International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

Supply Chain Analysis Of Brown Sugar Commodity In Kendari City Southeast Sulawesi

Dwi Rahmawati Rasyid[*1], Weka Gusmiarty Abdullah[2], Samsul Alam Fyka[3]

[1,2,3] Department of Agribusiness, Faculty of Agriculture, Universitas Halu Oleo
Kampus Hijau Bumi Tridharma, Anduonohu, Kec. Kambu, Kota Kendari,
Sulawesi Tenggara 93232, Indonesia

Corresponding Author: dwirahmawatirasyid@gmail.com

Abstract

This research aims to determine the supply chain flow of brown sugar commodities in Kendari City. This research was conducted in Kendari City, which was chosen deliberately with the consideration that Kendari City is one of the marketing centers for palm sugar, but the community does not process palm sap into brown sugar, so it was felt that a supply chain was needed to understand the flow of goods, information flow and financial flow of brown sugar commodity in Kendari City. This research was carried out in June 2023 until completion. The population in this study was 15 people. The data collection technique used was the snowball sampling technique, starting from retailers, and collectors to brown sugar processors. Research data was analyzed descriptively and qualitatively. The results of the research show that: 1) The supply chain flow for brown sugar in Kendari City originates from Penanggosi Village, East Kolaka 2) The flow of goods consists of Brown Sugar Processors - Collectors - Retailers - Consumers 3) The flow of information that occurs is well integrated 4) Flow finances flow from Consumers - Retailers - Collectors - Brown Sugar Processors.

Keywords: Brown Sugar; Sugar Palm; Supply Chain

INTRODUCTION

Indonesia is one of the tropical countries known for its vast forests. Based on data from the Directorate General of Forestry Planning and Environmental Management (PKTL) of the Ministry of Environment and Forestry, the results of Indonesia's 2019 forest monitoring show that the total forested land area of Indonesia is 94.1 million ha or 50.1% of the total land area

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

(Ministry of Environment and Forestry, 2019). Indonesia's tropical forests produce various types of timber, so they are called the main forest products (timber forest products). While other products that are not wood are called Non-Timber Forest Products (NTFPs).

Non-timber Forest Products (NTFPs) according to the Central Bureau of Statistics (BPS Indonesia, 2020)According to Statistics Indonesia (BPS Indonesia, 2020), all biological materials other than wood taken from forest areas to be utilized in various ways, such as for food, medicine, spices, natural oils, resins, latex, tannins, dyes, ornamental plants, handicraft materials, rattan, bamboo, and other non-timber products. One of the non-timber forest products is the aren palm (*Arenga Pinnata Merr*.) which is a multipurpose plant and has a high economic value, because all parts of the plant from leaves to roots can be utilized. (Marwah, *et al*., 2020)

Ar palm is one of the palm species that has a very wide distribution in Indonesia reaching 63725 ha. (Fatsan, *et al*., 2020).. In Southeast Sulawesi, the production of aren palm plantations can be seen in Table 1 below.

Table 1 Production of aren palm/enau plantation by district/city in Southeast Sulawesi

District/City	Aren production (tons)	
	2020	2021
Buton	-	-
Muna	1	1
Konawe	17	18
Kolaka	58	58
South Konawe	-	1
Bombana	1.822	1.756
Wakatobi	14	13
North Kolaka	117	118
North Buton	4	4
North Konawe	-	-
East Kolaka	11	8
Konawe Islands	-	-
West Muna	1	1
Central Buton	5	5
South Buton	-	-
Kendari City	1	2

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

Bau-Bau City	2	2
Southeast Sulawesi	2.053	1.987

Source: BPS Southeast Sulawesi (2022)

Table 1 shows that Kendari city had 1 ton of palm production in 2020 and increased to 2 tons in 2021. According to (Marwah *et al*., 2020)According to (Marwah et al., 2020), in Southeast Sulawesi, the area of palm trees is not yet known for certain, but it is an area that has abundant palm potential, growing naturally both in forest areas, as well as in community gardens and around people's yards, including in forest areas in Abeli District, Kendari City which covers an area of 773.3 ha.

The main product that is widely utilized in the household industry is nira which is processed into palm sugar, which is then used as a sweetener in various kinds of cakes, drinks and others. (Widyantara, 2019). According to (Porobaten, *et al*., 2017)(Porobaten, et al., 2017), the palm sugar industry is one form of effort to increase the income of the population and can increase local revenue based on the people's economy which simultaneously creates jobs and to obtain or increase family income even though the processing process still uses simple equipment or is done traditionally. The marketing system used by palm sugar farmers is also still classified as traditional where they only rely on large traders, namely collectors to take the harvest that has been produced. (Lingawan *et al*., 2019).

The current problem is that Kendari City is one of the marketing centers for palm sugar but no one is processing palm sap into palm sugar. According to (Rianse *et al*., 2017) (Rianse et al., 2017), it is interesting that many palm sap tappers in Kendari City (65%) have cultivated palm trees but the palm sap is processed into liquor. Traders supply palm sugar from other areas to fulfill market demand. According to (Nurul Imani Kurniawati, *et al*., 2020) these problems, efforts can be made to optimize the distribution of materials from suppliers, material flow in the production process to the distribution of products to consumers so that the maximum distribution process can be achieved with the concept of supply chain management.

According to (Asir, 2021)Supply chain is an organizational system that distributes production goods and services to its customers. The supply chain is a network of companies that work together in making products and delivering them to *end customers.* (Revaldiwansyah & Ernawati, 2021). According to Surni (2020)Supply chain refers to the flow of goods, information, money, and services to end customers. The purpose of managing the supply chain management system is to ensure that products (finished / semi-finished) reach consumers based on *time-delivery*, quality (*responsiveness),* and quantity. (Jaya, *et al.*, 2020) . The supply chain has an

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

important role in knowing the flow of goods, information flow, and financial flow of brown sugar commodities in Kendari City. Therefore, the researcher raised the topic of "Supply Chain Analysis of Brown Sugar Commodities in Kendari City".

METHOD

This research will be conducted in Kendari City, Southeast Sulawesi. The research location was chosen *purposively* with the consideration that Kendari City is one of the palm sugar marketing centers. This research was conducted from June 2023 to July 2024 in Kendari City, Southeast Sulawesi. The population in this study were 15 people, namely 2 palm sugar processors, 2 collectors, and 11 retailers in Kendari City (Lapulu Market, Baruga Market, Panjang Market, and Anduonohu Market). The sample collection method used is *Purposive Sampling* and *Snowball Sampling* which starts from interviewing retailers, collectors, to brown sugar processors. Data collection techniques were carried out by observation, interview, literature study, and documentation. The data analysis method used in this research is qualitative descriptive analysis method.

RESULTS AND DISCUSSION

Brown Sugar Production Process

Brown sugar production is an activity of making/processing brown sugar through several stages. The stages of brown sugar processing can be seen in the following figure.

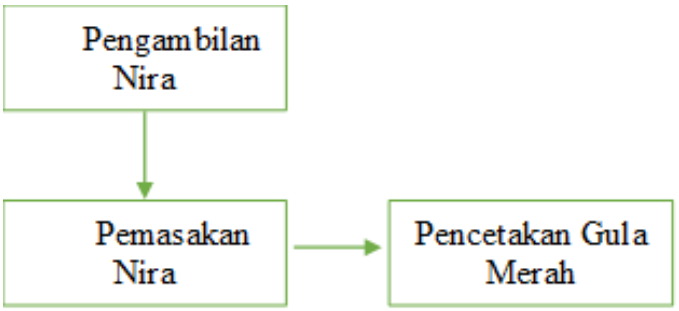


Image 1 Brown Sugar Production Process

1. Aren Nira collection. Nira palm is a liquid tapped from the male flowers of the palm tree, which is none other than the metabolic products of the tree (Widyawati, 2012). The process of collecting nira begins with knocking or beating the male flowers on the fronds

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

of the palm tree, then the tip of the bunch is cut so that the juice comes out. The nira water that comes out of this bunch will be tapped every day.

2. Aren Nira Cooking, the nira cooking process is carried out on a wood-fired stove. The nira water is cooked in a large pan that can hold as much as ± 20 liters of nira water in one cooking process. The nira cooking process lasts between five and six hours depending on the amount of nira being cooked (Hutami *et. al*, 2023). The palm sap is cooked for several hours until it thickens and then 5 crushed candlenuts are added as a natural hardener. If not using candlenuts, it can also be replaced with cooking oil because it has the same function as a natural hardener in making brown sugar. After the sugar has begun to cook, wait a few minutes until the sugar begins to thicken and is ready to be molded.
3. The molding of brown sugar is done after the nira that has been cooked begins to thicken. Once it is felt that the sugar has begun to cook, wait a few minutes until the sugar begins to thicken and is ready to be molded. Brown sugar molds can use wooden or coconut shell molds in the shape of a semicircle. After it cools and hardens, it indicates that the sugar can be removed from the mold and is ready for sale.

Brown Sugar Supply Chain

The supply chain structure explains the parties involved in the brown sugar supply chain. The actors in the brown sugar supply chain are brown sugar processors, collectors, and retailers.

Based on the results of the research, the brown sugar circulating in Kendari City comes from East Kolaka, Kolaka and South Konawe. In this study, researchers interviewed brown sugar processors from East Kolaka. The Marketing Channel of the brown sugar supply chain in Kendari City starts from brown sugar processors who take nira from palm trees which are processed into brown sugar, then collectors come to buy the brown sugar and then distribute and resell it to retailers in Kendari City and retailers sell the brown sugar for consumption by the people of Kendari City. The marketing channel of the brown sugar supply chain in Kendari City can be seen in Figure 2.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

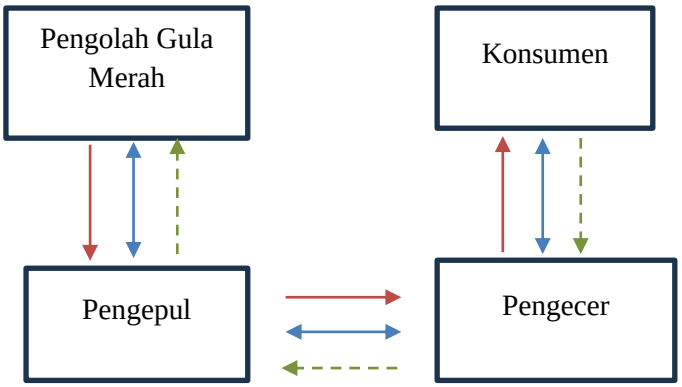


Image 2 Marketing Channel of Brown Sugar Supply Chain in Kendari City

Description:

Goods Flow

Information Flow

Financial Flow

In the supply chain of brown sugar commodities in Kendari City, there are three flows that must be known, namely the flow of goods, information flow and financial flow that are interrelated in the supply chain.

1. Flow of Goods, in the supply chain, is the physical or material flow from suppliers to consumers (Pratasik et al, 2021). This flow of goods or material flow is related to the transfer of brown sugar products from suppliers / brown sugar processors to consumers as well as from consumers who return or return products, services, recycling and disposal.

   Based on the results of the study, it can be seen that the channel network in the flow of goods in Kendari City can be seen from Figure 2, namely Brown Sugar Processors - Collectors - Retailers - Consumers. This is in accordance with Pujawan's statement in Aufar (2018), which states that product flow moves from suppliers to consumers or from upstream to downstream. Brown sugar processors sell brown sugar with an average volume of 100 kg/2-3 weeks to collectors. Then the collectors sell the brown sugar to retailers with a minimum take of 50kg to 60kg and retailers sell to consumers. Brown sugar from retailers that melts due to the rainy season or is at an inappropriate temperature can be *returned / bought back* by collectors at a price of Rp.16,000 / kg and then cooked again using Nangka wood so that the brown sugar becomes solid and can be resold.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

2. Information Flow, deals with the movement of goods/products from suppliers to consumers as well as from consumers returning or returning products, services, recycling and disposal. The flow of information moves from two directions, namely downstream to upstream and upstream to downstream. The flow of information that occurs in the brown sugar supply chain in Kendari City is well integrated. Information exchange can be done through phone calls and via *WhatsApp* or when meeting in person. The flow of information that runs between supply chain actors in Kendari City is information on market prices, the amount of inventory, the amount of demand, and the status of delivery and collection of brown sugar.

   Based on the results of the study, it can be seen that the marketing channel network on the information flow (seen from Figure 2) is: Brown sugar processors - collectors - retailers or vice versa Retailers - collectors - brown sugar processors. The flow of information regarding the delivery schedule informed to each part of the supply chain so that each part can adjust what quantity can be ordered so that stock vacancies do not occur. This is in line with the statement of Pambudi and Rahmi (2019) that sales information must be owned by every part of the supply chain from upstream to downstream because sales information can be useful for planning so that in making decisions for production and the number of shipments to distributors or afterwards can be more precise.

3 Financial Flow is a description of the flow of money / capital that starts from the consumer as a buyer and then flows in each chain and will eventually reach the producer to be used as a production cost (Amtiran, et. al).

   Based on the results of the study, it can be seen that the marketing channel network on the financial flow (seen from Figure 2) is: Consumers - Retailers - Collectors - Brown Sugar Processors. Brown sugar processors sell brown sugar to collectors with a price range of Rp.13,000/kg - Rp.18,000/kg. The brown sugar that has been purchased is directly distributed from collectors to retailers in Kendari City. Collectors sell brown sugar at a price range of Rp.15,000/kg - Rp.16,000/kg and then resell it to retailers at a price of Rp.16,500/kg. Then retail traders sell to consumers at a price of Rp.20,000/kg.

Activities of Supply Chain Actors

The activities of supply chain actors start from consumers who need an item and end with payment activities after the desired item is fulfilled. According to Stock and Lambert (2001), all companies or organizations involved in the supply chain are divided into two, namely

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

primary members (main actors) and *supporting members* (supporting actors). The activities of the primary actors can be seen in the following table.

Table 2 Activities of Main Actors in the Brown Sugar Supply Chain in Kendari City Southeast Sulawesi, Year 2023

No.	Key Actors	Activities
1	Brown sugar processor	• Purchase of additional materials • Processing • Sales
2	Collectors	• Purchase of merchandise • Transportation • Sales • Recovering damaged brown sugar
3	Retailer	• Purchase of merchandise • Sales

Table 2 shows that each main actor in the brown sugar supply chain in Kendari City, Southeast Sulawesi performs activities according to their respective roles.

1. Brown Sugar Processors are the first main actors in the brown sugar supply chain. Processors play a role in processing brown sugar which is still in the form of nira cooked until it becomes brown sugar that is ready for sale. The process of processing brown sugar goes through several stages until it becomes a product that is ready to be sent to various regions, one of which is Kendari City. The stages carried out are taking/tapping nira, cooking nira, and molding. The stages of processing nira into brown sugar are carried out using traditional methods such as making brown sugar in general. The results of the processing or the *output produced in the* form of brown sugar with original palm without a mixture of granulated sugar so as to produce pure palm sugar ready for sale. The sales activity of brown sugar processors is the exchange of brown sugar products based on an agreed price in order to gain profit with the consumer's money in this case the collector. Brown sugar processors have many relationships with collectors who come from various regions such as Kendari City, The production of brown sugar per day reaches 20-30 kg / day. Collectors usually buy brown sugar as much as 1 quintal or 100kg.
2. Collectors are the second main actor in the brown sugar commodity supply chain in Kendari City, Southeast Sulawesi. The activities carried out by this main actor are

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

purchasing, transporting, and selling goods in the form of brown sugar. The brown sugar obtained by collectors comes from purchasing activities from brown sugar processors. Purchasing activities by collectors are confirmed in advance by telephone regarding product inventory and brown sugar prices to brown sugar processors, after it is confirmed that the collectors' demand for brown sugar is fulfilled, the two main actors of the supply chain conduct buying and selling transactions in the garden where brown sugar is processed, then transferred to the collector's car for the transportation process. Transportation activities carried out by collectors are directly distributed or sold to retailers in Kendari City. Collectors use private vehicles (trucks) to transport merchandise so that it can be distributed effectively and efficiently. After the distribution process is complete, the next sales activity occurs from collectors to retailers who have previously discussed the price and quantity of brown sugar ordered by telephone.

3. Retailers are individuals or business entities whose main activity is to sell directly to end consumers in small parties (Minister of Industry and Trade of the Republic of Indonesia, 1998). The role of retail traders is to help consumers find the products they need and provide benefits for wholesalers (Ardyanti, 2024). Retailers are the third main actor in the brown sugar supply chain in Kendari City, Southeast Sulawesi. The activities of this main actor are buying and selling. The activity of purchasing merchandise by retailers is a buying and selling activity with collectors. Brown sugar that has been transported by collectors is taken to the market where retailers who have ordered brown sugar, so that retailers can carry out the next activity, namely sales to end consumers.

The brown sugar supply chain in Kendari City, Southeast Sulawesi, in addition to the main actors, there are also supporting actors. The activities of supporting actors can be seen in Table 3 below.

Table 3 Activities of Supporting Actors of Brown Sugar Supply Chain in Kendari City Southeast Sulawesi, Year 2023

No.	Supporting Actors	Activities
1	End Consumer	Eating brown sugar
2	Brown sugar additive supplier	Supplying candlenuts

Based on Table 3. shows that supporting actors in the brown sugar supply chain in Kendari City, Southeast Sulawesi are end consumers and suppliers of brown sugar hardeners.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

1. Final Consumers are all individuals and households who own or acquire goods or services for personal consumption (Ardiyanti, 2024). End consumers are the people of Kendari City who consume brown sugar obtained from retailers in the market. End consumers usually buy for supplies of sweetening ingredients for cakes and so on. The main activity of consumers is to spend the use value of brown sugar products.
2. Brown Sugar Supplement Suppliers are traders in the market who sell candlenuts or cooking oil. Candlenut / cooking oil is commonly used by brown sugar processors so that the brown sugar produced is denser and does not melt quickly. This is in accordance with the opinion of Syahidah *et al,* (2023) craftsmen use fine candlenut into the nira that is being cooked so that the froth does not overflow. According to Hutami *et. al* (2023) natural preservatives commonly used include safat fruit, castor seeds (*Jatropha multifida Linn*), candlenut seeds (*Aleurites moluccana), coconut* oil, jackfruit stems (*Artocarpus heterophyllus)*, guava (Psidi folium), and mangosteen fruit peel (*Garcinia mangostana L)*.

CONCLUSION

The flow of brown sugar supply chain in Kendari City originates from Penanggosi Village, East Kolaka. The flow of goods in the brown sugar supply chain in Kendari City is brown sugar processors - collectors - retailers - consumers. The flow of information that occurs in the brown sugar supply chain in Kendari City is well integrated, where information exchange can be done via telephone calls and via *WhatsApp* or when meeting in person. The financial flow in the supply chain flows from Consumers - Retailers - Collectors - Brown Sugar Processors.

REFERENCE

Asir M. 2021. *Rantai Pasok Kakao Karakteristik & Peran Stakeholder*. Pekalongan. NEM.

Heryani H. 2016. *Keutamaan Gula Aren dan Strategi Pengembangan Produk*. Lambung Mangkurat University Press.

Fatsan A, Sudarsono, Dinarti D, dan Maskromo I. 2020. Potensi Hasil dan Keragaman Fenotipik Aren (Arenga pinnata (Wurmb) Merr.). *Jurnal Berkala Penelitian Agronomi* 8(2):7-15.

Haris SW, Ridwan, dan Makkarennu. 2020. Analisis Pendapatan Usaha Gula Aren Di Desa Gantarang Kabupaten Sinjai Sulawesi Selatan. *Perennial* 16(1), 18-25.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

Haryandi, Mayasari LP, dan Dzulfikri MA. 2020. Analisis Manajemen Rantai Pasok Pemasok Lokal Di Pt. Prasmanindo Boga Utama Site Batu Hijau, Pt. Amman Mineral Nusa Tenggara, Sumbawa Barat, Nusa Tenggara Barat. *Jurnal Industri & Teknologi Samawa.* 1(1):1-8.

Badan Pusat Statistik. 2020. *Statistik Produksi Kehutanan*. Kendari. Badan Pusat Statistik Indonesia.

Indriani R, Darman R, dan Mahyuddin. 2019. *Aplikasi Pada Komunitas Cabe Rawit di Provinsi Gorontalo*. Gorontalo. Ideas Publishing.

Jaya R, Yusriana, dan Fitria E. 2020. Review Manajemen Rantai Pasok Produk Pertanian Berkelanjutan: Konseptual, Isu Terkini, dan Penelitian Mendatang. *Ilmu Pertanian Indonesia JIPI.* 26(1):78-91.

Leppe EP, dan Karuntu M. 2019. Analisis Manajemen Rantai Pasokan Industri Rumahan Tahu di Kelurahan Bahu Manado. *Jurnal Emba.* 7(1):201-210.

Lingawan A, Nugraha D, Jessica E, Aprianto E, Ardhito M, Japit P, Geovanny. 2019. Gula Aren: Si Hitam Manis Pembawa Keuntungan dengan Segudang Potensi. *Jurnal Pemberdayaan Masyarakat.* 1(1):1-25.

Martono RV. 2019. Dasar-Dasar Manajemen Rantai Pasok. Jakarta Timur. Bumi Aksara.

Marwah S, Hadjar N, dan Muhusana. 2020. Potensi dan Pemanfaatan Tumbuhan Aren (Arenga Pinnata Merr.) di Kawasan Hutan Kota Kendari Provinsi Sulawesi Tenggara. *Kehutanan Indonesia Celebica.* 1(1):22-30.

Arif M. 2018. *Supply Chain Management*. Yogyakarta. Deepublish.

Nursani D., dan Rachman, A. 2022. *Pengantar Manajemen Rantai Pasok*. LKPP.

Kurniawati NI, Werdani RE, dan Mege SR. 2020. *Manajemen Rantai Pasok untuk Peningkatan Ketahanan dan Keamanan Pangan*. Surabaya. Jakad Media Publishing

Pongoh MA. 2016. Analisis Penerapan Manajemen Rantai Pasokan Pabrik Gula Aren Masarang. *Jurnal EMBA.* 4(3):4695-704.

Porobaten E, Laoh OEH, & Waney NFL. 2017. Analisis Pendapatan Usaha Gula Aren di Dusun Kalatin, Kecamatan Ratahan Kabupaten Minahasa Tenggara. *Agri-SosioEkonomi Unsrat.* 13(3A) 39-50.

Radam RR, dan Rezekiah AA. 2015. Pengolahan Gula Aren (Arrenga Pinnata Merr) di Desa Banua Hanyar Kabupaten Hulu Sungai Tengah. *Jurnal Hutan Tropis*. 3(3):267-276.

Revaldiwansyah, MB, dan Ernawati D. (2021). Analisis Pengukuran Kinerja Supply Chain Management dengan Menggunakan Metode Supply Chain Operation Referance (Scor) Berbasis Anp dan Omax (Studi Kasus Pada Pt. Karya Giri Palma). *Jurnal Manajemen Industri dan Teknologi.* 2(3):1-12.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

Rianse U, Baka WK, Abdullah WG, Rianse IS, Zulfikar, dan Tamrin. 2017. Identifikasi Pohon Aren Unggul di Kota Kendari Sebagai Bahan Baku Pangan dan Sumber Benih Unggul. *Prosiding Seminar Nasional.* 371-378.

Surni, Nendissa DR, Wahib MA, Astuti MH, Arimbawa P, Miar, Kapa MMJ, dan Elbaar EF. 2020. Socio-Economic Impact of the Covid-19 Pandemic: Empirical Study Chicken Meat Supply in Indonesia. *Agriculture and Food*, 6(1):65-81.

Widyantara W. 2019. Risiko dan Faktor Faktor yang Mempengaruhi Produksi Gula Aren Cetak di Desa Belimbing, Kabupaten Tabanan. *Manajemen Agribisnis.* 7(1):71-75.

Yuniar AR. 2012. Analisis Manajemen Rantai Pasok Melon di Kabupaten Karanganyar. *Tesis.* Program Pascasarjana. Universitas Sebelas Maret. Surakarta.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.