

Analysis of the Supply Chain and Added Value of Brown Sugar by Artisans in Hulu Sungai Tengah Regency

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ABSTRACT

This study aims to analyze the brown sugar supply chain among artisans in Hulu Sungai Tengah (HST) Regency, focusing on the relationships between producers, distributors, and marketers. This study applied a qualitative descriptive approach, with data collected from in-depth interviews with brown sugar artisans in Barabai and Pandawan subdistricts, as well as field observations conducted in previous studies. Data analysis was carried out through the stages of reduction, data presentation, and conclusion drawing to describe the patterns of raw material, product, and information flows in the brown sugar supply chain system. The results show that the brown sugar supply chain structure in Hulu Sungai Tengah Regency consists of four main actors, namely palm sap farmers, brown sugar artisans, collectors, and market traders. The relationship between actors is still informal and depends on trust, without an institutional system or standard price contracts. Artisans play an important role in the value-added process because they process raw sap into marketable products through stages that are time-consuming and require labor and skill. However, limitations in raw palm sap, dependence on collectors, and a lack of production facilities mean that supply chain efficiency is still suboptimal. These findings emphasize the importance of integration between actors in the brown sugar supply chain system in order to strengthen the position of producers, increase the stability of raw material supplies, and expand distribution networks so that the local brown sugar industry can develop sustainably.

Introduction

The brown sugar industry is one of the people's economic sectors that plays an important role in supporting the rural economy in Indonesia. As a processed product of palm sap (*Arenga pinnata*), brown sugar not only serves as a natural sweetener, but also a major source of income for many households in palm-producing areas. Hulu Sungai Tengah (HST) Regency, South Kalimantan, is one of the regions that still maintains the tradition of brown sugar production from generation to generation. Based on preliminary observations, there are around 108 craftsmen spread across Barabai and Pandawan Districts, with a production system that has been carried out manually and traditionally for generations (Fahmi, Arabi et al., 2024). Despite its strategic role in the local economy, the brown sugar industry in HST faces a number of complex problems. One of the main problems lies in the supply chain, which is not yet well organized. According to Heizer, Render, and Munson (2020), the supply chain is a network of interconnected organizations involved in the process of supplying raw materials, production, distribution, and delivery

to end consumers. In the context of brown sugar, this supply chain involves palm sap farmers, artisans, collectors, and traders. However, preliminary interviews show that the relationships between these actors are still informal, relying on a system of social trust, without the support of clear contractual mechanisms between artisans and suppliers. As a result, coordination between actors is weak, leading to inefficiencies in the flow of raw materials, products, and information.

Inefficient supply chains also result in an uneven distribution of added value. According to Porter (1985), the concept of the value chain is used to identify activities that can create economic value for businesses. In the context of brown sugar producers, added value is actually created at the stage of processing palm sap into sugar, which requires labor, time, and high skills. However, in reality, the profits received by artisans are relatively small compared to those received by collectors or traders who play a role in distribution. This phenomenon is in line with the findings of Rahmawati (2019), who states that traditional supply chains tend to place small producers in a position of low bargaining power due to limited access to market information and capital. Another problem that worsens the condition of the brown sugar supply chain in HST is the artisans' dependence on palm sap as raw material. Palm sap production depends on the availability of productive palm trees and favorable weather conditions. During the rainy season or non-productive periods, the supply of palm sap decreases drastically, resulting in a decline in brown sugar production volume (Rukmana, 2018). Limitations in production infrastructure, such as firewood and manual molds, also reduce the efficiency of artisans' work (Adi, 2021). In addition, most artisans do not have access to modern processing technology or adequate storage facilities, so the quality of products easily deteriorates before reaching the market (Wibowo & Hidayat, 2020).

Previous studies on the brown sugar industry in South Kalimantan have mostly focused on simple aspects of production and marketing. For example, Efendi's (2017) research examined the production process of palm sugar in rural areas, but did not comprehensively examine the supply chain structure. Similarly, Agus's (2020) research focused on marketing strategies for brown sugar products, without linking them to value added distribution throughout the supply chain. In fact, recent studies confirm that supply chain analysis is key to improving the competitiveness of local agricultural and processed products (Chopra & Meindl, 2016; Christopher, 2016). Thus, there is a research gap between studies that highlight production and marketing aspects and studies that describe the integration between actors in the supply chain system. There is still little research that examines in depth the patterns of socio-economic relationships between actors, the distribution of added value, and the efficiency of raw material flows in the small-scale rural brown sugar industry. This study attempts to fill this gap through a qualitative descriptive approach using data from direct interviews with craftsmen, sap tappers, and collectors that were collected in a previous study.

The novelty of this research lies in its focus on understanding the structure of traditional supply chains based on social relationships of trust and analyzing the position of artisans in creating added value. In addition, this study also identifies critical points in the brown sugar supply chain that cause income distribution inequality and low production system efficiency. This approach differs from previous studies that only highlight the technical aspects of production or local product marketing strategies.

The urgency of this research is even greater considering that the brown sugar industry is facing pressure from modern sweeteners such as granulated sugar, refined sugar, and

packaged palm sugar. Without effective supply chain integration, traditional artisans will fall further behind and lose their competitiveness in the market. According to Lambert and Cooper (2000), the success of a supply chain depends not only on production efficiency, but also on coordination between actors and a fair distribution of added value. By comprehensively understanding the structure of the supply chain, the results of this study are expected to provide a basis for the development of strategies to empower artisans and optimize a fair and sustainable distribution system in Hulu Sungai Tengah Regency.

Research Methods

This study uses a descriptive qualitative approach, which aims to gain an in-depth understanding of the supply chain structure and value creation in the brown sugar industry in Hulu Sungai Tengah (HST) Regency. This approach was chosen because the characteristics of the phenomenon being studied are social, contextual, and cannot be measured solely through numbers (Creswell, 2018). Qualitative research allows researchers to explore the social relationships and subjective experiences of actors in the brown sugar supply chain, including their interactions with palm sap tappers, collectors, and market traders.

The research was conducted in two main districts that produce brown sugar in Hulu Sungai Tengah Regency, namely Barabai District and Pandawan District. These two areas were purposively selected because they have the highest number of active artisans and are the centers of traditional brown sugar production, with a total of 108 artisans. Interviews and data collection were conducted between April and July 2024, coinciding with the optimal period for palm sap production.

The research participants included the main stakeholders in the brown sugar supply chain, namely:

1. Palm sap tappers – primary raw material suppliers;
2. Brown sugar artisans – producers and creators of the added value;
3. Local wholesalers – intermediaries who distribute products to the market;
4. Market traders – market actors who interact directly with consumers.

Informants were selected using purposive sampling techniques, considering their active involvement in the production and distribution of brown sugar.

There were 12 informants, consisting of 6 main craftsmen, 3 sap tappers, 2 local wholesalers, and 1 market trader.

This study used two types of data:

1. Primary Data, obtained through in-depth interviews, direct observation of the production process, and documentation of artisan activities in the field.
2. Secondary data, obtained from previous research reports, data from the Trade and Micro, Small and Medium Enterprises Office, academic literature, and documents related to the brown sugar industry.

Primary data was the main source in thematic analysis, while secondary data was used for triangulation and to strengthen the research context.

Data collection was conducted using three main techniques:

1. In-depth Interview
Using semi-structured interview guidelines to gather information about production activities, relationships between actors, distribution mechanisms, and perceptions of added value. The interviews were conducted in person with the artisans at their workplaces using the local language (Banjar) to ensure an authentic understanding.
2. Participatory Observation
Researchers observed the processes of tapping palm sap, cooking, and molding brown sugar. These observations were used to understand the actual supply chain processes and to observe social interactions between actors.
3. Documentation
Including recording secondary data, photos of activities, simple transaction records, and brown sugar price data in local markets.

Data analysis was performed using thematic analysis based on the model developed by Miles and Huberman (1994), which consists of three main stages:

1. Data Reduction
The data from interviews and observations were selected and categorized based on the main topics: supply chain structure, added value, social relations, and production challenges.
2. Data Display
The data is presented in the form of tables, narratives, and supply chain flow models that show the relationships between actors (tappers → artisans → wholesalers → traders).
3. Conclusion Drawing and Verification
Conclusions were drawn iteratively based on emerging patterns and themes, then verified with field data and supply chain theory.

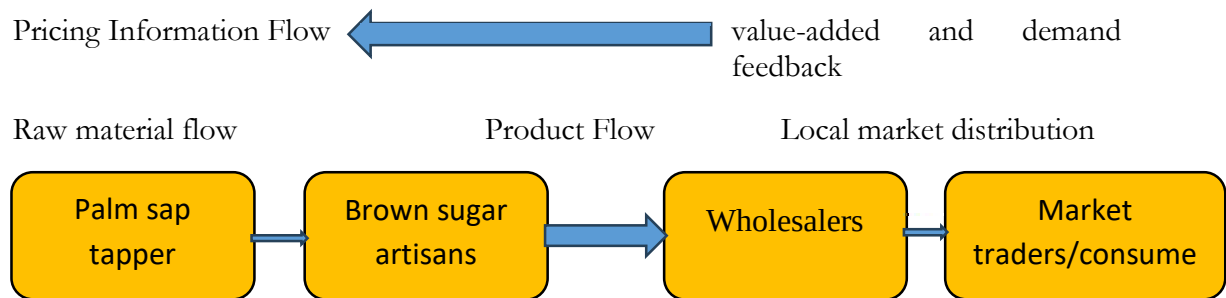
This approach was chosen because it is able to describe social and economic dynamics in an integrated manner, while also revealing the complexity of relationships between actors in traditional systems.

The conceptual framework of this study is based on the following assumptions:

- The supply chain structure consists of four main players: sap tappers, artisans, wholesalers, and traders.
- The main flows include the flow of raw materials, the flow of products, and the flow of information.
- Added value is created at every stage of the supply chain, especially at the artisan level.

- Supply chain efficiency is influenced by social relationships, coordination between actors, and market dependence.

This study explored these relationships through qualitative analysis of interviews and field observations, aiming to identify patterns, obstacles, and potential for integration of the brown sugar supply chain system in Hulu Sungai Tengah Regency.



- The raw material (palm sap) flow is from the tappers to the artisans.
- The product flow (molded brown sugar) is from the artisan to the collector, then to the market trader/end consumer.
- Information and added-value flows are passed back from the market to the artisan (price, demand, and profit margin).
- Relationships between actors are informal and trust-based, with the greatest added value at the artisan level, but their bargaining position remains weak.

Results

Field study results sourced from interviews with brown sugar artisans in Barabai and Pandawan subdistricts show that the brown sugar supply chain system in Hulu Sungai Tengah Regency is still traditional, informal, and primarily oriented to fulfill daily needs. However, this system has been able to survive for decades and has become the economic backbone of rural communities.

Asymmetric and Non-Integrated Supply Chain Structure

The brown sugar supply chain structure in HST forms a simple pattern: *palm sap tappers* → *artisans* → *wholesalers* → *market traders*. Each actor works independently without institutional coordination. There is no cooperative system, artisan association, or formal agreement between actors. Interviews with artisans *H* and *M* show that sap and brown sugar transactions are based entirely on trust, without written proof of payment. From a supply chain management perspective (Heizer, Render, & Munson, 2020), this type of structure is categorized as a fragmented supply chain, a supply chain that lacks both horizontal (between actors at the same level) and vertical (from top to bottom) integration. The

weakness of this structure is low coordination and high transaction costs due to limited market information. As a result, artisans are in the weakest economic position, as they have no control over prices, raw material supplies, or distribution channels. This situation is similar to the findings of Kaplinsky and Morris (2001), who explain that actors in the supply chain who do not have market control will become “value recipients” rather than “value makers,” even though they are the main actors in production.

Unequal Distribution of Added Value

The added value in the brown sugar supply chain should be greatest at the stage of transforming raw materials into finished products, at the artisan level. Based on interviews with *B*, *A*, and *I*, the brown sugar production process includes filtering, cooking the sap, stirring, and manual molding—all of which are done manually and require long working hours. However, the net profit earned by artisans is only slightly above the cost of raw materials and firewood. The price of brown sugar is determined by wholesalers, while artisans have no room for bargaining. This condition shows inequality in the distribution of added value (unequal value distribution), where the actors who carry out the most productive activities actually receive the smallest share. According to Porter (1985), added value is the difference between the total value received from consumers and the cost of the activities carried out. In the case of brown sugar in HST, the total value in the market is actually quite high, but most of it is absorbed downstream because artisans do not have direct access to the market. This finding is reinforced by Rahmawati (2019), who found a similar phenomenon in the Banyumas coconut sugar industry. The traditional supply chain causes added value to accumulate within the intermediary traders, not the primary producers. This phenomenon confirms the need for a reorientation of value in the supply chain, where economic justice is the main principle. In this context, justice does not only mean profit sharing, but also opportunities for artisans to gain equal access to information, technology, and markets.

Trust-Based Social Networks: Between Strengths and Weaknesses

One of the most interesting findings from this study is the strong social bonds between actors in the supply chain. The relationship between artisans and palm sap tappers, for example, is not bound by contract but by mutual trust and togetherness. *M* and *R* stated that they preferred long-standing tappers and wholesalers because “they already know each other's characters, have known each other for a long time, and are trustworthy.” This system demonstrates the characteristics of a trust-based supply chain, which operates on the basis of social trust rather than formal contracts. In the view of Granovetter (1985), this form of local economy cannot be separated from the social and cultural context of the community. However, high social trust also has a downside. It creates short-term stability but hinders innovation and long-term economic mobility. Because there are no formal contracts, there are no price guarantees or supply certainty. Artisans become reluctant to seek new partners or try to sell to a wider market for fear of damaging old social

relationships. In the long term, this condition actually creates structural dependency between artisans and wholesalers. Thus, these social relationships only serve as a foundation for social sustainability, but at the same time hinder economic sustainability. This type of model requires the strengthening of social relationships accompanied by increased economic capacity through collective organizations such as cooperatives or joint business groups (Lambert & Cooper, 2000).

Reporting Research Results

The research was conducted in two main brown sugar producing subdistricts in Hulu Sungai Tengah Regency, namely Barabai Subdistrict and Pandawan Subdistrict. This region is known to have a long tradition of producing brown sugar using palm sap, which is the main source of livelihood for most of the villagers. Production activities are carried out using traditional tools such as large iron pans, firewood, and manual molds made from coconut shells. In general, brown sugar production is carried out on a household scale, with an average production of 15–20 liters of palm sap per day per artisan, depending on the amount of palm sap available. The products are sold directly to local wholesalers with daily or weekly cash payments.

The study involved 12 key informants, consisting of:

- 6 brown sugar artisans (H, M B, A, I, R),
- 3 palm sap tappers,
- 2 wholesalers, and
- 1 local market trader.

Most artisans are between 38 and 60 years old, with more than 10 years of work experience. Their average formal education level is elementary to junior high school. The majority of artisans work with family members, without outsourced labor, making this a family business, with some being tappers, some being artisans, or both.

Table 1

Aspects studied	Fieldwork Findings	Impact on the supply chain
Supply chain structure	4 main actors (tappers, artisans, wholesalers, traders)	A simple system that only covers local areas
Added value	The largest is at the artisan level.	Unbalanced economic benefits
Relationships between actors	Cultural celebrations and customs	Maintaining stability, but reducing bargaining power

Challenges	Raw materials, prices, technology, production standardization.	Decline in production efficiency and sustainability
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The brown sugar production process is done manually using traditional tools. Each artisan processes an average of 15–20 liters of palm sap per day, with a final yield of around 5–8 kg of brown sugar. The main fuel is firewood, with a consumption of 15–20 bundles per week.

Added value is mainly obtained during the cooking stage, as artisans must carefully monitor the viscosity of the sap to prevent the sugar from burning. Interviews revealed that the selling price of brown sugar at the artisan level ranges from Rp 15,000–18,000 per kilogram, while at the market trader level it reaches Rp 25,000–28,000 per kilogram. It means that there is a price difference of around Rp 10,000 per kilogram, most of which goes to collectors and traders.

Some important qualitative findings from the interviews are:

- H and M (Barabai) stated that trust with long-standing wholesalers is more important than price differences.
- B and I (Pandawan) said that fuel costs have risen sharply, but selling prices have not increased proportionally.
- R (Barabai) explained that during the rainy season, production decreases by 50% because the palm trees do not produce sap consistently.

These findings indicate that social systems and natural conditions have a direct influence on supply chain continuity and the added value of artisans.

Discussion

From a supply chain efficiency perspective, the brown sugar industry in HST faces various systemic obstacles. First, limited raw materials, which are highly dependent on palm tree conditions and seasons, cause fluctuations in supply and artisan income. Second, low use of production technology results in long production times, high energy consumption, and low productivity. Third, limited market access prevents artisans from receiving higher price margins at the end consumer level. According to Christopher (2016), supply chain efficiency is determined by the ability of each actor to share information, manage inventory, and adjust production to market demand. When these elements do not function properly, costs increase, waiting times lengthen, and profit opportunities decrease. This situation is evident in HST.

In addition, the lack of quality standardization is also a serious obstacle. Brown sugar from different artisans has different colors, shapes, and hardness, making it difficult for the product to compete in the modern market. This finding is consistent with Wibowo & Hidayat (2020), who emphasize that product and packaging standardization are key

elements in strengthening the competitiveness of local food products. To achieve sustainability, strengthening the brown sugar supply chain cannot rely solely on economic convenience. Social and institutional interventions are also needed—such as the formation of artisan cooperatives, improvement of technical skills, provision of price information, and utilization of simple, effective, and efficient processing technologies.

This study has limitations in:

1. The number of informants was limited to the Barabai and Pandawan areas;
2. The absence of quantitative data on added value in the form of financial calculations;
3. The analysis focuses more on socio-economic aspects, without touching on environmental dimensions or ecological sustainability.

Conclusion

This study analyzes the supply chain system and added value creation in the traditional brown sugar industry in Hulu Sungai Tengah (HST) Regency using a qualitative descriptive approach. Based on in-depth interviews and thematic analysis of the fieldwork data, several key conclusions were drawn, as follows:

The brown sugar supply chain structure in HST is still traditional, simple, and not integrated. The supply chain consists of four main actors—palm sap tappers, brown sugar artisans, wholesalers, and market traders. The flow of raw materials runs in one direction from the top to the bottom, while the flow of information and economic value does not flow reciprocally. Coordination between actors is not regulated by a formal institutional system, but by social relationships based on trust that have been traditionally passed down from one generation to the next.

Artisans play a central role as creators of added value, yet they are in the weakest economic position. The brown sugar production process requires considerable time and energy as well as high-level skills, but artisans' profit margins are low because product prices are determined by collectors. Technically, the greatest added value is created at the artisan's level, but economic value is concentrated at the level of wholesalers and traders who have broader market access.

Social relationships among supply chain actors are based on trust, not formal contracts. Trust in social relationships is the main capital that maintains business continuity and supply stability, but it also creates structural dependence that reduces the bargaining power of artisans. In this context, social power is a double-edged sword. It strengthens solidarity but weakens economic bargaining power.

The main challenges to supply chain efficiency lie in the areas of raw materials, technology, and market access. Limited supplies of palm sap, the use of traditional equipment, the lack of quality standards, and the scarcity of market information cause the supply chain to be ineffective and inefficient. These conditions make it difficult for the brown sugar industry to compete with modern sweeteners such as granulated sugar or packaged palm sugar. A socio-economic supply chain strengthening model is needed that balances efficiency and

fairness for artisans. Supply chain development is not enough with production efficiency alone, but must also strengthen social relations, artisan capacity, and local economic institutions so that the distribution system becomes more equitable and sustainable.

In general, this study confirms that the brown sugar supply chain in Hulu Sungai Tengah Regency reflects a people's economy system that is rich in social values but weak in economic institutions. Efforts to strengthen the supply chain cannot be separated from the local social and cultural context that forms the basis of its sustainability.

Bibliography

Adi, M. (2021). *Analisis efisiensi produksi pada industri gula merah tradisional*. Jurnal Agroindustri Indonesia, 9(1), 32–41.

Agus, S. (2020). *Analisis pemasaran dan prospek pengembangan gula merah aren di daerah pedesaan*. Jurnal Agribisnis Tropika, 8(2), 45–56.

Chopra, S., & Meindl, P. (2016). *Supply chain management: Strategy, planning, and operation* (6th ed.). Pearson Education.

Christopher, M. (2016). *Logistics and supply chain management* (5th ed.). Pearson UK.

Creswell, J. W. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage Publications.

Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, 91(3), 481–510.

Heizer, J., Render, B., & Munson, C. (2020). *Operations management: Sustainability and supply chain management* (13th ed.). Pearson Education.

Efendi, M. (2017). *Kajian produksi dan distribusi gula merah aren di Kalimantan Selatan*. Jurnal Pembangunan Wilayah dan Perdesaan, 3(1), 25–33.

Kaplinsky, R., & Morris, M. (2001). *A handbook for value chain research*. Institute of Development Studies.

Lambert, D. M., & Cooper, M. C. (2000). Issues in supply chain management. *Industrial Marketing Management*, 29(1), 65–83.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Sage Publications.

Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. Free Press.

Rahmawati, N. (2019). *Rantai pasok dan nilai tambah pada produk olahan lokal: Studi kasus industri gula kelapa di Banyumas*. Jurnal Sosiohumaniora, 21(3), 213–224.

Rukmana, R. (2018). *Aren: Budidaya dan pengolahan hasil*. Kanisius.

Nurani, M. F., Arabi, I. ., & Anwary, A. . (2025). Sustainability analysis of the palm sugar industry in Hulu Sungai Tengah Regency: Perspectives on local economy, public policy, and labor law. *Journal of Islamic Economics Lariba*, 11(2), 847–878. <https://doi.org/10.20885/jielariba.vol11.iss2.art8>

Wibowo, T., & Hidayat, N. (2020). *Strategi peningkatan daya saing produk pangan lokal melalui efisiensi rantai pasok*. Jurnal Teknologi dan Industri Pangan, 31(2), 89–98.