

Natural Silk Production Conditions in South Sulawesi Province

Nurul Magfirah Ashar

Department of Agribusiness, Faculty of Economics and Management, IPB University

Email: nmagfirah@apps.ipb.ac.id

Abstract

Natural silk activities are divided into the upstream level (mulberry cultivation and silkworm cultivation) and the downstream level (spinning, weaving, and marketing silk fabric). This study aims to determine the condition of natural silk in South Sulawesi Province. The data used is secondary data from 2017 to 2021. The secondary data used are national and world silk demand, mulberry plantation area, number of silkworm seed distribution, amount of cocoon production, amount of yarn production, and amount of silk fabric production. The data analysis used is a descriptive quantitative literature review. The results showed that the condition of natural silk produced by the amount from 2017 to 2021 fluctuated in value but tended to decrease which could affect the development and contribution of South Sulawesi silk to national silk.

Keywords: Agribusiness, Volatile, Natural Silk, Silk Production

1. Introduction

Natural silk farming is an agribusiness activity that consists of a whole series of interconnected and interrelated upstream to downstream sub-systems. The core process in natural silk consists of an upstream sub-system in the form of business activities for planting mulberries as caterpillar feed and silkworm breeding—whereas *on-farm* or production activities in the form of rearing caterpillars to form cocoons that are ready to harvest. Activities in the downstream sub-system consist of spinning cocoons into silk thread, weaving them into silk cloth, and marketing the product to the end user. There are also supporting sub-systems that help the continuity of the process in aspects of cultivation and aspects of the natural silk industry such as credit institutions, research and development institutions, and extension institutions (Bappelitbangda Prov. South Sulawesi 2021).

Technically, the flow of natural silk activities is divided into two activities, namely at the upstream level and downstream level. The upstream level is activities starting from cultivating mulberries as feed for silkworms and cultivating silkworms from eggs to cocoons. At the downstream level, there are production activities which include the business of spinning silk thread and weaving silk cloth to market the products (Hartati, 2015). The products produced in activities in the upstream sector are silkworm cocoons or cocoons, while in the downstream sector, they produce silk thread and fabric products. The need for silk raw materials at the downstream level is increasing. However, the domestic supply of silk raw materials has not been able to meet the needs of the downstream sector (Minarningsih et al, 2021).

Natural silk activities are a type of business carried out in villages and are environmentally friendly (Tayal & Chauchan, 2017). Natural silk activities are labor-intensive and can be carried out by both men and women. This activity can produce high-value commodities and help increase people's income (Andadari & Sunarti, 2015; Andadari et al, 2016; Tayal & Chauchan, 2017).

South Sulawesi Province is one of the national producers of natural silk with a contribution of around 90% of silk thread production for all of Indonesia (Iwang and Sudirman 2020). This is in line with the stipulation of South Sulawesi Province Regional Regulation Number 7 of 2018 concerning the Industrial Development Plan of South Sulawesi Province for 2018-2038, as regulated in Article 6, it is stipulated that one of the leading industries of South Sulawesi Province is the textile and silk processing industry. consists of the spinning, weaving, and natural silk finished product industries.

According to the Natural Silk Center (2021), silk companies in South Sulawesi Province have been developed in 13 districts, namely Wajo, Enrekang, Bulukumba, Soppeng, Sidrap, Bone, Barru, Maros, Gowa, Toraja, Sinjai, East Luwu and Polewali Mandar. However, at this time only three districts are the main production centers and silk development centers, namely, Enrekang Regency and Soppeng Regency which are the centers for the development of mulberry (or mulberry) plants, silkworm farming, and cocoon production in the upstream sector, while Wajo Regency is the center for weaving. and silk fabric production in the downstream sector.

Silk activities in South Sulawesi Province have been carried out in an integrated manner starting from mulberry cultivation, silkworm rearing, yarn spinning, weaving, and the ready-made clothing industry. Natural silk is one of the local wisdom assets that has been carried out by the people of South Sulawesi Province since the 1950s and has become a typical product that has high interest among the community to be used as a primary product in the form of sarongs, metered cloth, Bodo clothes, silk shirts, wallets. , bags, and various souvenirs made from silk (Nurhaedah and Bisjoe 2013). Therefore, it is necessary to know the condition of natural silk in South Sulawesi Province.

2. Literature Review

Sinaga et al. (2010) opinion that natural silk is a strategic business to be developed because it has *backward linkage* and *forward linkage* which is relatively long so that silk has become one of the mainstay businesses that is worth developing. It is an exclusive business if it is processed by combining art and technology because it can provide high-added value.

Stakeholder needs are grouped into 6 groups of needs, namely participation, investment, regulation, continuity, advocacy, infrastructure, and facilities (Jayanti and Muksin 2015). Meanwhile, Pujiana et al. (2019) stated that stakeholder perceptions of the development of Bumdes Ramaksa are seen from four aspects, namely economic, ecological, social, and institutional aspects.

In the development of natural silk agribusiness, the government has a very important role. The government is highly expected to develop agro-industrial businesses, especially in overcoming

problems with the quality of human resources, limited capital, limited facilities and infrastructure, low product quality, and technological limitations. Making and making policies is a very important task for the government in developing natural silk agribusiness (Tarigan *et al.* 2010; Ramdana *et al.* 2021). Apart from that, according to research conducted by Tarigan *et al.* (2010) which states that the development of natural silk can be carried out by creating cluster institutions that involve everyone *stakeholder* related to synergy in developing natural silk agro-industry businesses. With the existence of the para cluster institution especially entrepreneurs can make commitments, and collaborate in business development so that they can produce efficiently which can ultimately increase income.

The government has an important role in developing natural silk agribusiness in Wajo Regency through the assistance of a collaboration program between entrepreneurs and craftsmen with Bank Negara Indonesia (BNI) which has formed a silk village in Wajo, as well as good marketing efforts. So it can increase the community's interest in getting involved in advancing the silk business (Iwang and Sudirman 2020).

3. Research Method

The method for writing this scientific article is qualitative methods and literature studies or library *research*. Examining theories and reviewing literature books that are by the theories discussed, especially natural silk in South Sulawesi Province. Apart from that, it also analyzes reputable and non-reputable scientific articles and journals. All scientific articles are sourced from Google *Scholar*.

In qualitative research, a literature review must be used consistently with methodological assumptions, meaning it must be used inductively so that it does not direct the questions asked by the researcher. One of the main reasons for conducting qualitative research is that the research is exploratory (Ali & Limakrisna, 2013). In the next stage, it will be discussed in depth in the section entitled "Related literature" (*Related literature*) or "literature review", as the basis for formulating hypotheses, and in the final stage these two pieces of literature become the basis for making comparisons with the results and findings revealed in the research (H. Ali & Limakrisna, 2013)

This type of research uses literature study. The literature study method is a series of activities related to methods of collecting library data, reading and taking notes, and managing research materials (Zed, 2008; Danial and Warsiah 2009). This technique aims to reveal various theories that are relevant to the problems being faced/researched as reference material in discussing research results.

This research aims to analyze the conditions of natural silk production in South Sulawesi Province by looking at the comparison with national silk demand. The data that will be used as analytical material in this research is secondary data in the form of time series data (*time series*) with a period of the last 5 years (2017-2021) obtained from the Provincial Bappelitbangda. South Sulawesi in 2021. The results of various literature reviews will be used to identify the condition of natural silk in South Sulawesi Province.

4. Finding and Discussion

Demand for Natural Silk. The large market potential for silk fabric is an opportunity for Indonesia to optimize the natural silk industry and improve quality. Based on the National Conference of the Indonesian Natural Silk Society (MPAI), the world's need for natural silk is 92,743 tons per year, and only 83,393 tons per year are met. This need is estimated to continue to increase along with the increase in population. Moreover, demand for silk fabric is relatively unaffected by economic conditions because the market segmentation is for middle and upper-class consumers (Hafsah, 2007).

According to ISC (2022), the world's annual production of natural silk has decreased per ton, while demand for natural silk has increased by 5%/year. Demand conditions that are greater than the supply of natural silk provide an opportunity to increase production (Rusdi et al. 2021). Indonesia contributes 0.4% of the world's natural silk (ISC 2022). Problems with world natural silk also occur in national silk production where national natural silk production decreased by 8 tons - 3 tons in 2015 - 2017 and experienced stagnation until 2021. Meanwhile, demand for national natural silk has increased every year (BPA 2021). The magnitude of the difference in global and national production and demand for natural silk is presented in Table 1 below:

Table 1 Comparison of production and demand for natural silk in 2015-2021

Year	Production (Tons/Year)		Demand (Tons/Year)	
	World	National	World	National
2015	202.073	8	225.000	9
2016	192.512	4	236.250	9,45
2017	177.507	3	248.062	9,9
2018	159.648	3	260.465	10,4
2019	109.111	3	273.488	11
2020	91.765	3	287.162	11,5
2021	83.331	3	301.520	12

Source: Balai Persuteraan Alam, 2021; *International Sericultural Commission 2022*

Based on Table 1, it can be seen that there is an imbalance between the amount of demand and the amount of production of natural silk, where the amount of demand is greater than the production of silk produced. To fix this problem, it is necessary to increase the production of natural silk. The success and sustainability of natural silk require the availability of adequate basic materials in the form of mulberry plants as caterpillar food and the quality of silkworms and cocoons which are the main ingredients in natural silk. Special experience and skills are also required in each sector involved (Meira et al. 2013). Following the opinion of Khaidarsyah and Ibrahim (2019) who state that in general, the main components seen in the success of natural silk production are based on the quality of the silk thread (sabbe), the coloring method (cello), and finally the activity of weaving silk thread into silk fabric. (Khaidarsyah and Ibrahim 2019).

South Sulawesi Province has made a significant contribution to national silk. Therefore, to

achieve increased production in balance with silk demand, South Sulawesi Province can take advantage of the potential which has supporting aspects of geography and human resource capabilities in carrying out natural silk agribusiness activities which must be managed well (Tenriawaru et al. 2021).

Government intervention to increase the development and improvement of silk in South Sulawesi Province began in 1970 through the Department of Agriculture (Dirjen Forestry) with the South Sulawesi Natural Silk Development Project (Ridwan et al., 2011; Balai Sutraan Alam, 2010). The Japan International Cooperation Agency (JICA) supported this silk development project by building the Natural Silk Technology Center in 1984 (Balai Silk Nature, 2021). The impact is that South Sulawesi Province has become one of Indonesia's natural silk development areas and contributes 70% to 80% of national silk thread production (Maturidy, 2011; Nuraeni, 2017; Isnani et al., 2019).

Natural Silk Production South Sulawesi. The actors along the chain of natural silk activities in South Sulawesi Province who are currently still active are spread across Soppeng and Enrekang Regencies which dominate the upstream section and Wajo Regency which dominates the downstream section of natural silk. Production results in the upstream sub-system of natural silk influence the success of the spinning process which can produce good quality yarn that can be used in the weaving process and making silk cloth. With high-quality silk products, there is a marketing process so that the product can attract consumer interest (Muin and Isnani 2019).

The success of natural silkworm activities at the upstream level is influenced by several factors, namely: superior silkworm seeds, rearing technology, feed quality (mulberry leaves), rearing environment, and cocooning process. All factors must be in the best condition and work optimally to produce high-quality cocoon and silk thread products (Andadari et al., 2016; Tayal & Chauchan, 2017). However, the conditions in each of the main natural silk activity chains have several problems, resulting in unstable conditions regarding the amount of production in the last 5 years (Table 2) in South Sulawesi Province.

Table 2 Natural silk production in South Sulawesi Province 2017-2021

Year	Mulberry Plantation Area (Ha)	Distribution of Silkworm Seeds (Box)	Cocoon Production (Kg)	Yarn Production (Kg)	Fabric Production (Meter)
2017	135,1	291,25	6.027,884	12.055,77	1.920
2018	582,7	375	9.372,015	18.744,03	2.112
2019	699,4	694,25	7.971,330	15.942,66	2.000
2020	756,9	560,75	15.011,520	30.023,04	1.176
2021	202,9	330,25	7.978,112	15.956,22	840

Source: Bappelitbangda Prov. Sulsel, 2021

Based on Table 2, it can be seen that the amount of production from each activity in natural silk in South Sulawesi Province has increased and decreased over the last 5 years. In the vast sector, mulberry plantation areas experience fluctuating conditions, which can be seen in Figure 1

below:

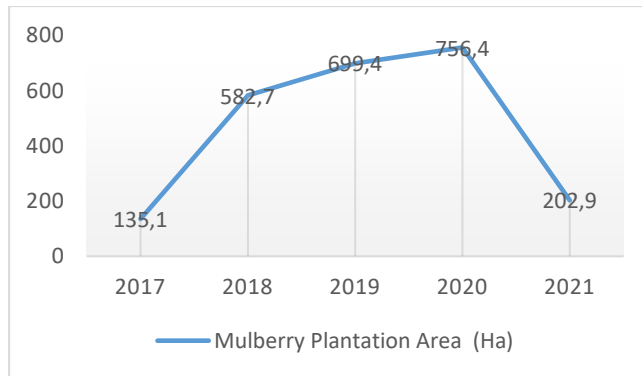


Figure 1. Mulberry Plantation Area (Ha)

Figure 1 shows that the largest mulberry land area in 2020 was 756.4 (ha), however, there was a fairly large decrease in land area in 2021, namely 135.1 (ha), with this reduction in land area having an impact on food for silkworms and the quality of silkworm production. This is by the opinion of Setiadi et al, (2017) who stated that to obtain maximum cocoon production and silk thread according to with target set is the development of mulberry plants that are good for feeding silkworms. If the mulberry land is large enough, it will affect the silkworm seeds that produce cocoons, by the opinion of Nurjayanti (2011) is that natural silk cultivation activities cannot be separated between caterpillars and mulberries because the production of mulberry leaves, which are the food for silkworms, greatly influences the production of cocoons produced. To find out the distribution of caterpillar seeds and cocoons produced, see Figure 2 and Figure 3.

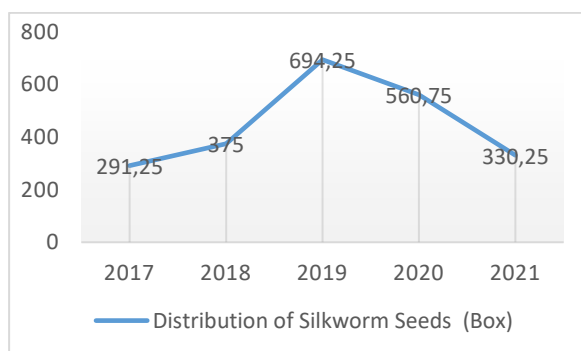


Figure 2. Distribution of Silkworm Seeds

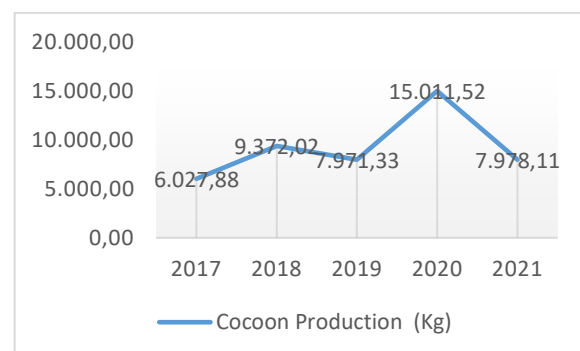


Figure 3. Cocoon Production

Figure 2 shows that in the upstream sector, namely for the distribution of silkworm seeds, which was the highest in 2019 and then decreased until 2021, silkworm seeds will have an impact on cocoon production by the opinion of Tayal & Chauchan (2017) that one of the factors that determines success in Silkworm rearing is the use of superior quality silkworm seeds, this is proven by the highest cocoon production (Figure 3) in 2020 amounting to 15,011,520 kg with

a total of 560.75 boxes of silkworm seeds while the highest silkworm seeds were in 2019 namely 694.35 boxes only produced 7,971.330 kg of cocoons. The quality of the silkworm will affect the quality of the cocoons produced. Cocoon weight, cocoon shell weight and cocoon shell ratio are the most economically important determining parameters in silkworm cultivation (Mirhosseini et al, 2010), in line with the results of research by Andadari & Kuntadi (2019) that the use of the same type of caterpillar for rearing under conditions Diverse places produce varied cocoon production. After knowing cocoon production, it is necessary to know the production of yarn which is the result of cocoon production which can be seen in Figure 4.

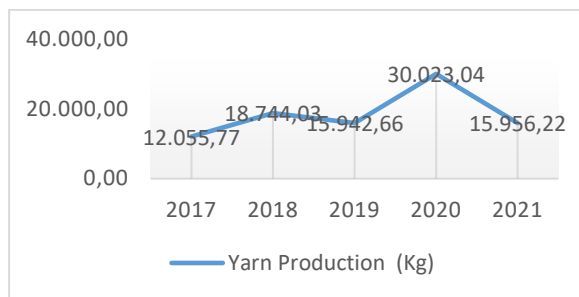


Figure 4. Yarn Production

The downstream sector of yarn production manufacturing shown in Figure 4 is experiencing fluctuating conditions. where in 2017 silk thread production reached 12,055.77 kg and experienced a very high increase in 2020 amounting to 30,023.04 kg, however, production decreased very low in 2021 amounting to 15,956.22 kg. This happens because of the low production quantity and quality of the cocoons produced. The cocoon fiber produced has a quality that cannot be used optimally in silk thread production. This is in line with research conducted by Minarningsih et al (2021) that the quality of silk cocoons will influence the quality of the silk thread produced. The filament character of the cocoon produced has a greater influence on the success of the silk thread produced (Sajgotra et al, 2018).

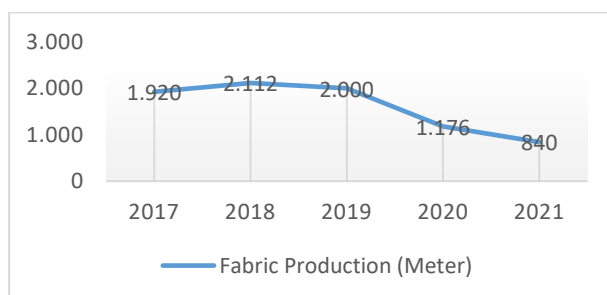


Figure 5. Fabric Production

In terms of results in the downstream sector, namely silk fabric, in Figure 5, the results of fabric production are not closely related to the yarn produced, for example in 2020 yarn production was 30,023.04 kg while fabric produced was 1,176 m while in 2019 yarn production was 15,942.66 kg and 2,000 m of fabric produced. This shows that even though yarn production is

quite high, the fabric produced is not comparable to yarn production. The silk thread manufacturing industry is a liaison industry between upstream industries (mulberry cultivation and silkworm cultivation) and downstream industries.

5. Conclusion

The condition of natural silk in South Sulawesi Province from 2017 to 2021 fluctuated where every activity in the area of mulberry land use, distribution of silkworm seeds, cocoon production, thread production, and silk cloth production increased, but when there was a decline it will decrease very drastically. This could influence the development and contribution of South Sulawesi silk to national silk.

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