

Natural silk agroindustry in Wajo Regency

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3 Natural silk agroindustry in Wajo Regency

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Abstract. Indonesia's demand for natural silk is quite high for each year, reaching around 200 tons of raw silk threads and 250 tons of spun silk threads, but domestic production of raw silk threads has only reached 110 tons. This shows that Natural Silk has great potential to be developed, especially in South Sulawesi. This business is generally home industry which is relatively easy to work with, simple technology, labor-intensive, fast production, and high economic value. The research was conducted in Wajo Regency in 6 sub-districts of natural silk development. The time for collecting data and information to be used in this study was planned for March - October 2019. The type of data used is primary data and data (collected through field observations followed by direct interviews with 25 entrepreneurs using a questionnaire. The data collected is then analyzed, using the quantitative descriptive analysis to confirm the analysis. Increasing the production of mulberry plants in Wajo is needed for the long term not only as a food ingredient for silkworms but also as a biopharma plant or a mixture of cosmetic ingredients. However, improvements are needed in the quality of cocoon products as well as more advanced technological inputs and capacity building for farmers and their institutions.

3 1. Introduction

Natural silk agribusiness is one of the Non-Timber Forest Products (NTFP) which is one of the social forestry activities aimed at increasing the people's economy, expanding business and work opportunities, empowering communities and improving the welfare of communities, especially for forest areas [1]. Utilization of Non-Timber Forest Products (NTFPs) needs to be developed and increased in economic value so that it can be relied on as a source of livelihood for the community or local and state governments [2,3].

Natural silk is an agroindustry activity, starting from mulberry planting (leaf production), silkworm breeding (caterpillar seed production), silkworm cultivation (cocoon production), cocoon handling (processing), spinning (yarn production), weaving (silk fabric production) to the marketing of silk fabrics. This is one of the efforts to rehabilitate land and conserve soil that can increase the carrying capacity and productivity of the land, especially on sub-optimally lands.

Indonesian silk is a group of agro-industries with great potential to be developed because it has various advantages:

1. Indonesia's natural geography is the availability of land with an altitude of 400-800 meters above a level to produce good mulberry and cocoons.
2. Silk products have high economic value and popular in Domestic and abroad markets.



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3. Natural silk businesses can be managed by rural communities, increase people's income quickly to reduce the problem of poverty, and develop a people's economy.
4. The demand for silk products by both the domestic and export markets tends to increase from year to year. Indonesia has the potential to develop natural silk, both to meet domestic needs and to meet the expected global market in the not too distant future.
5. Natural silk business can make a significant contribution to the national economy (contribution to Gross Domestic Product, GDP). This will be realized in the development of national natural silk is managed carefully and conceptually by supervisory agencies and stakeholders.

Based on that conditions, natural silk has a good prospect to be developed because;

1. High economic value
2. Cultivation business can be carried out by rural communities at large, so that increase community income, reduce poverty and drive the people's economy.
3. The height demand for silk products both domestically and abroad
4. The increased demand for silk thread in each year, namely 92.742 tons/year in 2002 increased to 118,000 tons (27.3%) in 2005. Meanwhile, Indonesia is only able to produce an average of 78 tons/year of silk thread.
5. Silk finished goods such as finishing silk fabrics and printed, read made garment, made up goods and materials for the interior and decoration market is quite bright, both for domestic and export.
6. The export of silk fabric shows a very significant increase, in 2000 it was only worth US\$ 1.5, an increase of 566% in 2004.

The brief description above reinforces the importance of studying the description of natural silk agroindustry in the Wajo which has the potential to increase income from the industrial sector.

2. Research Method

The research was carried out in Wajo Regency because it is a large district in South Sulawesi that has the mainstay commodity of the natural silk area. This district is also known as the "City of Silk". This research was conducted in 6 sub-districts of natural silk development in Wajo Regency, namely; Pammana District, Tempe District, Bola District, Gilireng District, Majauleng District and Tanasitolo District. This is chosen purposively with the consideration that sub-district has long been an area for silk development.

The upstream natural silk agroindustry is carried out through the maintenance of silkworms in Wajo District in Sabbangparu District (Walanae Village, Sompe, Salotenga, Ujungpero, Wage), Majauleng District (Macanang Village) and Pammana District (Lempa and Tandangpalie Villages). Furthermore, in the downstream, one of the district government programs that is already running (one village one commodity policy program). The location is located in Impa-impu, Pakkanna Village, Tempe District and Alluppang Village, Takkalalla District. These two districts were chosen as silk villages because 90% of the population depends on silk weaving activities. The concentration of fostering and developing weaving in this village is carried out by the Wajo Regency government.

Apart from weaving activities, marketing activities are also carried out commercially at the company "Losari Silk" and the "Abdi Sutera" Cooperative having its address at Sempange, Tanasitolo District. This cooperative has 25 entrepreneur members. The description of natural silk agro-industrial activities above is the basis for determining the location for data collection and information in this study, namely Sabbangparu District, Majauleng District, and Pammana District for natural silk activities in the upstream and Takkalalla, Tempe and Tanasitolo Districts for natural silk activities in Downstream.

The time for collecting data and information that will be used in this study is planned for March - October 2019. The type of data is secondary data (obtained from literature studies and agencies that exist or are related to this research, namely the Central Bureau of Statistics (BPS), Wajo Regency, Industrial Service. and Trade in Wajo Regency) and primary data (collected through field observations followed by direct interviews with respondents using a systematic questionnaire). The data collected was then analyzed using the quantitative descriptive analysis to confirm the analysis based on the research objectives.

3. Discussion

Natural silk in South Sulawesi began to develop in the 1950s [4]. At that time soldiers from Java brought silkworm and mulberry seeds. Quickly, silkworm cultivation spread to several districts such as Soppeng, Wajo, Enrekang. Almost all under the house is occupied for caterpillar maintenance. The maintenance of silkworms is favored by the people because of its relatively easy cultivation and can be done by all family members. Likewise, the weaving of the people (gedogan), is rapidly developing because of the tradition of the people who like to weave and the community uses silk sarongs for various kinds of traditional ceremonies such as weddings and harvest parties.

The production of silk thread in South Sulawesi reached its peak in 1971 at 140 tonnes/year and a drastic decrease in 1973 caused by pebrine disease. The government tries to destroy the local silkworms that had been used by farmers and prohibited their use because they considered local silkworms to spread pebrine disease. To cover the demand, the farmer groups imported F1 seeds from Japan. The price of these seeds was high and the continuity of imported seeds was not guaranteed so farmers tried to make F2 seeds and the results were rarely successful.

Sengkang which is the capital of Wajo Regency byname "City of Silk", the nickname also describes the region's mainstay in the natural silk industry. But the silk weaving industry is not only around the city of Sengkang but also spreads to several districts. 6.57% of the industrial sector's contribution to regional GDP, almost entirely comes from the small industry and home handicrafts sub-sector, most of which are the silk industry.

Even though Wajo is known as the center of the natural silk industry in South Sulawesi, most of its raw materials have come from Soppeng, Enrekang, and imported districts. The Wajo government supported this business and stated it in the Basic Pattern for Regional Development of the Wajo Regency for 2000 - 2005, namely in the direction of economic policy and the people's welfare in the natural and industrial parts of silk. The district government also plans to cooperate with the Bandung Textile Center and the textile laboratory test equipment assistance from the Central Industry and Trade Ministry will prepare a Textile Testing Lab in Sengkang.

One of the district government programs that are already running is the one village one commodity policy program. The location is in Impa-impada Desa Pakkanna, Tempe Subdistrict, which was chosen as the silk village because 90% of the population depends on silk weaving activities. In this village, the concentration of guidance and development of weaving is carried out by the district government. Coaching is carried out in the form of comparative study training to Java Island.

Natural silk has a long series of activities ranging from mulberry cultivation, silkworm cultivation, post-harvest handling, processing industry to marketing is part of the activities in the agricultural and industrial sectors that can contribute to the economy. Under division of the natural silk activity sector is divided into the upstream sector which includes the cultivation of mulberry, silkworm to cocoon and the downstream sector includes industry and marketing. This is the flow of the natural silk business process in Indonesia [5] (Picture 1).

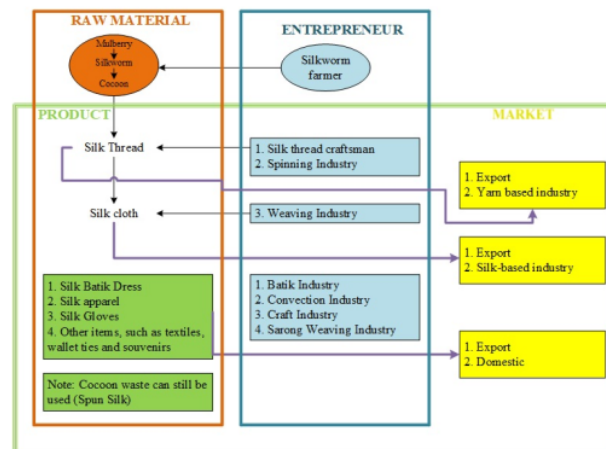


Figure 1. Natural Silk Business Process Flow

Flow in Figure 1 appears that silk development activities in Wajo Regency are carried out similarly and can be found in all sub-districts. Especially in the development of natural silk and silk thread production, which is centered in the Sabbangparu District and scattered in the Pammana District, Tempe District, Bola District, Gilireng District, and Majauleng District. Meanwhile, the center of the silk weaving industry is in Tanasitolo District and its development areas are scattered in Tempe District, Majauleng District, and Pammana District.

The background of the Wajo people who are known to have a high entrepreneurial spirit has an impact on their high motivation to develop silk commodities by being creative and always looking for innovations. They created various kinds of products from silk and even established cooperative relationships with textile entrepreneurs from Java, including well-known Indonesian designers. The following is an explanation of the stages of the natural silk business process flow in the Wajo Regency. The details of the natural silk agro-industry in Wajo Regency are started from mulberry planting (leaf production), silkworm nursery (caterpillar seed production), silkworm cultivation (cocoon production), cocoon handling (processing), spinning (yarn production), weaving (silk cloth production) to the marketing of silk fabrics [6] will be described below:

3.1. Mulberry Plant Development

Mulberry planting centers can be developed in all districts in Wajo Regency, but referring to the suitability of land conditions, mulberry planting can be developed in 6 sub-districts, namely Pammana District, Tempe District, Bola District, Gilireng District, Majauleng District, and Tanasitolo District. The area of potential in each district is quite diverse and until now the mulberry area still occupies a land area of about 240 hectares from 19,894 hectares [7].

The huge potential of land that can be used for mulberry cultivation demands the attention of all-natural silk stakeholders in utilizing it. If it is assumed that the production of mulberry leaves per hectare reaches 140 tons and the land under management is 19,894 hectares, then the mulberry land in 6 sub-districts of Wajo Regency has the potential to produce 2,785,160 tons. To meet the feed from 1 box of silkworm eggs, 500 kg or 0.5 tonnes of feed is needed, which means that a yield of 2,785,160 tonnes can meet the feed needs for the maintenance 5,570,320 boxes of silkworm eggs with the type of mulberry plant species developed. includes *Morus nigra*, *Morus cathayana*, *Morus alba*, *Morus multicaulis*, *Kanva*, and *S 54*.

Mulberry plants in Wajo Regency should be developed not only as a food for silkworms but also as a biopharma plant or a mixture of cosmetic ingredients because based on Kaomini [8] research, mulberry contains a lot of bioactivities. Its young leaves can be made healthy vegetables that have medicinal

properties for high blood pressure, increase breast milk, sharpen eyesight, and good for digestion. While the fruit is useful for strengthening the kidneys, improving blood circulation, overcoming constipation. The Chinese believe that mulberry fruit can sharpen hearing and can be formulated as a medicine for asthma, swelling of the face, and coughs, also the roots of the mulberry can be boiled as an antidote to fever.

3.2. Maintenance of Silkworms and Cocoon Production

The production of silk thread in South Sulawesi reached its peak in 1971 at 140 tonnes/year. After that in 1972/1973 pebrine disease spread which attacks silkworms which resulted in a drastic decrease in production. The government then took action to destroy the local silkworms that had been used by farmers and prohibited their use because they considered local silkworms to spread pebrine disease. To meet the needs of the community, the farmer groups imported F1 seeds from Japan. Because the price of seeds was high and the continuity of imported seeds was not guaranteed, farmers tried to make F2 seeds and the results were rarely successful.

In 1976, the people of South Sulawesi, through the BANPRES (Presidential Assistance) project, received 4 semi-automatic spinning machines which were placed in the districts of Soppeng, Wajo, Sidrap, and Enrekang. From 1975 to 1984, the Indonesian government conducted technical cooperation with the Japanese government (JICA) through the ATA-72 project to develop a natural silk project in South Sulawesi. Currently, the production of cocoons and silk threads in South Sulawesi has experienced ups and downs but is still the highest in Indonesia. The production of silk thread in 2003 was recorded at 59 tons/year and silkworm cultivation has spread in 12 districts.

But the silk weaving industry is not only around the city of Sengkang but also spreads to several districts. 6.57% of the industrial sector's contribution to regional GDP, almost entirely comes from the small industry and home handicrafts sub-sector, most of which are the silk industry. Even though Wajo is known as the center of the natural silk industry in South Sulawesi, most of its raw materials come from Soppeng, Enrekang, or imported.

The support of the Wajo Regency government is very clearly stated in the Basic Pattern for Regional Development of the Wajo Regency for 2000 - 2005, namely in the direction of economic policy and the people's welfare in the natural and industrial parts of silk. The district government also plans to collaborate with the Bandung Textile Center and help with textile lab testing equipment from the Central Industry and Trade Ministry to establish a Textile Testing Lab in Sengkang.

One of the district government programs that is already running is the one village one commodity policy program. Its location is located in Impa-impia Desa Pakkanna, Tempe District which was chosen as a silk village because 90% of its population depends on silk weaving activities. The concentration of guidance and development of weaving is carried out by the district government. Coaching carried out in the form of comparative study training to the Java Kokon is a product of silkworm rearing. The success of rearing silkworms can be seen from the number and quality of cocoons produced. Availability of feed in good quantity and quality will guarantee the production of quality cocoons. If it is assumed that from 1 box of silkworm eggs, about 40 kg of cocoons can be produced, then from the maintenance of 5,570,320 boxes of silkworm eggs, supported by good feed will produce 222,812,800 kg cocoons/year. However, currently now, cocoon production that can be produced by silkworm breeding in Wajo District ranges from 18-40 kg per box, or about 416,771 kg cocoons per year.

The problem is that the quality of cocoon products is low. This has an impact on the low selling price of cocoons, thereby affecting the income and welfare of silkworm farmers. However, almost all of these cocoons are still absorbed by the market due to high market demand. More advanced technological inputs and capacity building for farmers and their institutions need attention to increase the production and quality of cocoons produced in the future.

3.3. Silk Yarn Spinning Industry

The silk industry, especially natural silk thread, is one of the potential agro-industrial sub-sectors to be developed because it has various advantages. All raw materials are available and come from local natural

resources. Many of the largest silk producing countries such as China and India can dominate the silk market in the world because they carry out development and research by involving academics to get optimal results. Even developed countries such as the United States, United Kingdom, Germany, and Australia carry out research and development as well [9].

The world production of natural silk threads reaches about 83,393 tons per year produced by the largest producing countries, namely China, followed by India, Japan, Korea, and Brazil. Meanwhile, the world needs more, namely around 92,743 tons per year, so there is still a considerable shortage. This is a great opportunity for Indonesia which has the potential to develop natural silk, especially since natural silk can only be developed in tropical countries.

Today there are various kinds of textiles on the market. Some come from natural fibers or artificial/synthetic fibers. Natural fibers commonly used to make fabrics include silk, cotton, hemp, and fleece. Natural silk fiber has several advantages over other natural fibers. It softer, more elastic, and have smaller thread diameters [10]. The need for natural silk threads in Indonesia is quite high each year, reaching around 200 tons of raw silk threads and 250 tons of spun silk threads. Domestic production of raw silk threads has only reached 110 tons [11].

The results of Erry's [12] study indicate that in addition to the potential benefits that can be obtained from silk yarn production, it turns out that this business also has risks. The business risks faced with silk thread production activities. In the case study at Regaloh Natural Silk Business (PSA) in Pati Regency are high raw material prices (risk of input prices), the presence of threads that are cut during the production process (production risk), and the price of output (market risk). The high raw material prices were not followed by an increase in the selling price of silk thread (output price) which caused the Regaloh PSA revenue to decrease and even lose. If the selling price of silk thread is increased, consumer demand will decrease.

The raw material price in the form of silk cocoons is IDR 18,000.00/kg. Cocoons are expensive due to the maintenance of caterpillars to cocoons that require intensive care and a long time. Costs used to raise silkworms include buying caterpillar seeds, purchasing mulberry leaves, and purchasing chlorine and formalin for disinfecting caterpillar and building equipment.

The processing of cocoons into silk thread is divided into several stages, boiling cocoons, spinning (reeling), pressing, and packaging. There are 91 craftsmen work in this business which employs around 822 people. By using 274 units of spinning machines [13] they were able to produce 6,389 kg of raw not ready-to-weave silk threads per year, and then the silk threads had to go through a twisting process again to get woven twist silk yarns. This condition provides options for silk weaving craftsmen to use silk threads from other areas such as from Enrekang Regency, Minahasa Regency, even using imported silk threads.

Taking to the condition of the silk spinning industry, the Regional Government of Wajo Regency responded by bringing in 1 unit of laboratory equipment in 2005 and 6 units of automatic spinning machines in 2008. At this time, the tools have been put to good use by silk craftsmen so that they can repair and improve the quality of the silk thread produced. Another piece of equipment provided by the government is a 1 unit silk finishing machine, but it has not been used optimally because the operation of this machine requires special expertise and a lot of money.

3.4. Silk Weaving Industry

The silk fabric industry in Wajo Regency is a home industry using ATBM and Gedogan looms. In general, this is a side job for housewives and school dropouts. Silk weaving has a very strategic impact where the chain of production processes can involve many people both in rural areas as providers of silk raw materials and silk weaving from small and medium entrepreneurs or by large industries. The silk industry also stimulates the creativity of researchers to carry out research continuously [4].

One of the weaving entrepreneurs in Wajo Regency with the name "Losari Silk" and the "Abdi Sutera" Cooperative in Sempange, Tanasitolo District. This cooperative has 25 entrepreneur members. Losari Silk has 60 ATBM equipment units with a total of 85 employees. The weaving production capacity per ATBM is 4 meters of fabric per day. The employee wage is in the form of a piece, which

is IDR 3,000 / meter of cloth. In general, ATBM weavers in Wajo Regency carry out orders from Java, namely white plain cloth with crystal motifs, using imported silk threads from China as warp threads and local silk threads for feed. The price of cloth marketed ranges from Rp 35,000 to Rp 37,000 / meter. In Java, this plain cloth is batik and then sold in the market for ± IDR 300,000 - 500,000, -. Thus, there is a very large difference between the selling price of silk cloth that has been batik and silk cloth that has not been made.

In gedogan weaving, craftsmen generally use local silk thread. The management model in Gedogan weaving is an order system, where the merchant gives silk thread to the craftsman, the craftsman then processes it into a sarong for ± 20 days depending on the craftsman's activity. Furthermore, the craftsman then hands over the woven sarong to the merchant, and the merchant immediately pays ± Rp. 190,000 - 200,000 depending on the motive of the craftsman. The merchant then brought it to a silk sarong seller shop in Makassar. The selling price at the shop in Makassar is ± IDR 250,000 - 300,000.

The craftsmen involved in gedogan weaving in several villages have experienced a significant increase. One example is in Alluppan Village, Takkalalla. In 1974 there were only 20 weavers, now there are approximately 500 people. Weaving is a production stage after carrying out the spinning process, this weaving activity is the process of making cloth from raw yarn using a machine or loom. According to Erry's [12] research, 1 kg of yarn can produce 8 meters of silk. Thus, if the upstream activities are developed in all districts, and the end 18,567,733 kg of silk threads are produced, then 148,541,867 meters of silk cloth can be produced.

4. Conclusion

- Natural silk, which is a long series of activities ranging from mulberry cultivation, silkworm cultivation, post-harvest handling, processing to marketing, is part of the activities in the agricultural and industrial sectors that can contribute to the economy. The silk weaving industry in South Sulawesi is not only around the city of Sengkang but also spreads in several districts. Almost all of them are in the form of small and household industry sub-sectors.
- Increasing the production of mulberry plants in Wajo Regency is needed for the long term not only as a food ingredient for silkworms but also as a biopharma plant or a mixture of cosmetic ingredients. However, most of the raw materials are still imported from Soppeng, Enrekang, or imported.
- Cocoon production that can be produced by rearing silkworms in Wajo Regency is around 416,771 kg cocoons per year. However, the quality of the cocoon product is classified as low. This has an impact on the low selling price of cocoons, thereby affecting the income and welfare of silkworm farmers.
- More advanced technological inputs and capacity building for farmers and their institutions need attention in order to increase the production and quality of cocoons produced in the future.

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