs of the food industry, such as noodle factories, is wide open.

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