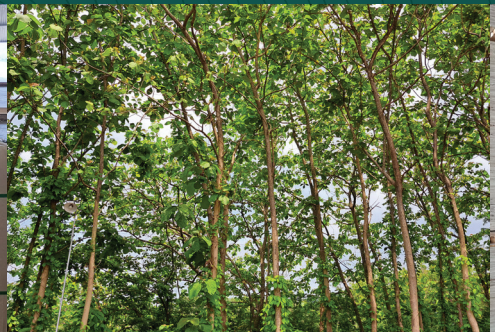
STUDY ON CONSUMPTION OF WOOD PRODUCTS IN WEST JAVA, CENTRAL JAVA, EAST JAVA, AND BANTEN

ITTO PD 928/22 Rev.1 (I)
Development Of Sustainable Domestic Market
For Wood Products

Jakarta, February 2025



INTERNATIONAL TROPICAL TIMBER ORGANIZATION

JAPANGOV THE GOVERNMENT OF JAPAN

MAFF Ministry of Agriculture, Forestry and Fisheries

MINISTRY OF FORESTRY REPUBLIC OF INDONESIA

FINAL REPORT ACTIVITY 1.1

STUDY ON CONSUMPTION OF WOOD PRODUCTS IN WEST JAVA, CENTRAL JAVA, EAST JAVA, AND BANTEN

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Faculty of Forestry Gadjah Mada University
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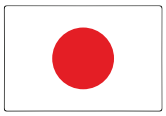

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EXECUTIVE SUMMARY

Since the 1970s, the wood industry in Indonesia has grown rapidly. This was triggered by the government policy in Law No. 5 of 1967 concerning the increased utilization of production forests. The COVID-19 pandemic has slowed economic activity in all sectors. ITTO (International Tropical Timber Organization) reported that domestic consumption has proven to stabilize tropical timber production during previous economic crises. This research aims to study the consumption of wood products and the characteristics of prominent substitute products in West Java.

This study was conducted in West Java Province using a literature study method using secondary data available on the official website of each ministry or related agency. The analysis was carried out using the trend analysis method to see the development of each wood product production and export. Trend analysis shows that nationally, wood product is dominated by woodchips which account for 70% of total production, while plywood & LVL and sawn-timber only contribute 7% and 5% respectively. The largest exports come from wood panel products (28%), followed by furniture (12%). Domestic sales are more focused on woodchips, plywood & LVL, veneer, and sawn-timber.

In West Java, wood products are dominated by plywood & LVL, veneer, and sawn wood. Wood furniture exports from West Java in 2022 reached 2.6 million m^3, showing great potential for the development of the furniture industry. However, West Java's contribution to national production is still small, with the production of plywood & LVL, veneer, and sawn-timber contributing only 1.4%, 3.4%, and 0.8% respectively. The wood processing industry in West Java is mostly concentrated in Cianjur Regency and Banjar City, with the main raw material coming from community forests (91%), while Perhutani only contributes 4%. The capacity utilization rate of the wood industry in West Java is still low, averaging below 50%, although capacity continues to grow.

Nationally, Banten's role as a timber producer has great potential. The types of wood products that are the prima donna in Banten include Plywood & LVL, molding, laminating & finger joined, and housing components. Most of Banten's wood industry is located in Tangerang Regency and Serang Regency. Wood products in Banten are dominated by plywood & LVL, veneer, and sawn-timber. Plywood & LVL production is experiencing a fluctuating trend of change. Meanwhile, veneer production has decreased every year. This indicates that Banten wood products are still in demand in the global market with export destination countries namely the United States and followed by Korea. The largest supply of raw materials in Banten also comes from community forests. However, updating information on community forest mapping has not been done properly. The Forestry Service can be involved in mapping community forests starting from ownership, address, potential, and types of stands and sales channels. On the other hand, the circulation of domestic timber in Banten is also not spared from processes that need to be improved together.

Banten Province also has an important role in the national wood industry, although its contribution is smaller than provinces such as East Java. Production in Banten is dominated by plywood & LVL, sawn-timber, and veneer. Raw materials for the industry in Banten mostly come from community forests (98.7%), while Perhutani only contributes 1.3%. The main export markets include the United States, South Korea, and Japan, with plywood & LVL as the main products. However, the industry's capacity utilization rate in Banten is also low, averaging below 50%.

The problem of wood products in Banten Province shows a similar pattern to West Java. The study recommends that local governments need to ensure information disclosure regarding the source and availability of raw materials. This includes providing accurate and real-time data on the supply of raw materials from production forests and community plantations. With this transparency, businesses will have better clarity in planning their production activities. The supply chain mapping of raw material sources has not been well done in Banten. Therefore, an information flow system for the distribution of wood raw material supply chains is necessary. To overcome these challenges, strategic steps are needed, including strengthening the raw material supply chain, improving product quality, optimizing production capacity, stricter regulatory oversight, and developing the domestic market. With these efforts, the wood industry in West Java and Banten is expected to increase its contribution to the national economy while maintaining the sustainability of forest resources.

The domestic market is heavily influenced by the export market as well. There are two types of influence from the export market. First, products from logs to semi-finished goods such as sawn-timber and veneer will usually also rise. This is because there are many large industries whose processes do not start from logs but from semi-finished goods in the form of sawn-timber and veneer. Second, for end-product goods such as plywood and furniture. If the export market is on the rise, there is a tendency for the domestic market to decline. This is due to the struggle for raw material needs increasing raw material prices, and the export market is more profitable than the domestic market. However, established segments of the domestic market are often unaffected by export fluctuations. This is because the domestic market has specialized market segments that also provide profits and an increase in purchasing power in the domestic market.

The wood industry in East Java is characterized by regional clustering, a predominance of larger enterprises, and significant variations in production levels. The region's capacity to fulfill most raw material needs for both local and international markets underscores its significant potential for development. However, to fully realize this potential, it is crucial to address the imbalance in production and distribution across certain areas. The effectiveness of resource utilization and sustainability in forest management is evident in the inter-regional cooperation in raw material fulfillment and the dynamics of timber trade in regional markets.

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I. INTRODUCTION

1.1. Background

Economic development is a sustainable planning process carried out by the government to improve the community's quality of life and increase long-term per capita income development planning in Indonesia, one of which is carried out through the forestry sector. Since the 1970s, the wood industry in Indonesia has experienced rapid development. This was triggered by government policy stated in Law Number 5 of 1967 concerning increasing the use of production forests. Apart from that, the policy of banning exports of logs at the end of the 1970s also provided a major impetus for developing the wood processing industry in Indonesia. These two policies increased the production capacity of the wood industry, especially in the sawn-wood and plywood industries in the 1980s.

The COVID-19 pandemic has slowed economic activity in all sectors. This is due to reduced state funds being diverted from development to protecting public health. Apart from that, the government's strict implementation of health protocols also limits people's economic activities. As reported by ITTO (International Tropical Timber Organization), domestic consumption has proven to stabilize tropical wood production during previous economic crises. During the widespread COVID-19 pandemic, the government and the wood industry are trying to increase domestic consumption of wood products which is experiencing a slowdown.

Based on ITTO research entitled "Impact of the COVID-19 Pandemic on Tropical Timber Production" ITTO concluded three important points, namely:

- Exports of primary wood products are highly vulnerable to economic shocks.
- The focus and high dependence on unprocessed wood products should be reconsidered to determine the future resilience of the forestry sector.
- Domestic consumption has stabilized tropical wood production during previous economic crises.

The decline in the consumption of domestic wood products in Indonesia needs to be overcome with various efforts. Domestic consumption, which has slowed in recent years, needs to be addressed by encouraging strong and resilient growth in the consumption of domestic wood products to maintain economic stability in this sector. Efforts to strengthen the domestic market can be made in various ways, including increasing people's preferences for the use of wood products rather than wood substitute products, providing more varied wood products for consumers, and reducing the use of wood substitute products, so that domestic wood products will grow. stronger and make a greater contribution to the national economy.

Wood products is a material product whose primary material is wood and has been processed in the factory. This processing produces final products with designs, shapes, and strengths according to needs and desires (Wulandari et al., 2022). Dumairy (1996) states that the industrial sector is believed to be capable of leading other sectors to open an economy. The wood industry is an institution that carries out wood processing into various kinds of products, both those that still show physical wood and those that do not. In increasing economic growth, the wood industry sector has a role in the form of industrial sector output or Gross Regional Domestic Revenue (GRDP) in the industrial sector, which cannot be separated from the role of investment and labor. To increase the consumption of domestic wood products, an in-depth study is needed to assess consumer preferences for using wood products, both in furniture wood, craft wood, and construction wood.

The public's need for wood products is increasing along with the increase in population. Most wood products are used as building construction materials, raw materials for pulp and paper, fuel and charcoal, as well as raw materials for making furniture. Based on a preliminary survey, most of the wood products consumed daily consist of furniture, construction, and wooden craft products. Based on the producer's perspective, to increase sales of their products, industry or business actors (producers), intermediaries, and sellers) need to understand consumer behavior towards the products being marketed. By understanding consumer behavior, business actors can determine the level of consumer satisfaction which can be used as an evaluation in developing appropriate marketing and pricing strategies according to product characteristics. This was done so that it could attract consumer interest in wood products.

Project PD 928/22 Rev.1 (I) "Development of Sustainable Domestic Market for Wood Products", implemented by the Directorate of Forest Products Processing and Marketing, Directorate General of Sustainable Forest Management, Ministry of Environment and Forestry, aims to encourage the development of product consumption domestic wood, to anticipate population and economic growth, through increasing consumption resilience, improving supply chains, and improving government policies. This project will be implemented in a participatory and collaborative manner to encourage domestic consumption of strong and resilient wood products, achieved through two outputs, namely: i) increasing domestic market capacity to meet consumer needs for wood products, and ii) improving institutional arrangements to increase domestic consumption of wood products.

The problem formulation of this study is how to determine the consumption of wood products for furniture commodities (indoor and outdoor), wood for construction, and wood crafts, and the prominent features of substitute products from target consumers on a national scale especially in the project area. This research aims to study the consumption of wood products in the project area of ITTO PD 928/22 Rev.1 (I).

1.2 Objective

This research aims to study the production and consumption of wood products that stand out in the project area. The benefits of this research are as follows:

- To increase domestic market capacity to meet consumer needs for wood products;
- To improve institutional arrangements to increase domestic consumption of wood products.

1.3 Output

The study covers the information and practices of the preference of consumption of wood products of targeted consumer groups in the project locus. The expected proposed activity to achieve the output of Activity 1.1 consists of:

- To select relevant stakeholders in the project area.
- To study wood product consumption at the national scale and project area.
- To conduct the study by collecting information and practices of the preference of consumption of wood products of targeted consumer groups in the project area.
- To develop the analysis of existing and future rates of consumption and preference of wood products of targeted consumer groups in the project area.

The study was conducted by the universities consisting of the Faculty of Forestry and Environment IPB University for the locus of West Java Province and Banten Province, the Faculty of Forestry Gadjah Mada University for the locus of Central Java, and the Faculty of Agriculture of Brawijaya University. The output of the study consists of 1 package of analysis results (1 activity report) and 3 seminars.

Overall, this research provides some important insights to highlight possible steps for policymakers to develop a sustainable wood production project. Taking into consideration the strengths and weaknesses that companies have, policymakers should focus on implementing sustainable wood production practices to stimulate economic growth and protect the environment.

II. METHODOLOGY

2.1 Time and location

This study was conducted in West Java, Banten, Central Java, and East Java Province. This study also captured the existing condition of the wood industry at the national level. The data collection was conducted during November 2023 to May 2024.

2.2 Study Method

2.2.1 Data Collection

Study on consumption of wood products in West Java, Banten, Central Java, and East Java was conducted by collecting secondary and primary data. Secondary data was obtained through literature studies, data downloads on the Forest Products Processing Raw Material Fulfillment Plan Information System or SI-RPBBI that supports the study activities, and statistical records from various sources.

2.2.2 Data Analysis

Table 1 Variables, indicators, data sources, and data analysis methods

No.	Variable	Indicator	Data Source	Data analysis method
1	Consumption of engineered wood products	a. Production b. Overseas Sales c. Domestic Sales	Statistic (BPS & KLHK)	a. Listing b. Tabulation c. Percentage
2	Industry characteristics	a. Total b. Commodity c. Capacity	Statistic (BPS, KLHK & Dishut)	a. Listing b. Tabulation c. Percentage

III. RESULT

3.1 Production and Consumption of Wood Products at the National Scale

3.1.1 National Wood Industry Productivity

1) Production

Indonesia is an important country as a producer of forest products, especially wood; tropical timber is one of the strategic forest product commodities as a raw material for domestic industry and foreign exchange earner from the non-oil and gas sector (Wibowo and Anggraeni 2018). Wood is an organic material that is hard and naturally formed from cellulose fibers in trees. Wood can be used for technical products, ranging from wood poles to finished products. In a broader sense, wood is in the form of pieces of wood or fiber, such as Oriented Strand Boards (OSB), plywood, fibreboards, cement-bonded particleboards, resin-bonded particleboards, or chipboards, composite wood (SCL), flax-boards, and others (Ministry of Trade, 2023).

National timber production supports the timber industry and wood product sales. National timber production is about producing high-quality timber and implementing sustainable forestry practices to create abundant timber resources to meet industry and consumer needs. Sustainable forestry practices are a vital cornerstone of national timber production. These include reforestation to replace fallen trees, primary forests and conservation areas protection, and responsible forest management. By implementing these practices, national timber production ensures that forest ecosystems are maintained, biodiversity is protected, and timber resources can be managed sustainably.

The wood industry is important in converting logs into more valuable and ready-to-use products. Indonesia's primary wood industry is divided into two types of sectors: industries with a production scale of > 6,000 m^3 and industries with a production scale of < 6,000 m^3. Primary industries produce wood products, including plywood & laminated veneer lumber (LVL), veneer, and sawn-timber. The following is the development of the primary industry of wood industry with capacity > 6,000 m^3 based on the type of production (Figure 1)

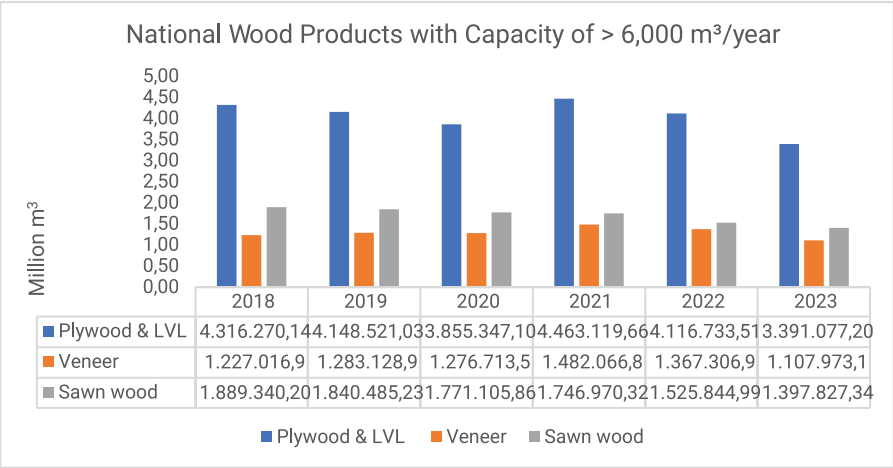


Figure 1 National wood production with a capacity of > 6,000 m^3/year

Based on RPBBI data (Figure 1), the highest production order is plywood & LVL, sawn-timber, and veneer. Plywood & LVL production is three times larger than other timber production, reaching 4.4 million m^3 in 2021. When viewed from the development trend, plywood & LVL production is similar to veneer production; both have increased production in 2021 and then decreased in the following years. Meanwhile, the trend of sawn-timber production consistently decreased from 2019 to 2023.

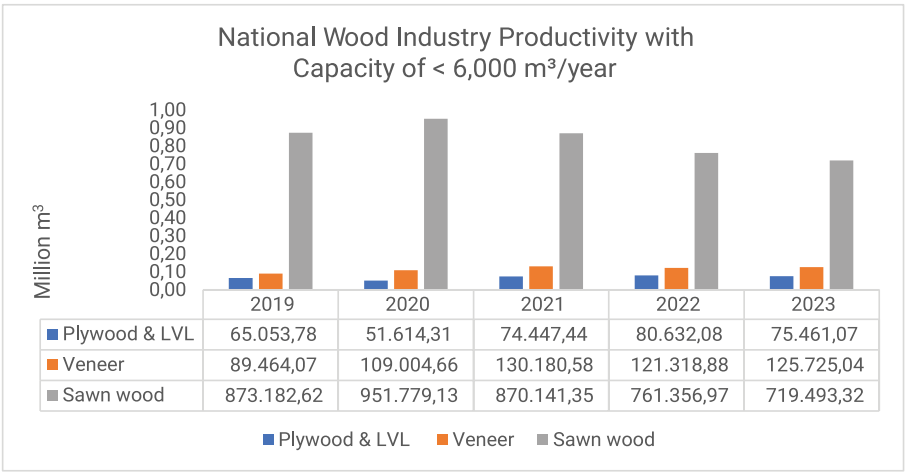


Figure 2 National wood industry productivity with capacity of < 6,000 m^3/year

In contrast to industrial production with a capacity of > 6,000 m^3/year, the order of industrial production with a capacity of < 6,000 m^3/year is the largest: sawn-timber production, veneer production, and plywood & LVL production (Figure 2). Sawn-timber production is 10 times larger than other wood products, reaching 951,000 m^3 in 2020. The development trend of sawn-timber decreased by 32% from 2020 to 2023. Meanwhile, other timber production experienced fluctuations.

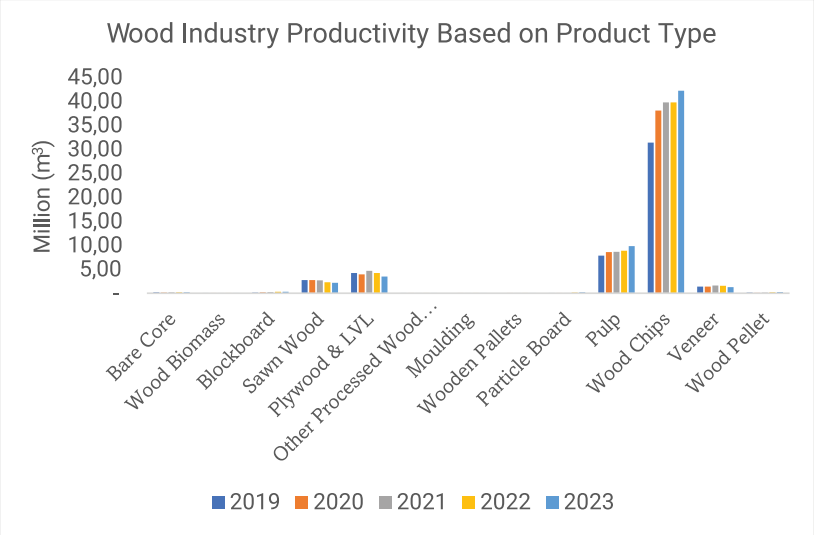


Figure 3 Wood industry productivity based on product type

Based on the PHL Satudata portal (Figure 3), the highest order of national wood products by product type is woodchips, pulp, plywood & LVL, sawn-timber, veneer, and other products. The development trend of woodchip production has increased from year to year. In 2023 woodchip production reached 42 million m^3/year, or around 70% of total wood products. This production is much greater than the production of primary industries such as plywood, veneer, and sawn-timber, whose production amounts to less than 5 million m^3/year or only 14% of total wood products.

2. Export market

Since the opening of the ASEAN Free Trade Agreement (AFTA) as a free trade area of countries, ASEAN has become the production base of the world market (Ministry of Trade, 2016). With the existing conditions, to increase the economic competitiveness of Indonesian products, it must be able to prioritize other advantages that its competitors and competitors do not own. Along with the increasing international demand for high-value and sustainable products, Indonesia has provided wood products through a commitment to environmental sustainability. According to Martha *et al*. (2012), Indonesia is one of the world's most extensive wood and furniture exporters. However, the quality of Indonesian products is still less competitive with other countries' products. The low mastery of manufacturing process technology and understanding of the mechanical properties of wood is one of the causes. The use of raw materials and woodworking that are not by standard specifications and wood types causes the products to be of poor quality (Wibowo and Anggraeni 2018). Figure 4 presents national exports of wood products by product type.

Figure 4 Export of wood products

Based on PHL's SatuData source (Figure 4), wood panels are the highest export product type. Wood panels are artificial boards with the principal constituent component of other wood elements. Wood panels consist of several types of products, such as plywood, particle board, and fiberboard (Walker 2006). Wood panel exports contribute 28% of total wood product exports. Based on research by Tanjung NC (2017), the growth of wood panel exports in 2011-2015 has increased. The increase in exports is due to the increasing market interest in the use of products with the aim of structural and non-structural use.

Apart from wood panels, the other products with the highest exports were pulp and paper, with a contribution of 25% and 15% to total exports, respectively. Wooden furniture products contributed 12% of total exports. Suwita (2016) mentioned that the competitiveness of Indonesian furniture has high competitiveness in the European Union market. To increase furniture exports, policymakers must be able to provide information to furniture producers regarding EU regulations, standards, and market conditions (Wibowo and Anggraeni 2018).

Indonesia exports of wood products to various regions of the country. Asia and North America are the largest importers of Indonesian wood products. The highest exports to the Asian region occurred in 2020 and 2021. These are the years when the coronavirus outbreak is on the rise. This indicates that exports of wood products were not affected by the pandemic then. Meanwhile, the highest exports to the North American region occurred in 2022, the year after the pandemic ended. Apart from Asia and North America, other country regions that are the largest wood importers are the European Union and Africa. Exports per destination country are presented in Figure 5.

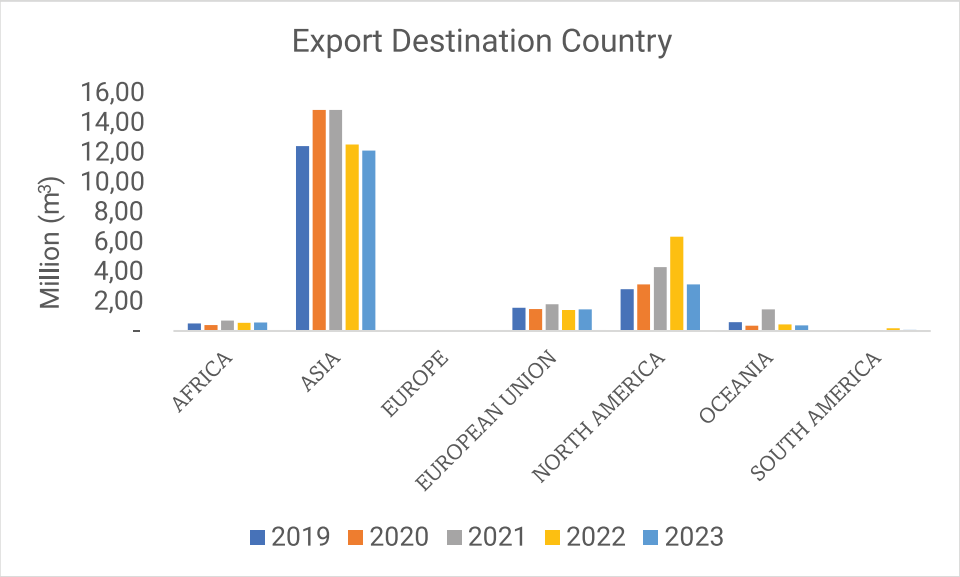


Figure 5 Exports per destination country

3. Domestic market

Consumer preference can be interpreted as a person's choice of likes or dislikes for a product, both goods and services consumed. The product chosen by consumers shows consumer preferences from a wide selection of existing products (Kotler 1997). According to Engel et al. (1994) in Pratama (2010), consumer preferences for products and services can be measured with a measurement model that can analyze the relationship between consumer product knowledge and attitudes toward products according to product characteristics or attributes.

Willingness to Pay (WTP) is a form of economic assessment carried out by looking at the willingness to pay individuals to enjoy goods and services. This WTP approach essentially looks for individual assessments regarding increasing or decreasing cost expenditures on improving the quality of goods and services. Willingness to pay is influenced by age, knowledge, and income (Fathia et al. 2018 and Saptuyningsih 2007). Another factor that influences willingness to pay is the quality of the goods offered, especially wood products. Product quality is one of the reasons consumers are willing to pay more.

Domestic sales reflect the demand in the country for engineered wood products. These products not only fulfill household and construction needs but are also an integral part of the culture and lifestyle of people in Indonesia.

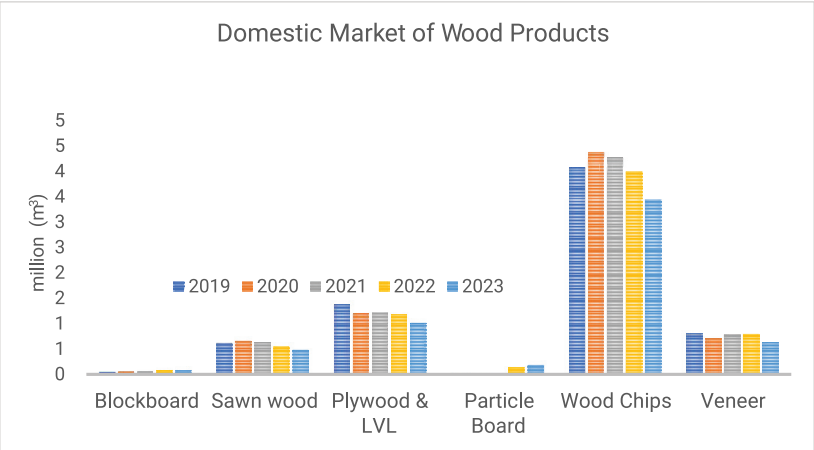


Figure 6 Domestic sales of wood products

The development of domestic sales of this product shows a downward trend. This decline in sales was caused by the Covid-19 pandemic. All economic activities in sectors and industries including the furniture industry have contracted. In addition, in the domestic market, the teak wood furniture industry has buyers who are not clustered and buy products in small volumes compared to production. Product quality among buyers is generally uniform, except for exclusive furniture, so switching costs are relatively low. Although the products are useful, buyers are generally not profit-seeking, except for overseas importers who often act as distributors. Most buyers do not have backward integration, except for importers (Gunadi 2021).

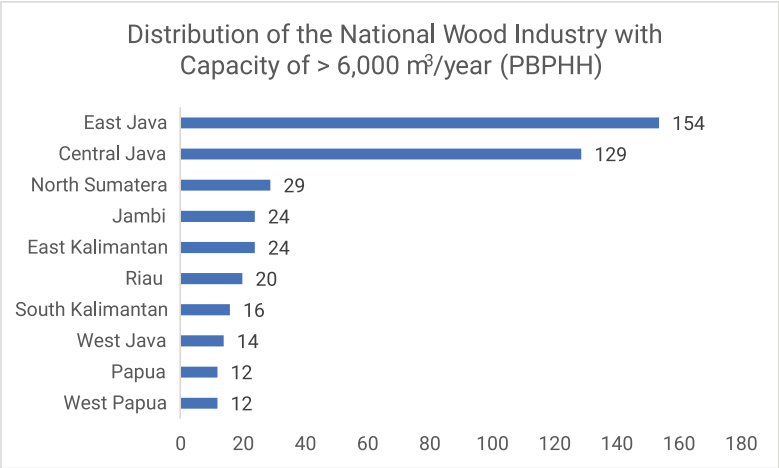
Sales increased from 2019 (4.1 million m^3) to 2020 (4.4 million m^3) and consistently decreased from 2020 to 2023 to reach 3.4 million m^3/year. Other products absorbed by the domestic market are plywood & LVL with average sales of 1.2 million m^3/year. The sales trend of plywood & LVL in the domestic sector has also decreased yearly. Domestic sales of sawn-timber and veneer products did not reach 1 million m^3/year in 2019-2023.

3.1.2 Industry Characteristics

1) Quantity, scale of industry, and distribution

The wood industry is distributed across various provinces in Indonesia (Figure 7). East Java and Central Java provinces are the largest centers of the wood industry, each with a significant number of industries. East Java Province, with 154 wood industries, shows the critical role of this province in contributing to national timber production. This is supported by abundant timber resources in the region, as well as developed infrastructure and markets. Similar to East Java, Central Java Province, with 129 wood industries, also has an important role in the industry. Central Java is a production center due to its strategic location on the island of Java and has good access to raw materials and markets.

Apart from East Java and Central Java, the wood industry is also spread across other provinces in Indonesia. This shows the potential that exists in various regions to contribute to this industry. It also reflects the importance of the wood industry sector in the national economy and its role in creating jobs and economic growth in various regions.



Source: SIRPBBPHH (2024)

Figure 7 Distribution of national wood industry with capacity of > 6,000 m³/year

2) Commodity

Wood is an organic material that is hard and naturally formed from cellulose fibers in trees. Wood can be used for technical products, ranging from wood poles to finished products. Various types of wood products have been developed and widely produced in Indonesia, including sawn-timber, veneer, plywood, particleboard, fibreboard, furniture products, and other products. There are 35 types of products in the national engineered wood industry. This diversity reflects the flexibility of the wood industry in meeting various market needs, both domestically and internationally. In addition, the diversity of types also creates added value from various kinds of raw wood materials. Wood products in Indonesia are presented in Table 2.

Table 2 Type of Wood Products

No	Production Type
1	Bare core
2	Wood biomass
3	Blockboard
4	Fancy block board
5	Fancy plywood
6	Film face plywood
7	Finger joint laminated board
8	Flooring/parquet flooring
9	Sawn-timber
10	Plywood & Laminated Veneer Lumber
11	Other Processed Wood Made from Round Wood/Small Round Wood

No	Production Type
12	Door/window frames
13	Laminated board
14	Lumber core
15	Medium Density Fibreboard (MDF)
16	Furniture
17	Moulding
18	Multiplex
19	Multiply
20	Wooden pallets
21	Particle board
22	Particle board is made from round wood/small round wood
23	Particle board made from non-round wood/small round wood
24	Polyester block board
25	Polyester plywood
26	Other products are sawn-timber derivatives
27	Other products are plywood derivatives
28	Other products are veneer derivatives
29	Pulp
30	S4s (Slides 4 sides)
31	Wood chips
32	Close packing
33	Veneer
34	Wood pellet
35	Woodworking

Plywood, veneer, and sawn-timber are primary industry commodities that play an important role in Indonesia's wood industry sector. They play a central role in the supply chain of the wood industry and contribute significantly to the national economy. In addition, they also play a key role in supporting various industrial sectors, such as construction, furniture, and packaging.

3) Capacity

The capacity of the wood processing industry includes the ability to convert wood raw materials into wood products ready for sale. In addition, installed capacity also includes the ability to meet ever-changing market demands with high efficiency and high-quality products. Installed capacity refers to the maximum level of output that can be produced from available primary resources during the operating period. The national wood processing industry's installed capacity and production realization are described as follows.

a) Plywood & LVL installed capacity

The installed capacity of plywood & LVL is the largest compared to that of veneer and sawn-timber. The level of national plywood & LVL installed capacity from 2018 to 2019 has increased consistently yearly. The capacity, which was initially only 10.05 million m^3 in 2018, reached 11.18 million m^3 in 2022. However, the realization of plywood & LVL production has never reached its capacity. The realization of plywood & LVL production only reached 39% of its capacity. This shows that the realization of plywood & LVL production has the potential to be increased. The installed capacity and production realization of plywood & LVL are presented in Figure 8.

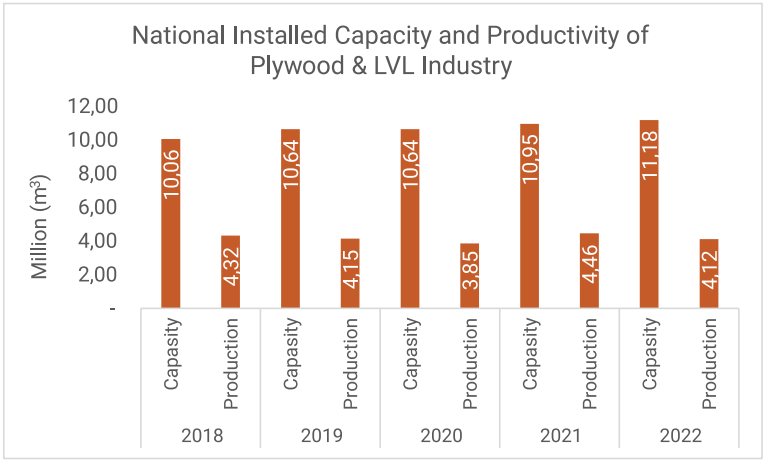
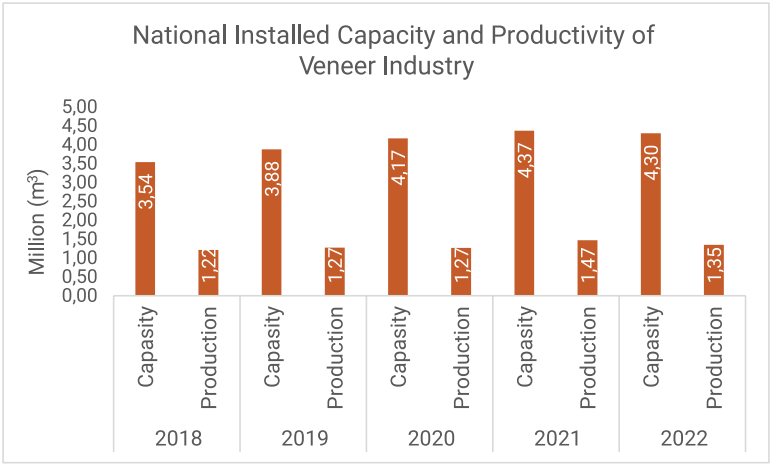


Figure 8 National installed capacity and productivity of plywood & LVL

b) Installed capacity of veneer

Similar to plywood & LVL capacity, veneer installed capacity also shows an increasing trend. The installed capacity in 2022 decreased. The installed capacity of the veneer is smaller than the installed capacity of plywood & LVL, and sawn-timber. The highest installed capacity of veneer only reached 4.37 million m^3 in 2021. However, the installed realization of veneer from 2018 to 2022 has yet to reach its capacity. The realization of production only reached 33% of its capacity. This also shows that the realization of veneer production has the potential to be increased.

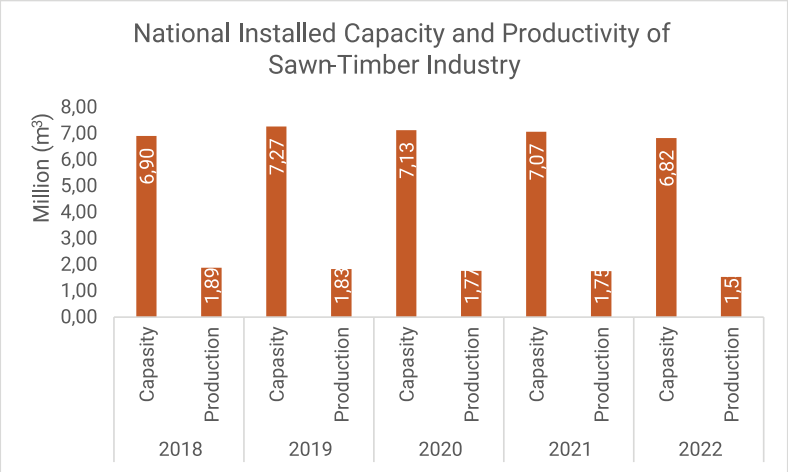


Source: RPBBI (2023)

Figure 9 National installed capacity and productivity of veneer

c) Installed capacity of sawn-timber

The national installed capacity of sawn-timber is quite large compared to veneer production and lower than plywood & LVL production. In contrast to other installed capacities that continue to increase, the installed capacity of sawn-timber fluctuates. The highest installed capacity occurred in 2019, at 7.27 million m^3. However, the installed capacity decreased consistently in the following years until it reached 6.82 million m^3. Similar to other production realizations, the realization of sawn-timber production has never reached its capacity. On average, sawn-timber production realization only reached 25% of its total capacity. This shows that the realization of sawn-timber production also still has the potential to be increased.



Source: RPBBI (2023)

Figure 10 Installed national capacity and productivity of sawn-timber

The realization of national wood processing industry production from 2018 to 2022 never reached its installed capacity. This shows that the national wood processing industry needs to increase its production.

3.2 Study on Production and Consumption of Wood Products in West Java

3.2.1 West Java Wood Industry Productivity

1) Production

The engineered wood industry is one of the main pillars of the regional economic contribution. The engineered wood industry also plays a role in building a strong local economic network. The large number of small and medium enterprises involved in the wood products supply chain, from raw material collection to craftsmen to distributors, creates a dynamic and sustainable economic ecosystem. This strengthens the local economy and increases regional economic independence and resilience.

In West Java, log production based on wood species such as teak, pine, mahogany, sengon, agathis, rosewood, rasamala, puspa, maesopsis, acacia mangium, and mixed wood from Natural Production Forest is a type of wood that is used as wood processing such as sawmills, plywood, molding, furniture/furniture, musical instruments, crafts/carving and so on (Ahmad 2023). Figure 11 presents data on the primary industry of wood products with a capacity of > 6,000 m^3/year from 2019 to 2023.

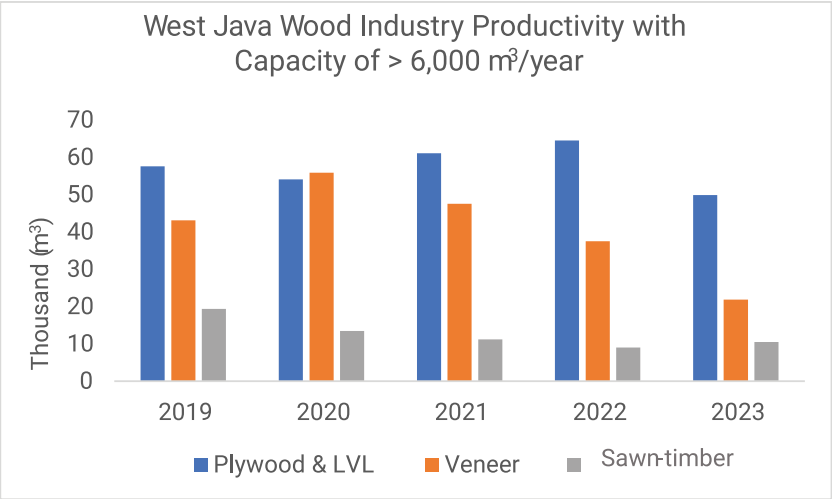


Figure 11 West Java wood industry productivity with a capacity > 6,000 m^3

Primary industry wood product with a capacity of > 6,000 m^3/year in West Java is dominated by plywood & LVL (RPBBI 2024). At the same time, the smallest production is sawn-timber. The highest plywood production occurred in 2022, amounting to 64,000 m^3. At the same time, the highest veneer production occurred in 2020 at 55,000 m^3. The highest sawn-timber production occurred in 2019 at 23 thousand m^3. The development trend of production of each type of wood product is different. Plywood & LVL experienced a fluctuating trend from 2019-2023. At the same time, the trend of veneer production experienced a downward trend in 2020-2023. Similar to veneer production, sawn-timber production also experienced a downward trend from 2019-2022 and experienced a 14% increase in 2023. Primary industry wood products with a capacity of > 6,000 m^3/year in West Java do not contribute significantly to national wood products. Plywood & LVL production, veneer production, and sawn-timber production contributed 1.4%, 3.4%, and 0.8% to national production for each type, respectively.

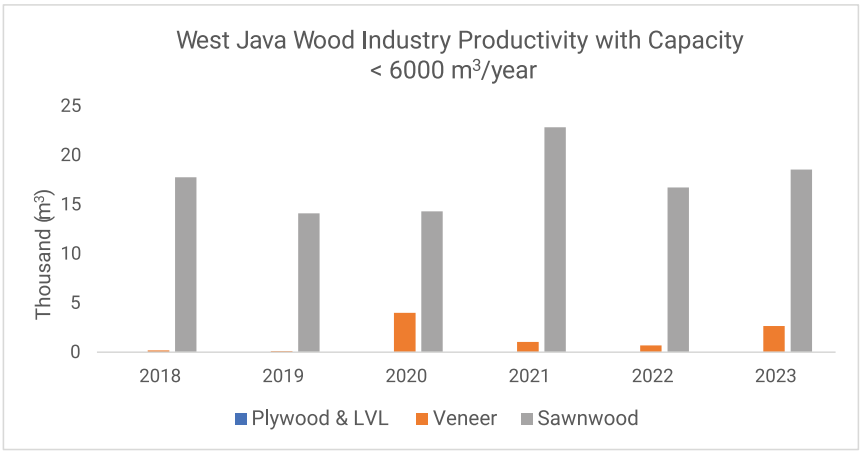


Figure 12 West Java wood industry productivity with capacity of < 6,000 m^3

Primary industry production of < 6,000 m^3/year capacity is dominated by sawn-timber production. There is no plywood production in West Java for this capacity industry. The development trend of sawn-timber production has fluctuated. Based on the SatuData PHL (2024) shown in Figure 13, there are other types of wood products but they do not contribute significantly to production in West Java.

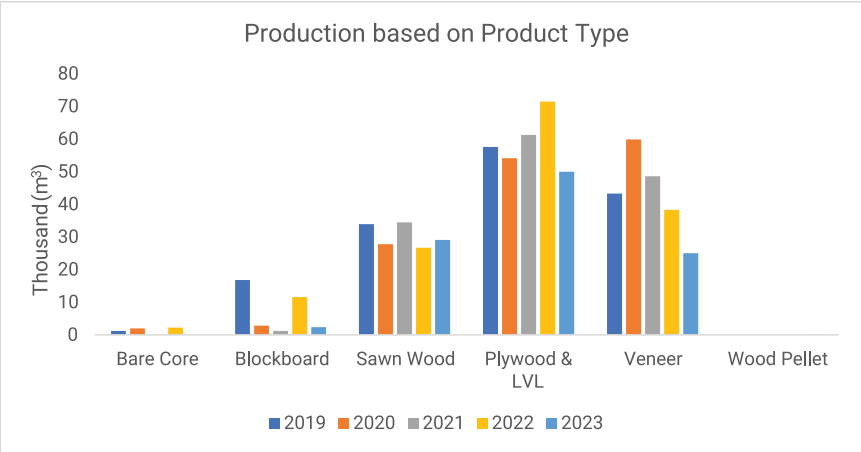


Figure 13 Production based on product type in West Java

2) Export market

Wood product exports in West Java are an important economic sector. The wood product industry can be one of the main sectors in the regional economy. Wood product exports from West Java include various types of wood products, such as plywood, sawn-timber, veneer, and other products. Figure 14 presents the export volume of wood products in West Java.

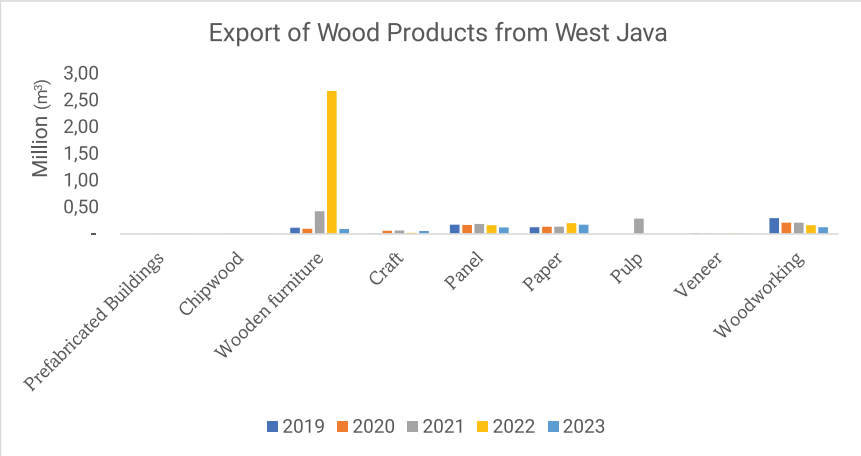


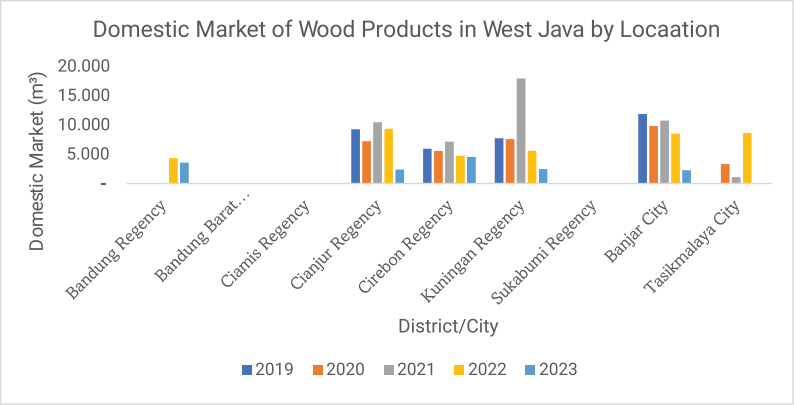
Figure 14 Export of wood products from West Java

Furniture and woodworking products dominate exports of wood products in West Java. In 2022, wooden furniture exports in West Java reached 2.6 million m^3. This indicates the potential for developing the furniture industry in West Java. Other products contributing to export include wood panels, paper, and handicrafts.

3) Domestic market

The West Java domestic market sales of wood products have contributed to the local economic chain. Sales of wood products in the domestic market not only provide direct economic benefits to producers and businesses in the wood industry but also support the growth and sustainability of the local economy as a whole. Banjar City is an area of West Java that sold a lot of wood products from 2019 to 2023, making a 25% contribution to total

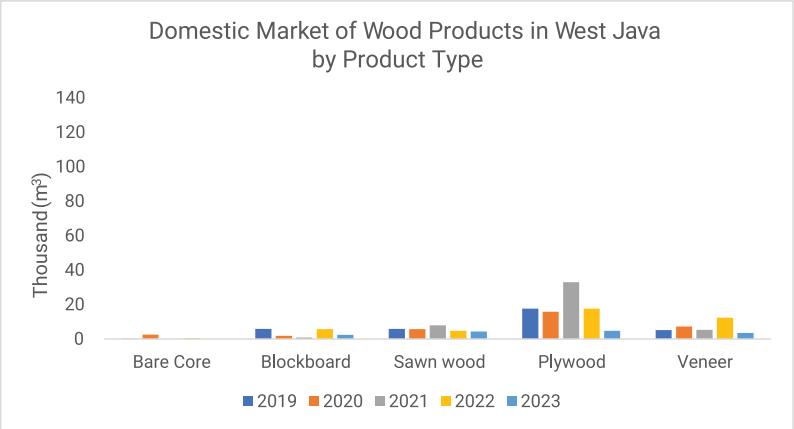
West Java sales. This is followed by Kuningan district with a contribution of 24% to total sales and Cianjur district with a contribution of 22% to total sales of wood products in West Java. Meanwhile, other cities and districts only contributed less than 20% to the total sales of products in West Java. The domestic market of wood products is presented in Figure 15.



Source: SIRPBBPHH (2024)

Figure 15 Domestic market of wood products in West Java by location

West Java's domestic sales are dominated by plywood & LVL, with average annual sales of 18 thousand m^3/year. In addition, sawn-timber and veneer products also have high sales in the domestic market (Figure 16). The highest sales of plywood & LVL in the domestic market reached 33,010 m^3 in 2021, but sales of plywood & LVL products in the domestic market experienced a significant decline. In 2023, sales of plywood & LVL products only reached 4,720 m^3. The sales decreased by 86% against 2021 production. On the other hand, sawn-timber and veneer products experienced fluctuating development from 2019 to 2023.



Source: SIRPBBPHH (2024)

Figure 16 Domestic market of wood products in West Java by product type

3.2.2 Industry Characteristics

1). Quantity, scale of industry, and distribution

The wood industry in West Java is distributed in 9 cities/regencies, with only 14 industries. Most of these industries are located in Cirebon Regency, totaling 3 industries, including two in the form of private company (PT) and one in the form of a local government-owned company (PD), with total production from 2019 to 2023 of 28,707 m^3. In addition to Cirebon Regency, the majority of the wood industry is also located in Banjar City, Kuningan Regency, and West Bandung Regency, with two industries each in the form of PT. Although the industry is more widely spread in Cirebon Regency, the most significant production is

in Banjar City, with a total of 213,262 m^3. This shows that the highest level of wood industry productivity in West Java is in Banjar City. The distribution of industries in West Java is presented in Table 3.

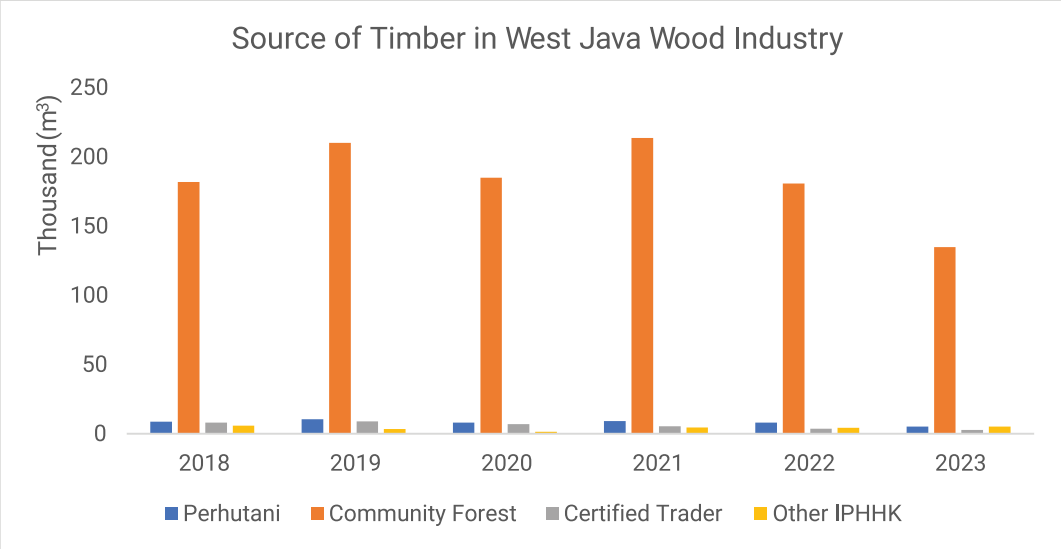
Table 3 Distribution and industrial production in West Java

Region of Origin	Wood Industry						Total Industry	Total Production 2019-2023 (m^3)
	PT	PD	Perhutani	CV	KBM	KSU		
Bandung Regency	-	-	-	1	-	-	1	7.849
Bandung Barat Regency	2	-	-	-	-	-	2	-
Ciamis Regency	1	-	-	-	-		1	-
Cianjur Regency	1	-	-	-	-	-	1	39.942
Cirebon Regency	2	1	-	-	-	-	3	28.707
Kuningan Regency	1	-	-	1	-	-	2	41.193
Sukabumi Regency	1	-	-	-	-	-	1	-
Banjar City	2						2	213.262
Tasikmalaya City	1	-	-	-	-	-	1	49.546

Source: SIRPBBHH 2024

Sources of raw materials for the wood industry in West Java come from 4 sources, namely Perum Perhutani, community forests, certified traders, and other IPHHK (Figure 17). The source that most contributes to supplying raw materials for the industry comes from community forests, which contribute 91% of the total source of raw materials. According to Hakim et al. (2009), the decline in the supply of raw materials from outside Java and from Perum Perhutani tends to have encouraged the contribution of supply from community forests in Java. Community forests are a source for fulfilling the need for wood supply in Java. The source of supply from community forests fluctuates from year to year. The highest supply occurred in 2021, amounting to 213,730 m^3. In 2023, the supply of raw materials from community forests decreased to 134,721 m^3. This has implications for production, which decreased in 2023.

In addition to community forests, Perum Perhutani also provides raw material sources to the wood industry. Although not as large as community forests, the source of raw materials originating from Perum Perhutani is the second largest source after community forests, namely 4% of the total source of raw materials. The source of raw materials from Perum Perhutani fluctuates around 8-10 thousand m^3/year. Similar to the source of raw materials from community forests, Perhutani's source also decreased in 2023 with a volume of only 5,200 m^3/year. Another source of raw materials is from certified traders, owners, or traders who own wood, with clear wood origins. This source also contributes enough raw material for the wood industry with an average volume of 5.9 thousand m^3/year or 3% of the total raw material sources. Other raw materials are from other IPHHK sources that only contribute 2% of the total raw material sources.



Source: RPBBI (2023)

Figure 17 Source of timber in West Java wood industry

2) Commodity

West Java is one of the regions that have both large-scale and small-scale wood industries. Wood products in West Java are of a variety of types and are spread across nine districts/cities. The types of products that are widely spread in the regency/city are plywood & LVL, veneer, and sawn-timber. These 3 types of products can be further processed into final products such as furniture, construction wood, and crafts. The distribution of wood products in West Java is presented in Table 4

Table 4 Distribution of wood products in West Java

District/City	Type of Product
Bandung Regency	Veneer
Bandung Barat Regency	Blockboard
	Sawn wood
	Plywood & LVL
	Veneer
Cianjur Regency	Barecore
	Blockboard
	Sawn-wood
	Plywood & LVL
	Veneer

District/City	Type of Product
Cirebon Regency	Bare Core
	Blockboard
	Sawn-wood
	Plywood & LVL
	Medium Density Fibreboard (MDF)
	Veneer
Kuningan Regency	Bare Core
	Blockboard
	Plywood & LVL
Sukabumi Regency	Sawn-wood
	Plywood & LVL
	Veneer
Banjar City	Plywood & LVL
	Veneer
	Sawn-wood
	Blockboard
	Sawn-wood
	Plywood & LVL
	Veneer
Ciamis Regency	Blockboard
	Plywood & LVL
	Veneer

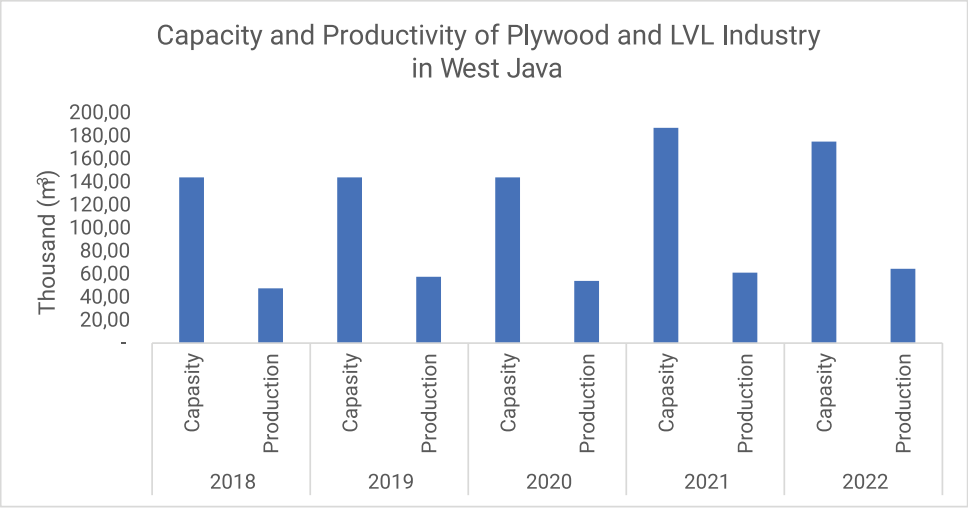
3) Capacity

From 2018 to 2022, West Java province experienced an increase in the installed capacity of the wood processing industry, driven by increased investment and industrial infrastructure. It is essential to evaluate the extent to which wood industry production has reached the specified capacity to ensure the sustainability of the wood industry in West Java. Potential growth, challenges, and opportunities can be identified by understanding the capacity and realization of wood processing industry production in West Java Province. The following is the capacity development and realization of wood industry productivity in West Java.

a) Installed capacity of plywood &LVL

The installed capacity of plywood & LVL in West Java shows an upward trend from 2018 to 2022. The initial capacity of only 143,000 m^3 in 2018 became 186,000 m^3 in 2021, then decreased again to 174,000 m^3 in 2022. Production realization does not show a significant increase. Similar to the national production realization, the realization of plywood & LVL production in West Java has also never reached its capacity. The

average production is only realized at 36% of its capacity. This is caused by several factors, one of which is the difficulty of finding raw materials for the wood industry in West Java.

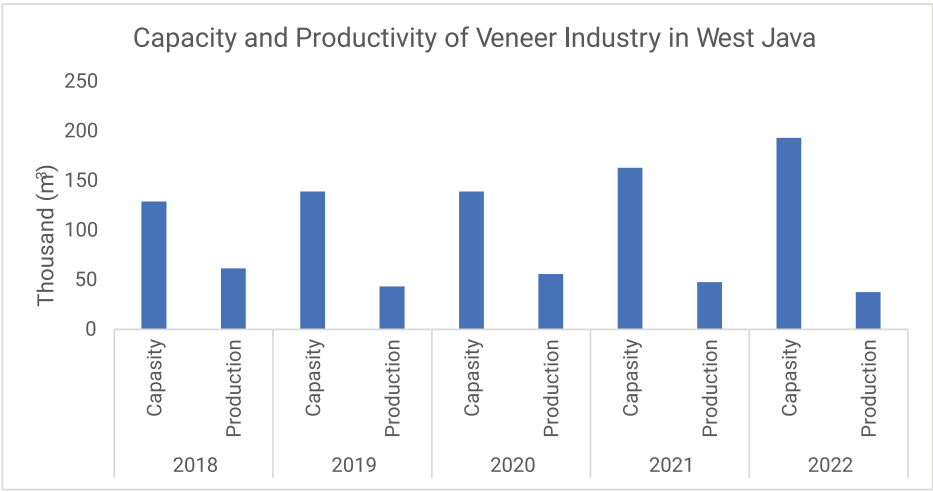


Source: RPBBI (2023)

Figure 18 Capacity and productivity of plywood and LVL industry in West Java

b) Installed capacity of veneer

The installed capacity of the veneer industry in West Java shows the same development trend as the development of national installed capacity, which is increasing from year to year. The installed capacity in 2018 amounted to 129,000 m^3 to 193,000 m^3 in 2022. Contrary to the installed capacity, the realization of veneer production in West Java shows a downward trend. The initial production realization in 2018 was 61,400 m^3, in 2023 only 37,500 m^3 was realized. The average veneer productivity in West Java is 33% of its capacity.

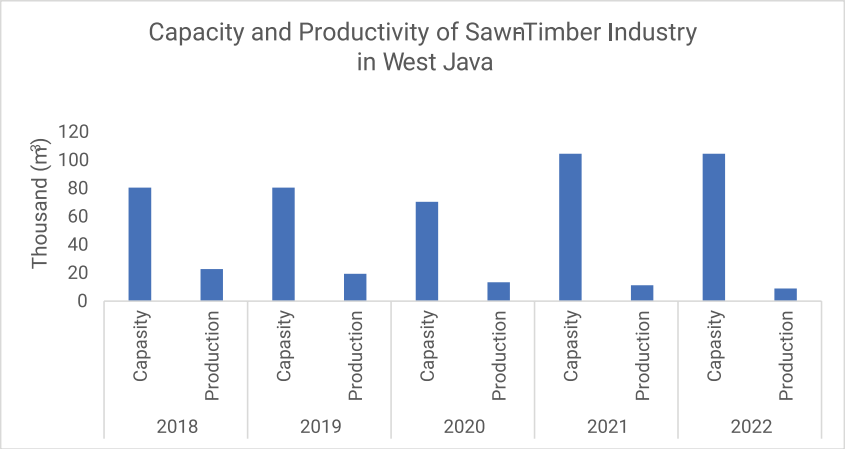


Sumber: RPBBI (2023)

Figure 19 Capacity and productivity of the veneer industry in West Java

c) Installed capacity of sawn-timber

The installed capacity of sawn-timber in West Java has increased every year. However, the realization of sawn-timber production in West Java shows a downward trend. The realization of production that occurred in 2018 reached 61,400 m^3 (28% of installed capacity) and consistently decreased until 2022 to reach 37,500 m^3 (9% of installed capacity). The average realization of sawn-timber production in West Java is 18% of the total installed capacity.



Source: RPBBI (2023)

Figure 20 Capacity and productivity of sawn-timber industry in West Java

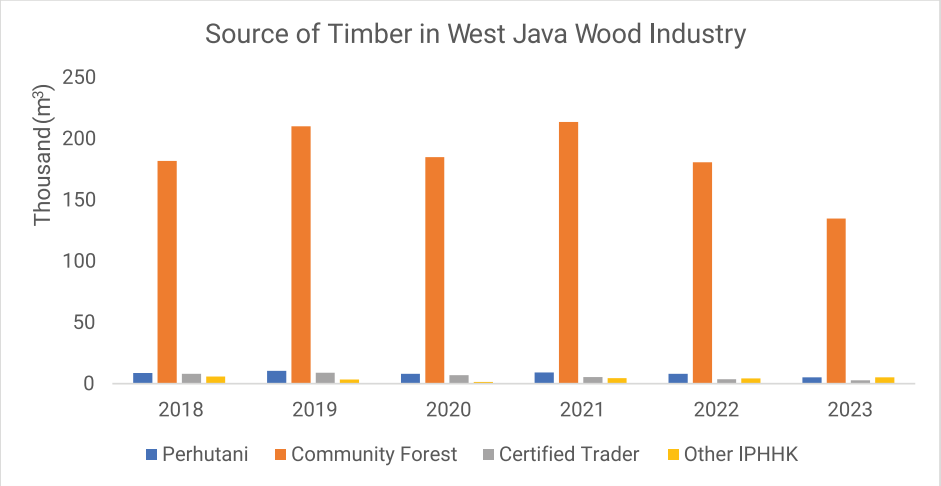
3.3 Study on Production and Consumption of Wood Products in Banten

3.3.1 Banten Wood Industry Productivity

1) Production

The wood industry is one of the main pillars of the regional economic contribution. The wood industry also plays a role in building a strong local economic network. The large number of small and medium-sized enterprises involved in the wood industry supply chain, from the collection of raw materials, and artisans, to distributors, creates a dynamic and sustainable economic ecosystem. In Banten Province, the production of logs is teak, manii, mahogany, sengon, ki renghas, ki banen, ki hampelas (Rachman 2011) and (Sri 2014). This type of wood is a mainstay wood and is widely used in wood products such as sawn-timber, plywood, furniture, and wood crafts.

According to the Banten Provincial Office, there are at least 200 trucks out of Banten distributing logs to Central Java, East Java, and outside Java that have escaped supervision and are backed up by irresponsible individuals. If one truck can transport 6 m^3, it means that 1,200 m^3 a day reaches 432,000 m^3 **of** potential supply of wood raw materials for industries in Banten out of the Banten area, resulting in a shortage of production raw materials.



Source: RPBBI (2023)

Figure 21 Wood industry productivity of Banten with capacity of > 6,000 m^3

Primary wood industry productivity with a capacity of > 6,000 m^3/year in Banten is dominated by plywood & LVL (RPBBI 2024), while the smallest production is veneer. Plywood & LVL production was highest in 2019 at 249,000 m^3. Meanwhile, veneer production is constant from 2019 to 2023 at 4,950 m^3/year. Sawn-timber reached its highest production in 2019 of 58,000 m^3. The development trend of the primary wood industry is decreasing every year in the types of plywood & LVL, and sawn-timber, but the trend of veneer production is constant every year.

Banten's wood product does not play a significant role in national production, with the percentages of plywood, LVL, veneer, and sawn-timber respectively at 5.2%, 0.4%, and 3.3% of the total national production. This is different from the province of East Java with an average contribution of around 35% per year. This happens because the number of wood industries in East Java is indeed more advanced than in Banten Province.

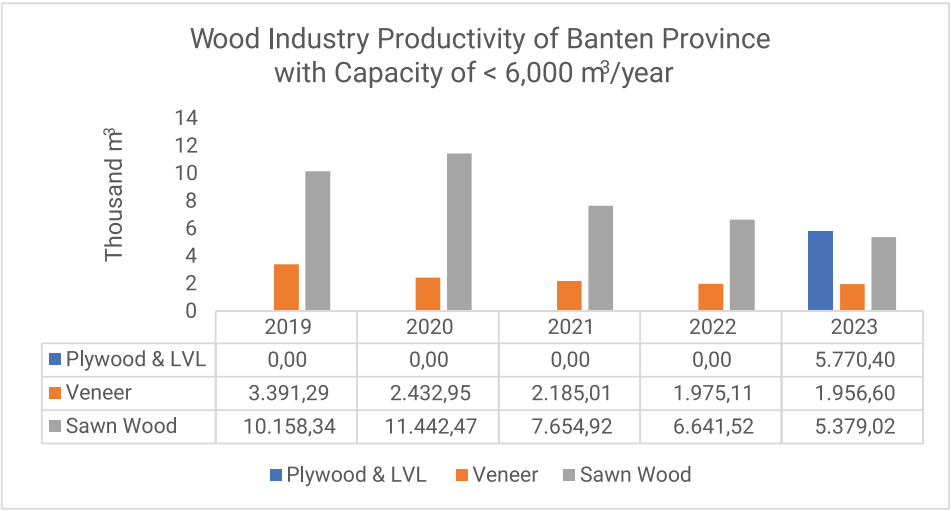
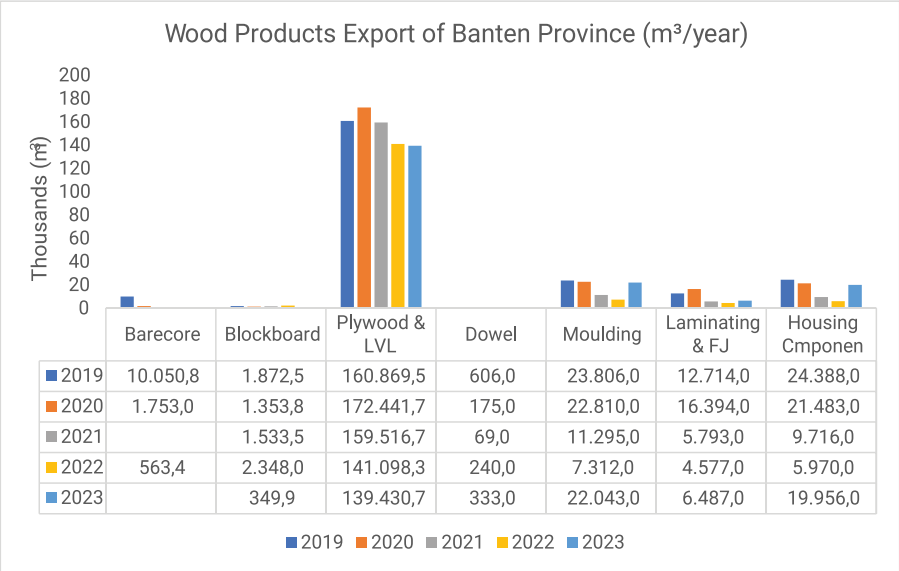


Figure 22 Wood industry productivity of Banten with the capacity of < 6000 m^3

Primary industrial production with a capacity of < 6,000 m^3 in Banten is dominated by sawn-timber. Plywood & LVL production in Banten will only be available in 2023. The development trend of the primary wood industry with a capacity of < 6,000 m^3/year fluctuates for sawn-timber and reaches its highest production in 2020 of 11,000 m^3/year. Meanwhile, veneer has a downward trend from 2019 which was originally 3,000 m^3/year to 1,900 m^3/year.

2) Export market

Wood product exports in Banten are one of the important economic sectors. Wood products exports from Banten include various types of wood products, such as plywood, sawn-timber, veneer, and other products. Based on data from CDK Tangerang for the last 5 years (2019-2023), wood products that have high exports are plywood & LVL with an average volume of 154,000 m^3/year, followed by molding products and housing components respectively with an average of 17,000 m^3/year and 16,000 m^3/year (Figure 23). Although not as large as plywood & LVL exports, this product is still a significant contributor to wood exports from Banten.

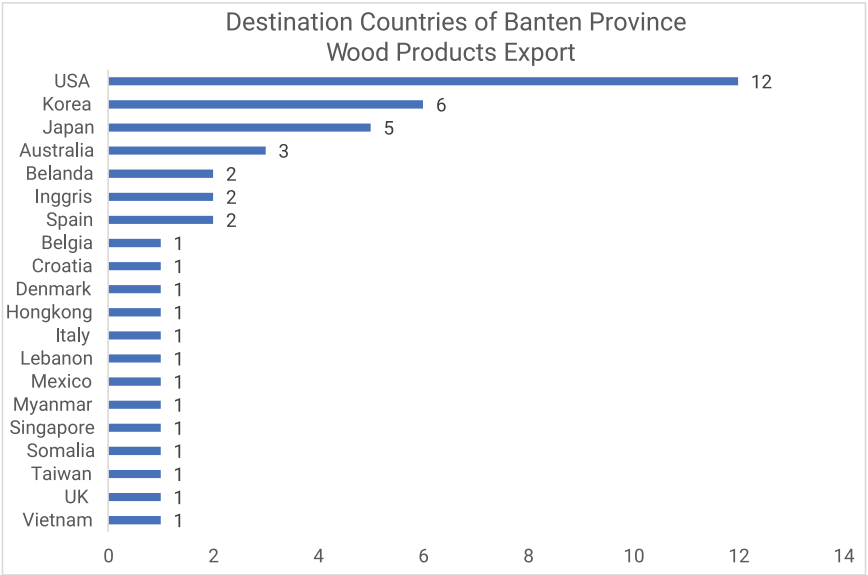


	Barecore	Blockboard	Plywood & LVL	Dowel	Moulding	Laminating & FJ	Housing Cmponen
2019	10.050,8	1.872,5	160.869,5	606,0	23.806,0	12.714,0	24.388,0
2020	1.753,0	1.353,8	172.441,7	175,0	22.810,0	16.394,0	21.483,0
2021		1.533,5	159.516,7	69,0	11.295,0	5.793,0	9.716,0
2022	563,4	2.348,0	141.098,3	240,0	7.312,0	4.577,0	5.970,0
2023		349,9	139.430,7	333,0	22.043,0	6.487,0	19.956,0

Source: SIRPBBPHH, CDK Tangerang (2024)

Figure 23 Wood products export of Banten Province

According to data from the Lebak and Tangerang Forestry Service Branches. The United States ranks first in the export destination country for wood products in Banten province with 12 industries. Followed by Korea with 6 industries and Japan with 5 industries.

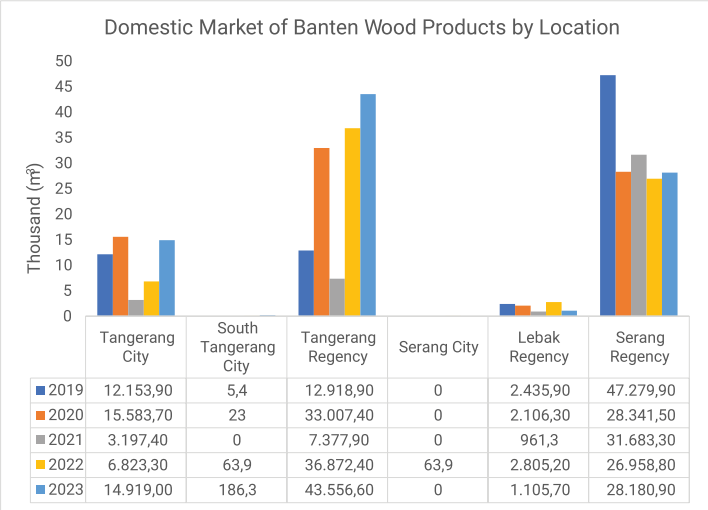


Source: CDK Tangerang (2024)

Figure 24 Destination countries of Banten Province wood products export

3) Domestic market

The sale of wood products in the Banten Province's domestic market has contributed to the local economic chain. The sale of wood products in the domestic market not only provides direct economic benefits for producers and business people in the wood industry but also supports the growth and sustainability of the local economy as a whole. Serang Regency is a Banten area that sells a lot of wood products from 2019 to 2023 with a contribution of 45.3% to Banten's total sales. Furthermore, followed by Tangerang Regency with a contribution of 37.29% to total Banten sales. The full domestic market of wood products is presented in Figure 25.

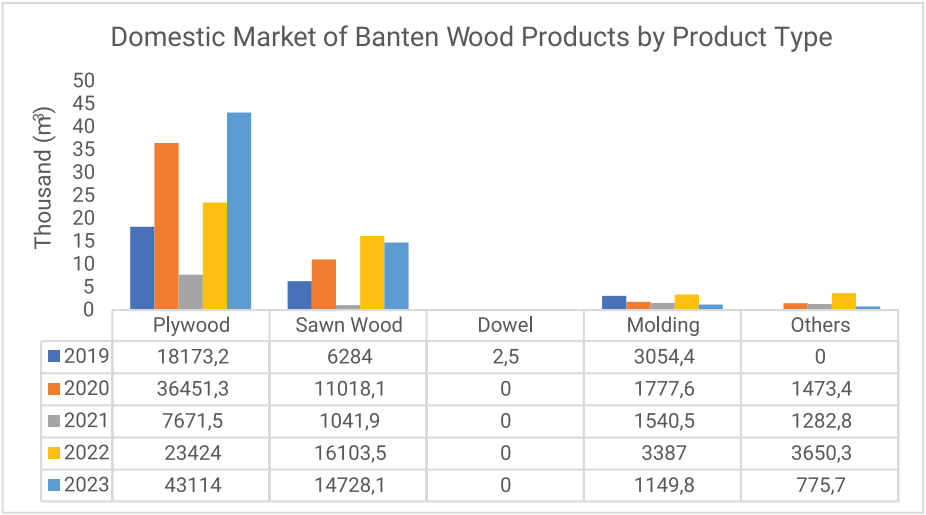


	Tangerang City	South Tangerang City	Tangerang Regency	Serang City	Lebak Regency	Serang Regency
2019	12.153,90	5,4	12.918,90	0	2.435,90	47.279,90
2020	15.583,70	23	33.007,40	0	2.106,30	28.341,50
2021	3.197,40	0	7.377,90	0	961,3	31.683,30
2022	6.823,30	63,9	36.872,40	63,9	2.805,20	26.958,80
2023	14.919,00	186,3	43.556,60	0	1.105,70	28.180,90

Source: CDK Tangerang (2024)

Figure 25 Domestic market of Banten wood products by location

Similar to exports, Banten's domestic sales are also still dominated by plywood. In addition, sawn-timber products have fairly high sales after plywood & LVL in the domestic market (Figure 26). Sales of plywood & LVL products in the domestic market will reach 43,000 m^3 in 2023.



	Plywood	Sawn Wood	Dowel	Molding	Others
2019	18173,2	6284	2,5	3054,4	0
2020	36451,3	11018,1	0	1777,6	1473,4
2021	7671,5	1041,9	0	1540,5	1282,8
2022	23424	16103,5	0	3387	3650,3
2023	43114	14728,1	0	1149,8	775,7

Source: SIRPBBPHH, CDK Tangerang (2024)

Figure 26 Domestic market of Banten wood products by product type

3.3.2 Industry Characteristics

1) Quantity, scale of industry, and distribution

The wood industry in Banten is distributed in 6 cities or regencies, with a total of 43 industries. The majority of these industries are located in Tangerang Regency of 31 industries, including 27 in the form of PT and 4 in the form of PD with a total production from 2019 to 2023 of 570,666 m^3. In addition to Tangerang Regency, the majority of the wood industry is also located in Tangerang City with 6 industries in the form of PT. Lebak Banten only has 2 industries, but has a fairly high production value, namely 544,854 m^3, which is almost the same as the production level of Tangerang district. This shows that the highest level of wood production in Banten is in Tangerang Regency and Lebak Regency.

Table 5 Distribution and industrial production in Banten

Region of Origin	Wood Industry						Total Industry	Total Production 2019-2023 (m^3)
	PT	PD	Perhutani	CV	KBM	KSU		
Tangerang Regency	27	4					31	570.666
Serang Regency	1						1	162.444
Lebak Regency	2						2	544.854
South Tangerang	1						1	10,74
Tangerang City	6						6	52.677
Kota Serang	1						1	63,9

Source: SIRPBBHH 2024, CDK Tangerang 2024

The source of raw materials for the wood industry in Banten comes from 2 main sources, namely Perum Perhutani and community forests (Figure 27). Of the two sources, the one that contributes the most to supplying industrial raw materials comes from community forests with a contribution of 98.7% of the total raw material sources in Banten. From 2018 to 2023, sources of raw materials from community forests dominated the supply to the wood industry.

The source of supply from community forests from year to year continues to grow. According to the Ministry of Environment and Forestry to Press Release Number: SP.037/ HUMAS/PP/HMS.3/01/2019, the Minister of Environment and Forestry, Siti Nurbaya said that the supply of timber raw materials from plantation forests and community forests is increasing from 37.3 million m^3 in 2015 to 46.6 million m^3 in 2018. In particular, from community forests, it increased from 4.8 million m^3 in 2015 to 6.2 million m^3 in 2018. The growth of the timber industry on the island of Java is due to increasing market demand, supporting infrastructure in Java, and industries in Java that are increasingly mushrooming.

The highest supply occurred in 2019 at 81,500 m^3. In 2020, the source of raw material supply from community forests decreased by only 189.24 m^3. In addition to community forests, Perum Perhutani also contributes to providing a source of raw materials for the wood industry. Although not as large as community forests, the source of raw materials from Perum Perhutani is the second largest source after community forests, which is 1.3% of the total source of raw materials. The source of raw materials from Perum Perhutani fluctuates around 400-1,200 m^3/year.

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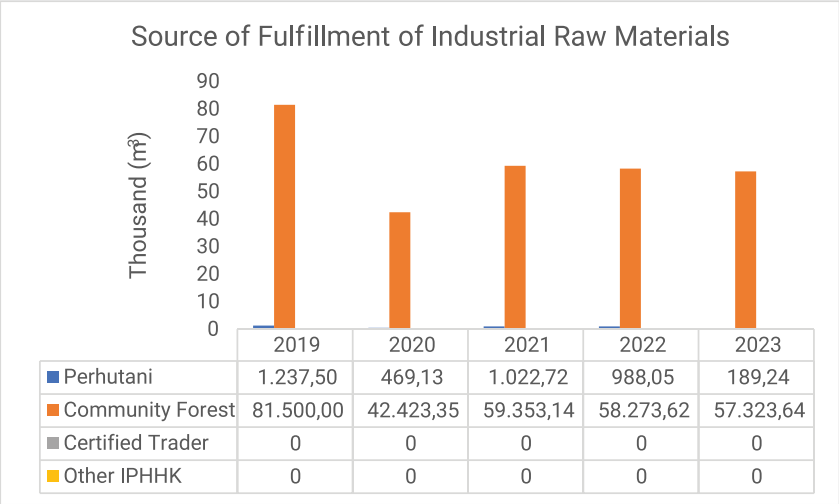


	2019	2020	2021	2022	2023
Perhutani	1.237,50	469,13	1.022,72	988,05	189,24
Community Forest	81.500,00	42.423,35	59.353,14	58.273,62	57.323,64
Certified Trader	0	0	0	0	0
Other IPHHK	0	0	0	0	0

Source: RPBBI (2023)

Figure 27 Source of fulfillment of industrial raw materials in Banten

The supply of raw materials from community forests began to decline by 42,423 m^3 in 2020. This is due to the effect of the Covid-19 pandemic so the absorption of raw materials from people's wood is starting to sluggish. Intervention from the government is needed to maintain sufficient wood raw materials so that the industrial business cycle remains alive and fulfilled.

2) Commodity

Based on RPBBI (2023) data, the primary timber forest product industry with a capacity of less than and > 6,000 m^3/year consists of plywood & LVL, veneer, sawn-timber, wood chips, and pulp. However, due to the different market niches of pulp and paper, the discussion focused on three types of commodities, namely plywood & LVL, veneer, and sawn-timber. The primary forest product industry that has a capacity of < 6,000 m^3/year usually produces using manual and conventional methods. The industry is running on Small or Medium Enterprises (SMEs), with simpler production. These industries tend to supply local or regional needs and focus on more limited markets.

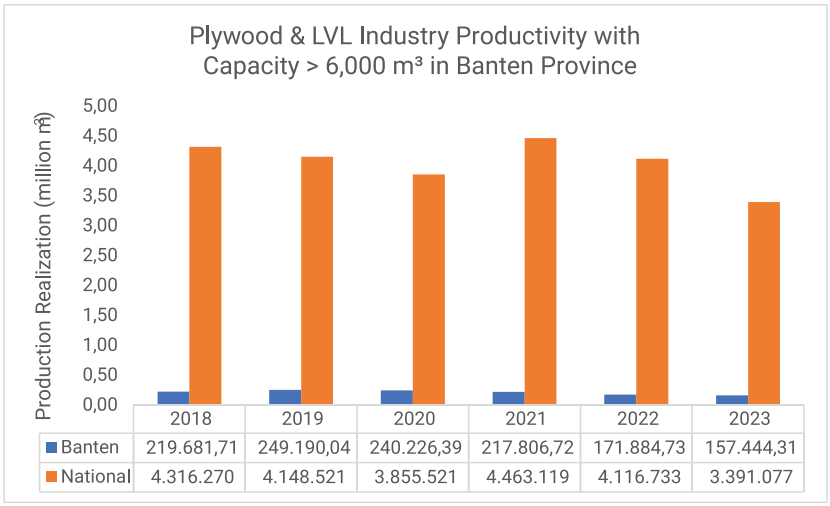
On the other hand, the wood which has a capacity of > 6,000 m^3/year carries out a mass and efficient production process. The industry uses modern technology and has a more complex management system to meet the needs of a larger market, both at the national and international levels. The industry includes large, vertically integrated factories capable of producing a wide range of wood products in significant volumes. The following will be discussed about production based on capacity and type.

The installed capacity of plywood & LVL in Banten shows an upward trend from 2018 to 2022. The initial capacity of only 143,000 m^3 in 2018 became 186,000 m^3 in 2021, then decreased again to 174,000 m^3 in 2022. Production realization does not show a significant increase. Similar to the national production realization, the realization of plywood & LVL production in Banten has also never reached its capacity. The average production is only realized at 36% of its capacity. This is caused by several factors, one of which is the difficulty of finding raw materials for the wood industry in Banten.

The primary industry of timber forest products with a capacity of > 6,000 m^3/year:

a) Plywood and LVL production

Data shows that the plywood & LVL industry in Banten only contributes 5.1% of national production (Figure 28). The development of plywood production is fluctuating and does not follow the trend of national production development. The average production of plywood & LVL Banten is 209,307 m^3/year.



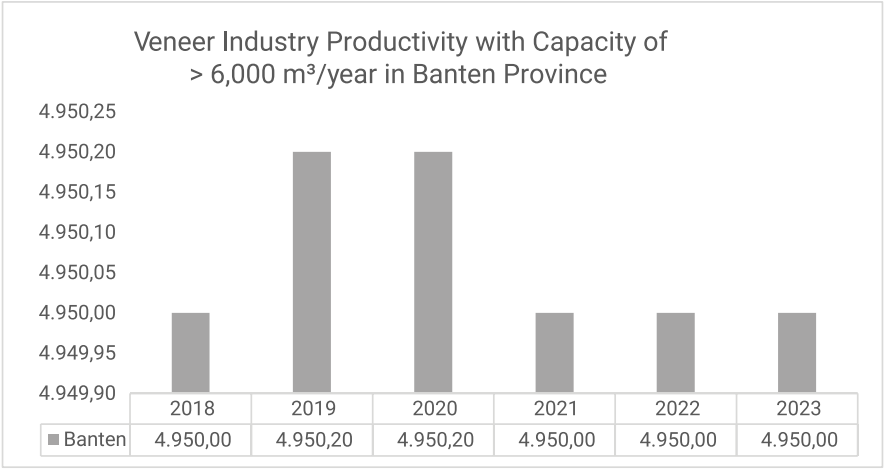
	2018	2019	2020	2021	2022	2023
Banten	219.681,71	249.190,04	240.226,39	217.806,72	171.884,73	157.444,31
National	4.316.270	4.148.521	3.855.521	4.463.119	4.116.733	3.391.077

Source: RPBBI (2023)

Figure 28 Plywood & LVL industry productivity with capacity > 6,000 m^3/year

b) Veneer production

Figure 29 shows the production of primary industrial veneer from timber forests with a capacity of more than 6,000 m^3/year in Banten Province. Banten's veneer production has an average contribution of 0.3% to national production. Veneer production in Banten Province in 2018-2023 tends to be consistent at 4,950 m^3/year. The production trend increased in 2018- 2020 and the production trend decreased consistently from 2021 to 2023.



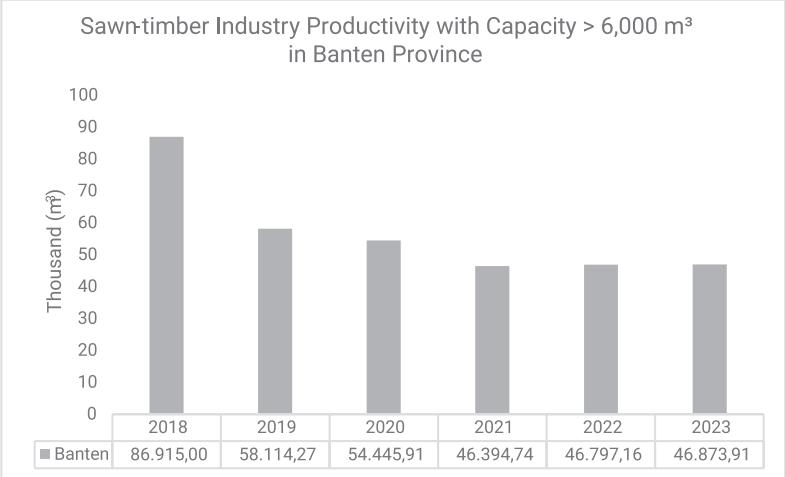
	2018	2019	2020	2021	2022	2023
Banten	4.950,00	4.950,20	4.950,20	4.950,00	4.950,00	4.950,00

Source: RPBBI (2023)

Figure 29 Veneer industry productivity with capacity > 6,000 m^3/year in Banten Province

c) Sawn-timber production

The development of sawn-timber production in Banten shows a downward trend following national production (Figure 30). The development of national sawn-timber production, sawn-timber production in Banten Province has experienced a consistent decline from 2018 (86,900 m^3/year) to 2022 (46,700 m^3/year), sawn-timber production in Banten only contributes around 3.3% of total national production.



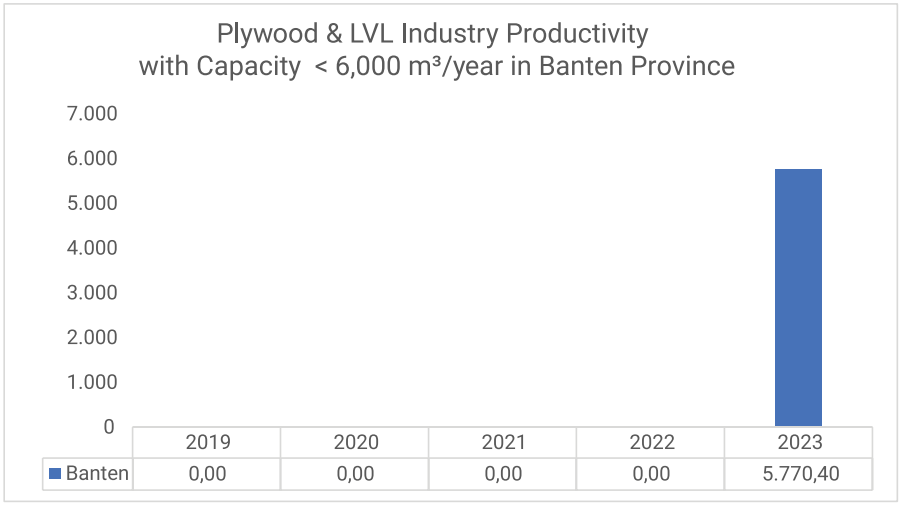
Source: RPBBI (2023)

Figure 30 Sawn-timber industry productivity with capacity > 6,000 m^3/year in Banten Province

The primary wood industry with a capacity of < 6,000 m^3/year described below:

a) Plywood and LVL production

In the timber forest product primary industry with a capacity of < 6,000 m^3/year, there was no plywood & LVL production from 2019 to 2022 (Figure 31). The absence of such production may indicate that small industries in Banten may have limitations in terms of technology, resources, or markets that limit their ability to produce plywood and LVL.

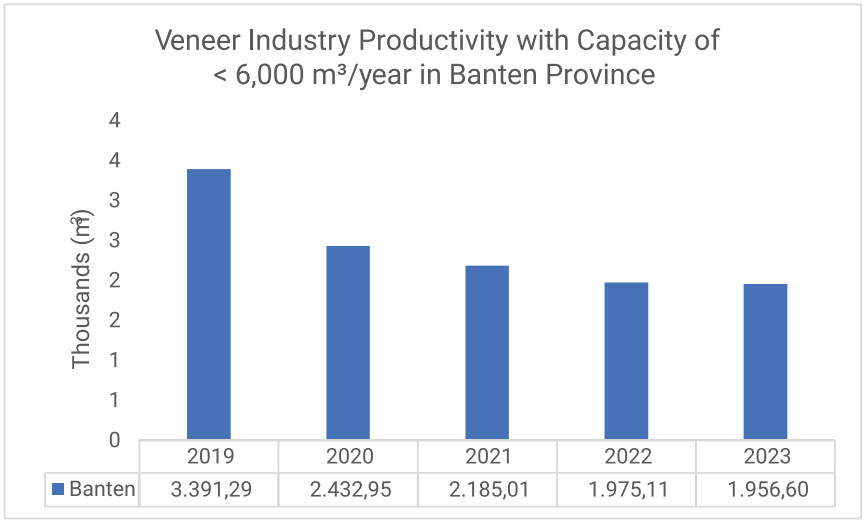


Source: RPBBI (2023)

Figure 31 Plywood & LVL industry productivity with capacity < 6,000 m^3/year in Banten Province

b) Veneer Production

Data shows a decline in veneer production in Banten Province from 2018 to 2023 (Figure 32). In 2018 and 2019, veneer production in Banten was above 3,000 m^3/ year. From 2020 to 2023 veneer production experienced a significant decline to 1,956 m^3/year. This significant decline and increase are due to various factors, such as fluctuations in raw material prices, changes in government policies related to the timber industry, and seasonal changes. Nonetheless, a significant increase in veneer production occurred in 2020 indicating the potential to develop this industry.

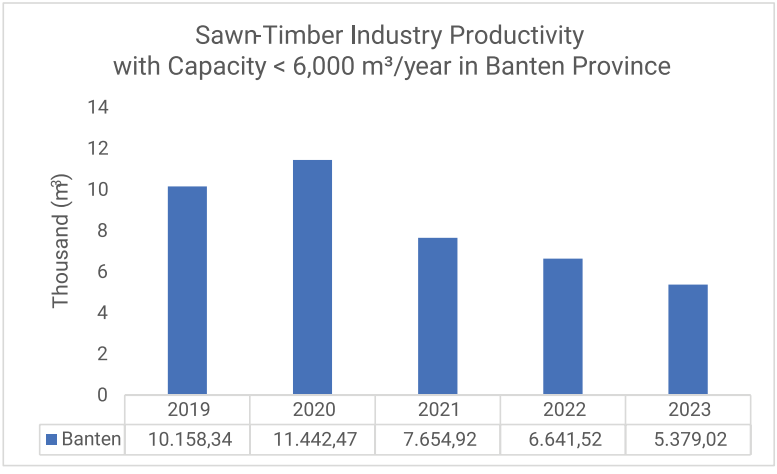


Source: RPBBI (2023)

Figure 32 Veneer industry productivity with capacity < 6,000 m^3/year in Banten Province

c) Sawn-Timber Production

The development of sawn-timber industry production with a capacity of < 6,000 m^3/year in Banten Province follows the trend of national production development (Figure 33). Sawn-timber production in Banten contributes 0.9% of the total national production. Production increased in 2020 was 11,442 m^3 and decreased until 2023 only reaching 5,379 m^3.



Source: RPBBI (2023)

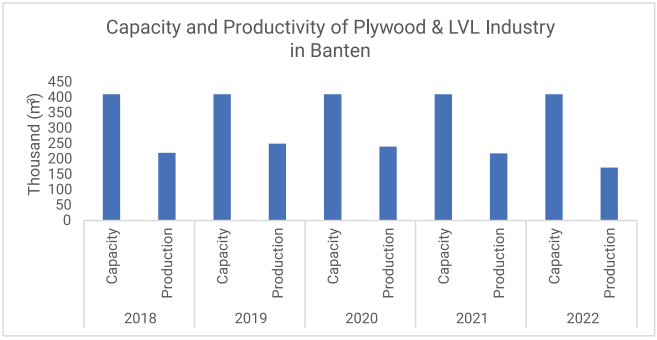
Figure 33 Sawn-timber industry productivity with capacity < 6,000 m^3 in Banten Province

3) Capacity

Over the past few years (2018-2022), Banten Province has experienced an increase in the production capacity of the wood processing industry. It is important to evaluate the extent to which the production of the wood industry has reached the specified capacity to ensure its continuity in Banten. By understanding the capacity and production realization of the wood processing industry in Banten Province, it is possible to identify growth potential, overcome challenges, and exploit existing opportunities. The following is the development of the capacity and realization of wood production in Banten.

a) Plywood & LVL industry productivity

The production capacity of plywood & LVL in Banten shows a trend from 2018 to 2022. The installed capacity is stagnant at 410,000 m^3/year. However, the realization of production does not show a significant change in the realization of production. The highest production was seen in 2019 which reached 249,000 m^3/year. Meanwhile, the lowest production is in 2022 with a production of 171,000 m^3/year. The realization of plywood & LVL production in Banten has also never reached its capacity. The average utility from 2018 to 2022 is 53.30% of installed capacity.

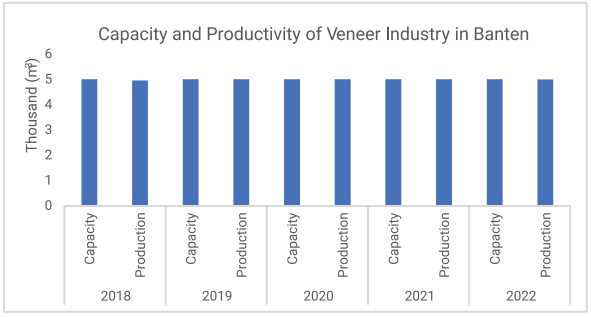


Source: RPBBI (2023)

Figure 34 Capacity and productivity plywood & LVL industry in Banten

b) Veneer industry productivity

The installed capacity of veneers in Banten shows a stagnant trend of 5,000 m^3/year. In contrast, national production capacity, which is growing increasing from year to year. Contrary to production capacity, the realization of veneer production in Banten shows a downward trend. The average realization of veneer production in Banten is 99.72% of its capacity. This shows good industrial performance because it can meet its installed capacity. Intervention steps are needed so that it can increase its installed capacity which has an impact on increasing industrial productivity.

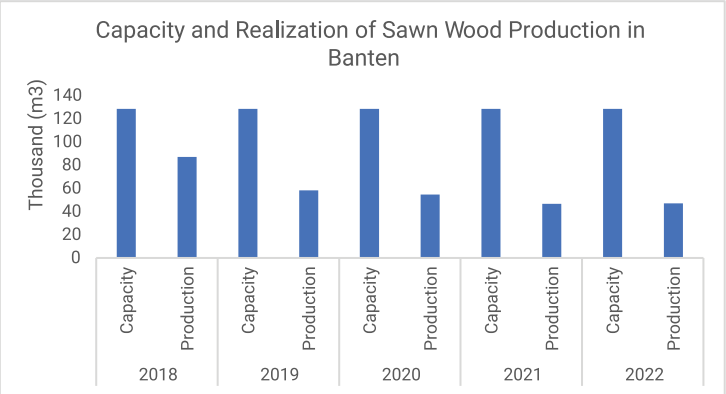


Source: RPBBI (2023)

Figure 35 Capacity and productivity of the veneer industry in Banten

c) Sawn-timber industry productivity

The production capacity of sawn-timber in Banten has stagnated at 128,000 m^3/year. However, the realization of sawn timber production in Banten shows a downward trend every year. The average realization of sawn-timber production in Banten is 45.66% of the total production capacity.



Source: RPBBI (2023)

Figure 36 Capacity and realization of sawn-timber production in Banten

3.4 Study on Production and Consumption of Wood Products in Central Java

3.4.1 Central Java Wood Industry Productivity

1) Production

The amount of log consumption or log used by the wood industries in Central Java is 3,437,460 m^3 in 2023 (calculation until November). The amount of log consumption in the industry is calculated based on the receipt of log material sourced from PBPH and community forest received by PBPHH holding industries/large and SMEs primary industries that have reported through the Forest Product Processing Raw Material Fulfillment Plan Information System (SI RPBBPHH). The log consumption in 2023 decreased by 18% compared to the log consumption of 2022, which was 4,194,278 m^3. Interestingly, log consumption in 2021 was 4,361,208 m^3, which was larger, around 17.7%, than that in 2020. The trend of log consumption in wood industries in Central Java from 2017 to 2023 can be seen in Figure 37. This data shows that during COVID-19, which started in 2019, the use of raw materials increased in 2021, and even though it fell in 2022, the number of log consumption was still higher than that in 2017 and 2019 (before COVID-19 period). However, the trend of log consumption in the wood industries in the last 2 years is decreasing. This data is also in line with export data, in which the value of exports during the COVID-19 period increased until 2021 and started to decrease at the end of 2022. There are several predictions to explain this phenomenon. The first reason is the reallocation of the traveling budget to home improvements or activities at home, which has been reused for business trips again. Second, the return to normal conditions after the COVID-19 pandemic has reduced economic capacity and focused on fulfilling primary needs. Third, there are allegations that purchases made during the COVID-19 pandemic are still being stored in warehouses so there is a reduction in orders that are expected for the next 1-3 years.

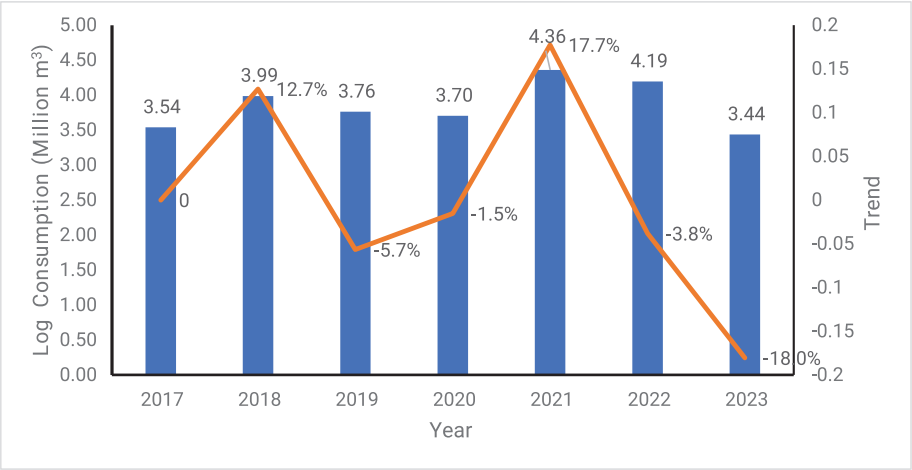


Figure 37 Log consumption in wood industries in Central Java Province

Compared to Indonesia log consumption, log consumption in Central Java varied from 5.51% to 6.70% (Figure 38). Based on volume, the contribution of log consumption from Central Java seems to be small. This is because typical wood products have higher added value such as wood furniture. This assumption is supported by the value of exports from Central Java having a higher percentage compared to the percentage of contribution of log consumption.

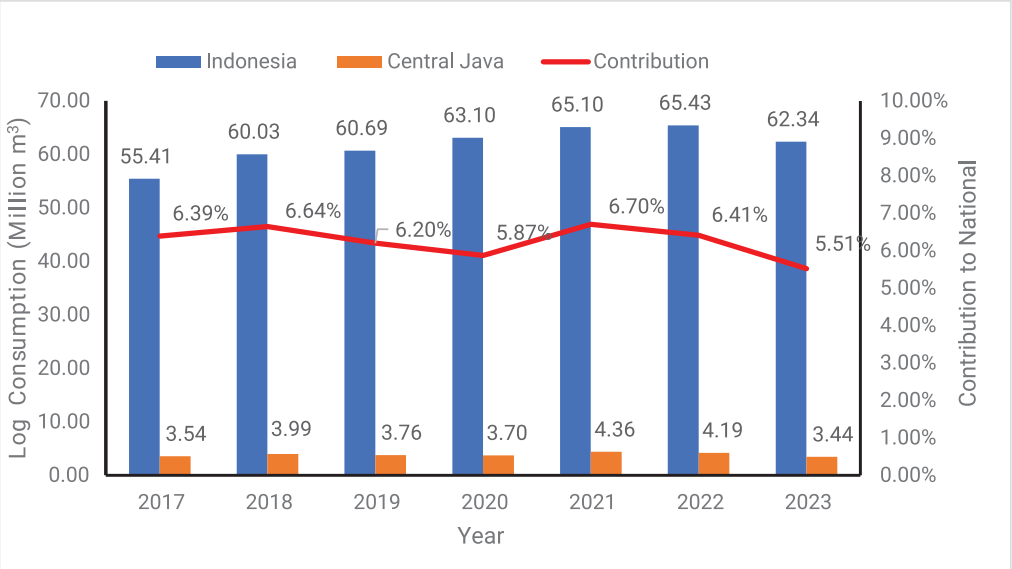


Figure 38 Log consumption of wood industries in Central Java and Indonesia

Based on production capacity, the log consumption in Central Java is dominated by industries with production capacity above 6,000 m^3/year. The proportion of log consumption for the industries that have a capacity < 6,000 m^3/year is in the range of 8-12% compared to the industries with a production capacity of > 6,000 m^3/year (Figure 39). The proportion of log consumption or log used of the industries with a production capacity of < 6,000 m^3/year is only 9-13% than that of the industries with a production capacity of more than 6000 m^3. However, this data is only based on data reported by Legality and Sustainability Verification System Certificate (SVLK) holders. There may be additional data on industries that have a capacity of < 6,000 m^3/year but do not yet have SVLK.

According to observations, the number of wood species that dominate the use of logs is sengon species which is produced for veneer, plywood, blockboard, and laminated veneer lumber. The high demand for sengon for wood products is providing incentives for

the development of community forests that are generally planted with sengon. Sengon has several advantages, besides its fast growth it also can coexist with crops quite well, thus providing an opportunity for farmers to be able to get additional income during the waiting period for the sengon harvest.

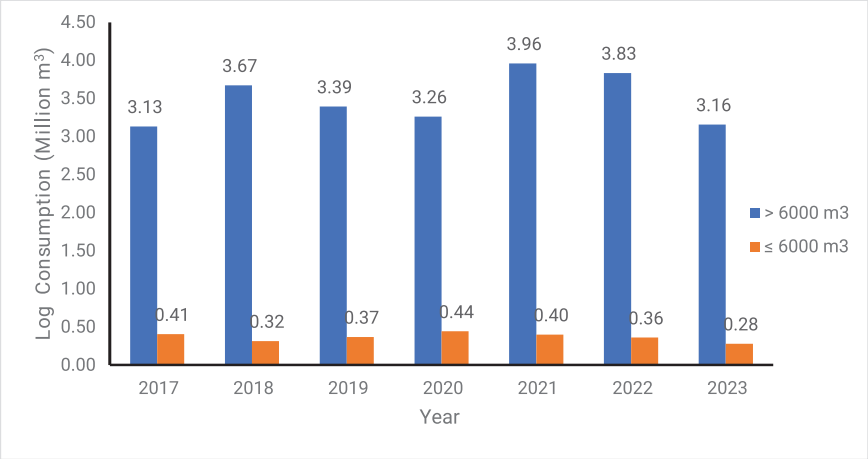


Figure 39 Log consumption based on the production capacity of the industries in Central Java Province

Log consumption in the wood industries in Central Java Province mostly comes from plantation forests at 66.3%, natural forests at 22.7%, processed materials at 10.59%, and plantation crops at 1.05 %, (Figure 40). This data is interesting because when considering the log production reported data, log production in Central Java is relatively small. Perhutani produce log in Central Java is only 332,316 m^3. This means that a high proportion of log consumption comes from plantation forests or other natural forests out of Central Java. Perhutani alone only supplies 2.26% of the fulfillment of industrial raw materials in Central Java. This indicates that the existence of plantations from private or community forests plays an important role in supporting raw materials to wood industries in Central Java Province.

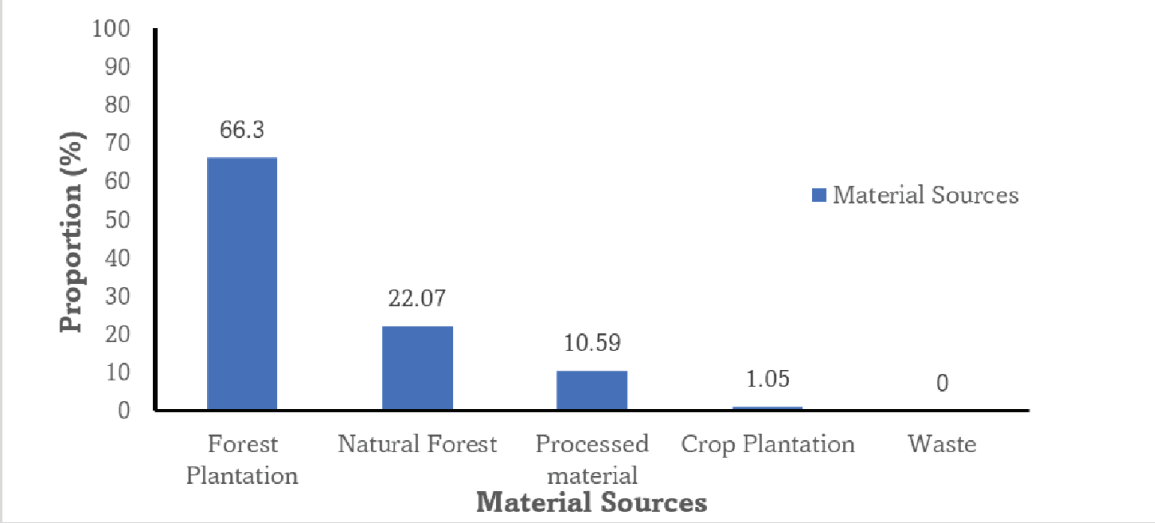


Figure 40 Log sources in wood industries in Central Java Province

The primary industry of timber forest products is an industry that processes logs into semi-finished goods or finished goods. The secondary wood processing industry is an industry that processes forest products whose raw materials are derived from primary

industrial products, timber forest products and/or from Processed Wood Registered Shelter (TPT-KO) company. Products included in this category of wood products are bare core, wood biomass, block board, Finger joint board, sawn-timber, plywood and laminated veneer lumber (LVL), moulding, wood pallet, particle board, wood chips, veneer, and wood pellet. Total wood production in Central Java Province varied from 1.5 to 2.5 million m^3 (Figure 41). There was a slight increase in production from 2015 to 2019 and a decrease in 2019, which was the beginning of COVID-19. Wood production increased significantly from 2020 to 2022 reaching 2.5 million m^3. However, the wood production started to decrease in 2023 which was 1.9 million m^3. Compared to total wood production in Indonesia, wood production from Central Java Province contributed from 4.22% to 4.54% based on volume.

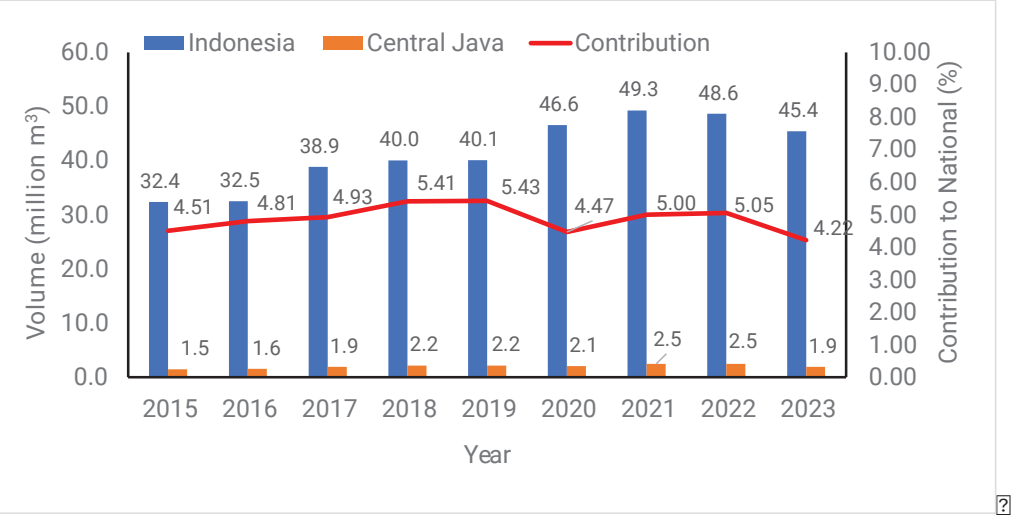


Figure 41 Wood products in Central Java and Indonesia from 2015 to 2023

Considering the type of wood products reported by wood primary industries and integrated wood industries, plywood, and LVL show the highest contribution to wood products from Central Java Province, followed by sawn-timber, veneer, blockboard, bare core, particle board, and wood pellet (Figure 42). Plywood and LVL were produced until 1.19 million m^3 in 20021, 1.13 million m^3 in 2022, and 0.9 million m^3 in 2023. There is a tendency for wood products to decrease from 2021 to 2023, except production of blockboard and bare core which slightly increased in 2022.

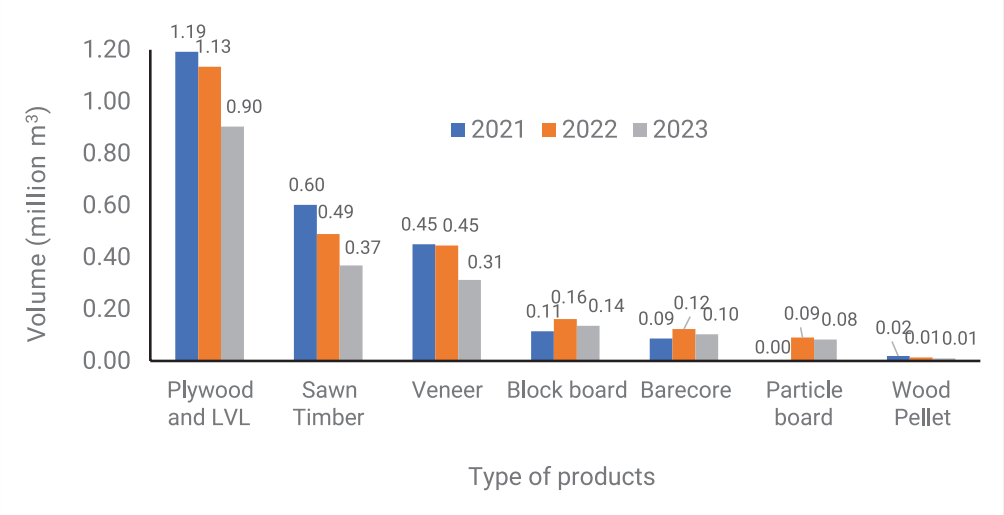


Figure 42 Type of wood products as reported by wood primary industries or integrated wood industries

2) Export market

The export value of wood products from Central Java Province reached 1.59 billion USD in 2023. This export value is based on the issuance of V-Legal documents and FLEGT licenses. The export value of wood products in 2023 was smaller than that in previous years, which were1.84 billion USD in 2022 and 1.91 billion USD in 2021 (Figure 43). This shows a downward trend from 2021 to 2023. This decline must be anticipated as the cause and solution to be able to raise it again. The export value of wood products from Central Java Province contributes between 12 and 14% to national export.

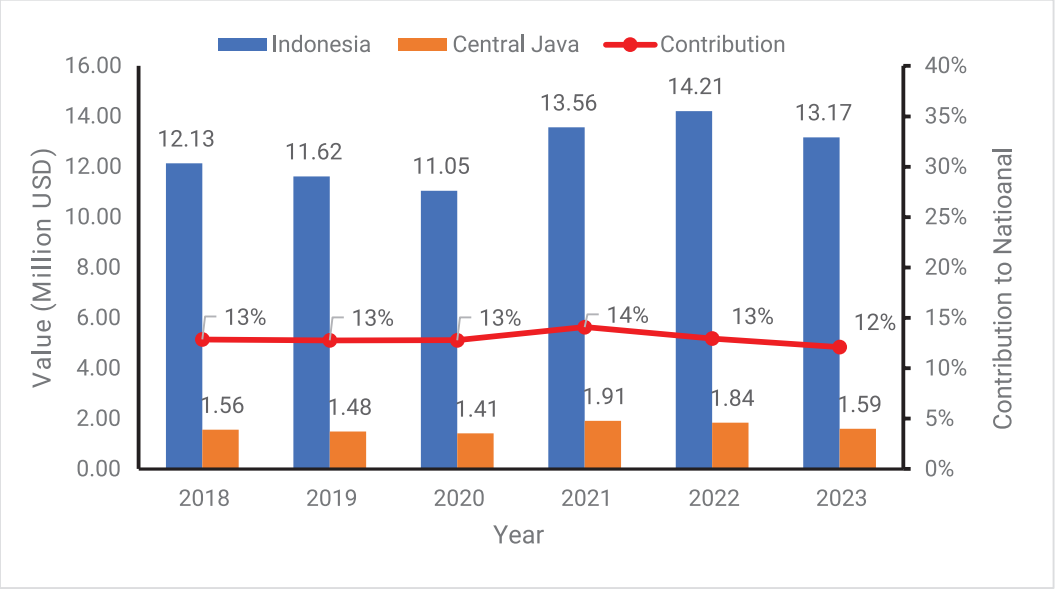


Figure 43 The export value of wood products from Central Java Province and Indonesia in 2018-2023

Based on product type, in 2023, the export value of furniture products dominates the export value from Central Java, which is 673.5 million USD or 41.9%, followed by panel (582 million USD or 36.5%) and woodworking products (222.3 million USD or 13.9%). This composition is different from the export value based on the type of product from all over Indonesia which is dominated by paper products at 33.25%, followed by pulp products at 28.511%, and panel products at 16.86%. This indicates that the type of wood production in Central Java has its characteristics, which may affect to type of log consumption and typical wood industries.

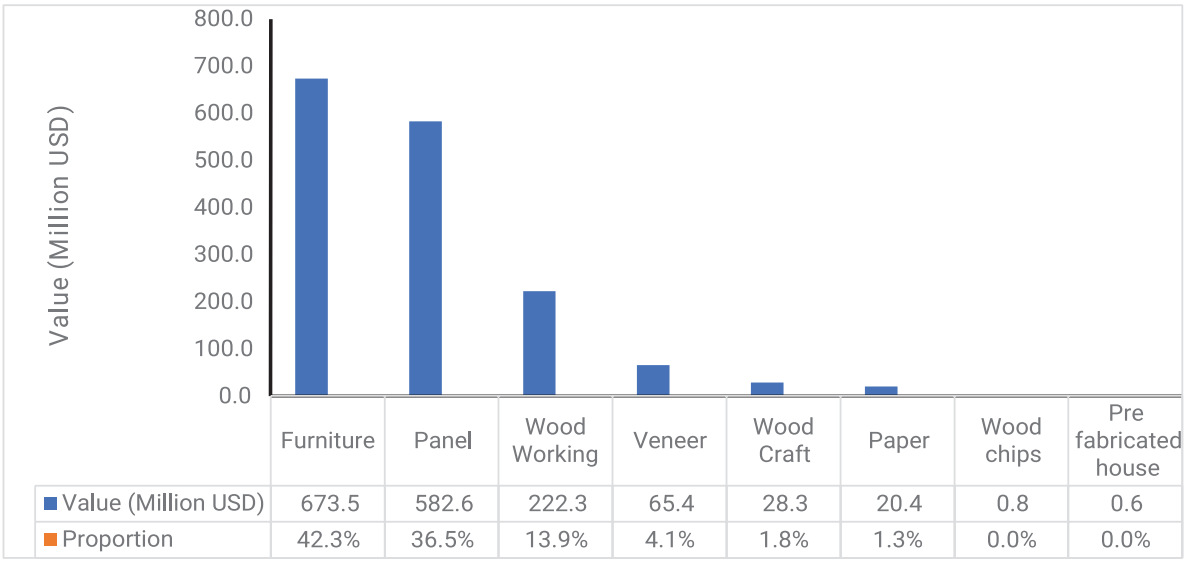


Figure 44 Export value of forest product based on product type from Central Java

Based on data reported in the Forest Product Processing Raw Material Fulfillment Plan Information System (SI-RPBBPHH), the volume of exported wood products reached 11,077,724.18 m^3 with the highest contribution from plywood and Laminated Veneer Lumber (LVL) products at 46% (Table 6). Bare core and block board ranked 2nd and 3rd in the volume of exported products, which were 3,103061 m^3 and 1,607,894 m^3, respectively. This data is somewhat different from the data in Figure 43 the amount of wood produced in Central Java from primary industries and integrated industries related to the type of wood product. The data shown in Table 7 may include data from secondary wood industries that are not included in the 44.

Data Table 6 is somewhat different from the data in Figure 43 and Figure 44 regarding the export value and type of exported wood products. This information also indicates that some of the wood products are made by companies in Central Java but not exported through companies registered in the Central Java location.

Table 6 The volume of wood products exported from the wood industry in Central Java

Product Type	Volume (m3)	Percentage
Plywood and LVL	5,060,446	45.7%
Bare core	3,103,061	28.0%
Blockboard	1,607,894	14.5%
Moulding	490,085	4.4%
Veneer	340,095	3.1%
Flooring	135,014	1.2%
Laminated Board	113,620	1.0%
Wood pellet	107,807	1.0%
Lumber core	40,319	0.4%
Sawn Timber, Lumber	33,124	0.3%
Particle board	21,876	0.2%
Furniture	14,244	0.1%
Finger Join Laminated	10,140	0.1%
TOTAL	**11,077,724.18**	

3) Domestic market

Based on data reported in the Forest Product Processing Raw Material Fulfillment Plan Information System (SI RPBBPHH), the volume of wood products for the domestic market reached 7,603,983.65 m^3 which is 69% compared to the export market. The highest wood products contribution for the domestic market is plywood and LVL which was 3,248,656 m^3 followed by veneer and sawn-timber products which were 1,988,426 m^3 and 1,574,117 m^3, respectively (Table 7). According to interviews with the companies, products for domestic purposes can be altered to be exported products by other wood companies, especially veneer, sawn-timber, and lumber board. This can be seen by the number of wood industries that have SVLK certificates as exporters non-manufacture (Table 9).

Table 7 Wood products manufactured for domestic market in Central Java

Product Type	Domestic (m3)	Percentage
Plywood and LVL	3,248,656	42.72%
Veneer	1,988,426	26.15%
Sawn Timber, Lumber core	1,574,117	20.70%
Blockboard	540,351	7.11%
Particle board	151,179	1.99%
Bare core	51,520	0.68%
Moulding	18,317	0.24%
Wood pellet	16,131	0.21%
Laminated Board	6,184	0.08%
Furniture	3,974	0.05%
Lumber core	2,592	0.03%
Flooring	2,531	0.03%
Finger Join Laminated	6	0.00%
TOTAL	**7,603,983.65**	

The domestic market is heavily influenced by the export market as well. There are two types of influence from the export market. First, products from logs to semi-finished goods such as sawn-timber and veneer will usually also rise. This is because there are many large industries whose processes do not start from logs but from semi-finished goods in the form of sawn-timber and veneer. Second, for end-product goods such as plywood and furniture. If the export market is on the rise, there is a tendency for the domestic market to decline. This is due to the struggle for raw material needs increasing raw material prices, and the export market is more profitable than the domestic market. However, established segments of the domestic market are often unaffected by export fluctuations. This is because the domestic market has specialized market segments that also provide profits and an increase in purchasing power in the domestic market.

3.4.2 Industry Characteristics

1) Quantity, scale of industry, and distribution

Based on Law No. 23 of 2014, the implementation of processing timber forest products with a capacity of < 6,000 m^3/year is the authority of the Provincial Forestry Service. Based on the data from the Environment and Forestry Agency of Central Java Province, there are 1059 registered industries with a total capacity of 2,789,993 m^3/year (Table 8). These industries are distributed in 33 regencies and cities in Central Java with the highest number in Jepara Regency (103 industries), followed by Banyumas Regency (98 industries) and Temanggung Regency (91 industries).

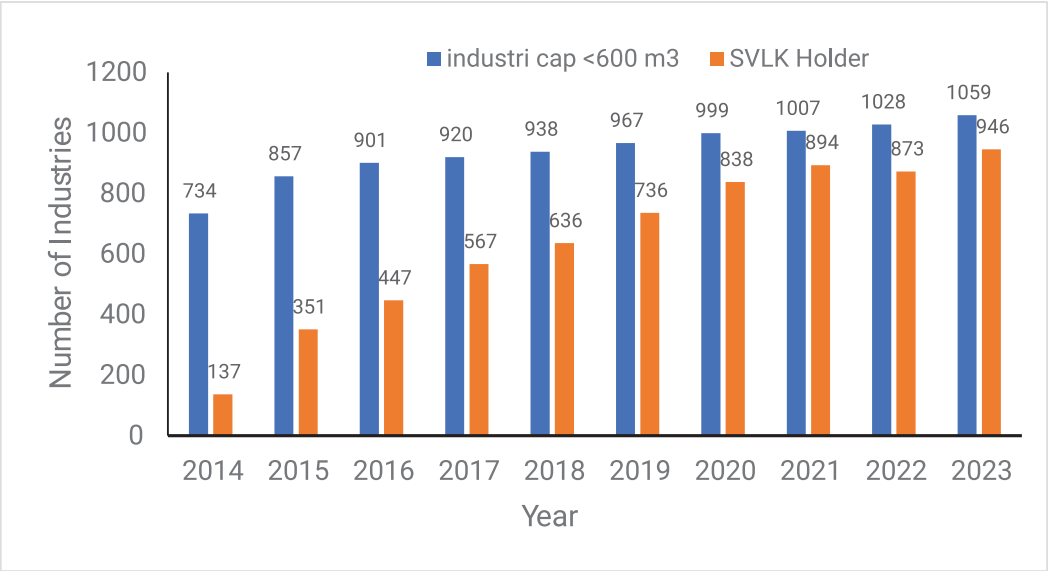
There is a significant increase in the total number of industries and SVLK holders in Central Java Province from 2014 to 2023, which was 734 to 1059 industries (Figure 45). The total number of industries are the registered industries. Efforts to increase the number of registered industries have been made such as supervising and inviting registered industry resource persons related to the benefits obtained, as well as several registration convenience programs. However, based on observations, registered industries are required to do many things that are relatively difficult compared to unregistered industries.

There are 1023 certificate holders which are divided into three categories, namely exporters, manufacturer non-exporters, and exporter non-manufacturers. The number of exporters is 787 industries, manufacturer non-exporters are 188 industries, and exporter non-manufacturers are 48 industries (Table 9). Jepara Regency is the district that has the most industries holding Legal Wood Certificates with 354 industries, followed by Semarang City with 162 industries, and Sukoharjo Regency with 57 industries.

Table 8 Total industries have a capacity of < 6,000 m^3/year in Central Java Province

REGENCY	INDUSTRIES
KOTA TEGAL	1
SALATIGA	1
SURAKARTA	1
KEBUMEN	4
KUDUS	5
PEKALONGAN	11
PURBALINGGA	11
PURWOREJO	13
SRAGEN	13
TEGAL	14
GROBOGAN	16
SUKOHARJO	17
PATI	18
MAGELANG	20
REMBANG	21
SEMARANG	21
KARANGANYAR	22
KLATEN	23
WONOGIRI	24
BOYOLALI	27
KENDAL	31
BLORA	35
DEMAK	37
BATANG	41
CILACAP	43
BREBES	48
KOTA SEMARANG	50
PEMALANG	55
WONOSOBO	69
BANJARNEGARA	75
TEMANGGUNG	91
BANYUMAS	98
JEPARA	103
TOTAL	**1,059**

Source: Environment and Forestry Agency of Central Java Province



(Source: Environment and Forestry Agency of Central Java Province)

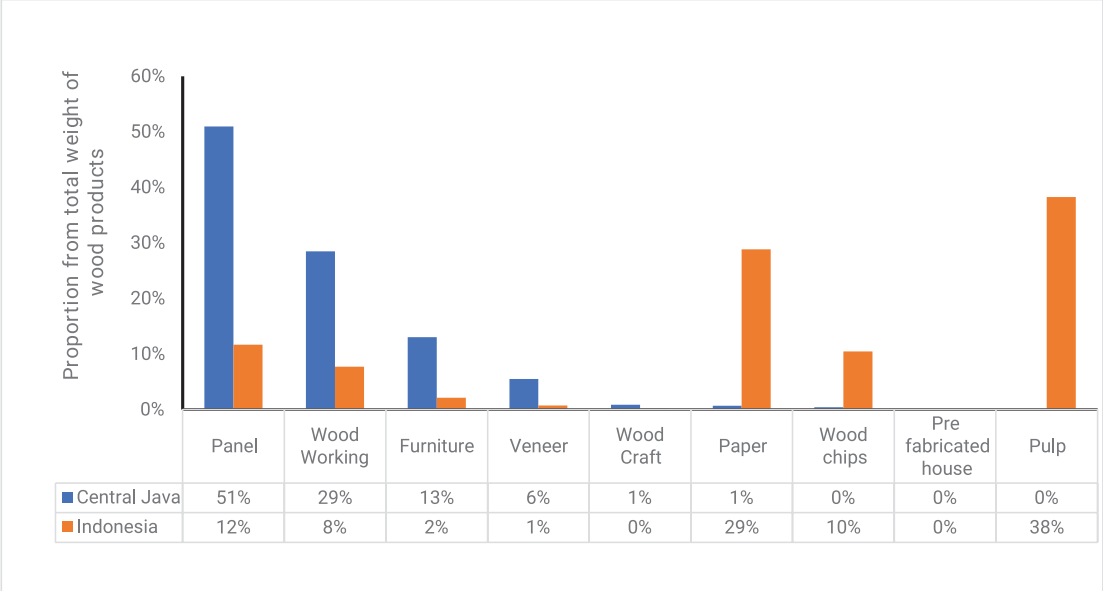
Figure 45 Total industries and SVLK holders in Central Java 2014-2023

Table 9 Total industries based on wood legality scheme in Central Java Province

REGENCY	WOOD LEGALITY SCHEME			TOTAL
	EXPORTIR	EXPORTIR NON MANUFACTURER	MANUFACTURER NON EXPORTIR	
JEPARA	327	5	22	354
KOTA SEMARANG	116	28	18	162
SUKOHARJO	55	0	2	57
DEMAK	39	0	9	48
KLATEN	26	2	13	41
TEMANGGUNG	27	1	7	35
WONOSOBO	12	0	15	27
KARANGANYAR	12	3	11	26
KENDAL	20	1	5	26
SEMARANG	20	4	1	25
BATANG	19	0	5	24
BANYUMAS	11	1	11	23
MAGELANG	15	0	5	20
CILACAP	9	1	6	16
BOYOLALI	12	1	1	14
PURBALINGGA	8	0	4	12
PURWOREJO	5	0	6	11
REMBANG	6	0	5	11
PATI	7	0	4	11
SRAGEN	8	0	2	10
KUDUS	8	1	1	10
KOTA SURAKARTA	9	0	0	9
PEKALONGAN	1	0	7	8
WONOGIRI	0	0	7	7
TEGAL	2	0	5	7
BLORA	5	0	1	6
GROBOGAN	0	0	5	5
KEBUMEN	1	0	4	5
BREBES	0	0	4	4
KOTA MAGELANG	2	0	1	3
BANJARNEGARA	3	0	0	3
KOTA SALATIGA	2	0	0	2
PEMALANG	0	0	1	1
KOTA PEKALONGAN	0	0	0	0
KOTA TEGAL	0	0	0	0
TOTAL	**787**	**48**	**188**	**1023**

2) Commodity

The type of wood products released from the forest product export data, which is based on the issuance of V-Legal documents of FLEGT licensed (for the European Union) exported, are paper, pulp, panel, furniture, woodworking, woodcraft, prefabricated house, and woodchips. The wood product exported is dominated by panels, woodworking, and furniture, based on the weight of the products (Figure 46). This condition is slightly different from national export which is dominated by pulp, paper, and panel.



	Panel	Wood Working	Furniture	Veneer	Wood Craft	Paper	Wood chips	Pre fabricated house	Pulp
Central Java	51%	29%	13%	6%	1%	1%	0%	0%	0%
Indonesia	12%	8%	2%	1%	0%	29%	10%	0%	38%

Figure 46 The proportion of the weight of the wood product exported from Central Java Province and Indonesia in 2023

Based on data and our investigation, there are four clusters of industries that have dominant specific products and used species (Table 10). Cluster one (1) is an area where the products of the industries are dominated by bare core, blockboard, and plywood. This area is Wonosobo, Temanggung, Magelang, Banjarnegara, Purworejo. The industries used mostly sengon. Several industries are using jabon, mahogany, or others but the proportion is small. Cluster two (2) are areas where the products of the industries are dominated by sawn-timber, veneer, and wooden accessories. This area are Demak, Batang, Semarang, and Banyumas. The industries used teak, mahogany, sengon, and sonokeling. Cluster three (3) are areas where the products of the industries are dominated by furniture with hall-full carving. This area is Jepara and Kudus. The industries used teak, mahogany, acacia, and sonokeling. Cluster four (4) are area where the products of the industries are dominated by furniture with a small portion of carving and used other materials such as rattan, bamboo, textile, and others. This regency are Klaten, Surakarta, Sukoharjo, Sragen, and Boyolali. The industries used teak, mahogany, rattan, bamboo, and acacia.

Table 10 Industrial cluster based on product and species dominant.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Dominated by bare core, blockboard, and plywood	Dominated sawn-timber, veneer, wooden accessories, small carving	Wooden furniture with carving domination	Furniture with simple or small portion carving

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Regency	Wonosobo, Temanggung, Magelang, Banjarnegara, Purworejo Banyumas	Demak, Batang, Semarang, and Banyumas.	Jepara, kudus	Klaten, Surakarta, Sukoharjo, Boyolali Sragen.
Species	Sengon, jabon	Teak, mahogany, sengon	Teak, mahogany	Teak, mahogany, other (ratan, textile, iron, stainless steel)

3) Capacity

Based on data from the Central Java Provincial Environmental Service, there are 1059 industries registered as industries with a capacity < 6,000 m^3/year with a total production capacity of 2,789,993 m^3/year. This industry is distributed in all districts in Central Java.

Table 11 Total wood industries with the capacity of < 6,000 m^3/year in Central Java

REGENCY	INDUSTRIES	CAPACITY(m^3)
KOTA TEGAL	1	5,975
SALATIGA	1	1,950
SURAKARTA	1	3,000
KEBUMEN	4	9,000
KUDUS	5	14,400
PEKALONGAN	11	26,650
PURBALINGGA	11	38,500
PURWOREJO	13	51,569
SRAGEN	13	28,730
TEGAL	14	39,298
GROBOGAN	16	16,300
SUKOHARJO	17	58,090
PATI	18	56,590
MAGELANG	20	62,140
REMBANG	21	32,970
SEMARANG	21	84,289
KARANGANYAR	22	47,410
KLATEN	23	50,915
WONOGIRI	24	69,448
BOYOLALI	27	60,402
KENDAL	31	93,500
BLORA	35	51,722
DEMAK	37	179,520
BATANG	41	131,071
CILACAP	43	84,650
BREBES	48	57,346
KOTA SEMARANG	50	220,469
PEMALANG	55	77,450
WONOSOBO	69	147,946
BANJARNEGARA	75	211,578
TEMANGGUNG	91	244,375
BANYUMAS	98	269,463
JEPARA	103	263,277
TOTAL	**1,059**	**2,789,993**

Source: Environment and Forestry Agency of Central Java Province

3.5 Study on Production and Consumption of Wood Products in East Java

3.5.1 East Java Wood Industry Productivity

1) Production

The production of wood products in East Java has been steadily increasing, providing opportunities for the residents and contributing to the region's economic growth. This growth in wood product production not only creates jobs but also boosts the local economy (Wirawan et al., 2018). Furthermore, the development of wood product production in East Java could serve as a model for other regions looking to establish a sustainable forest product processing industry. Increased wood product production in East Java will have positive long-term impacts on the local economy, as it will stimulate regional economic growth and reduce unemployment.

The focus on sustainable wood production in East Java is crucial for addressing environmental issues such as deforestation and promoting better management systems. It is important to note that balancing economic growth and environmental protection is key in this context (Wibawa et al., 2021). The concept of sustainable wood production in East Java involves ensuring that the industry's activities are environmentally friendly and economically viable (Uzzo, 2013). This can be achieved through the implementation of sustainable practices such as responsible logging, reforestation efforts, and promoting the use of alternative materials. By adopting sustainable practices, the wood product industry in East Java can minimize negative impacts on the environment while still meeting economic growth targets (Setiartiti & Hisjam, 2019). Implementing sustainable wood production practices in East Java will not only contribute to the region's economic growth but also ensure the long-term preservation of its forests and biodiversity (Uzzo, 2013). This will attract investors and increase the competitiveness of the wood processing industry in East Java (Setiartiti & Hisjam, 2019) in domestic and international markets (Widyastutik & Arianti, 2014).

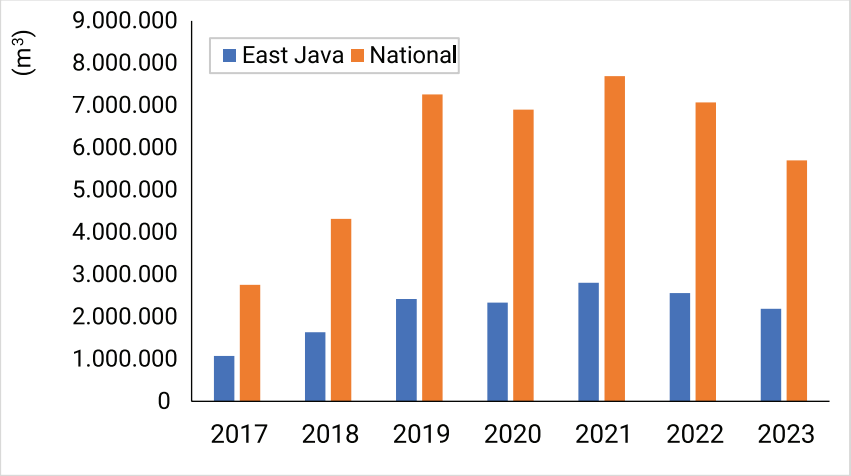


Figure 47 Wood industry productivity in East Java Province

The wood industry's productivity plays a crucial role in the development and sustainability of the forest industry (Hamdan et al., 2020). The combined production of processed wood in veneer, plywood, LVL, and sawn-timber used for national output has been the source of data collection. It provides valuable insights into the trends and patterns of wood products in East Java Province. By analyzing the data from 2017 to 2023, it becomes

evident that the wood products in East Java Province aligns with national trends, contributing an average of 35% to the total national production. This highlights the province's significant contribution to the overall wood products in Indonesia (Hamdan et al., 2020). Between 2017 and 2019, both East Java Province and the nation experienced a substantial increase in wood products. In 2019, the production of wood products in East Java Province reached 3 million cubic meters, representing a 38% contribution to the total national production. However, there was a decrease in production in 2020 on both the national and provincial levels. Nevertheless, 2021 marked a significant milestone in the wood industry. Despite the challenges faced in 2020, there was a notable recovery and growth in wood industry in East Java Province. This recovery signifies the resilience and potential of the forest industry in East Java Province. In 2022, the wood industry in East Java Province continued to show promising growth, reaching 3.5 million cubic meters, which accounted for a 40% contribution to the total national production.

This positive trend is indicative of the province's ability to adapt and thrive in the face of challenges. The production of wood products is influenced by a range of factors, including market dynamics, technological changes, and industry practices (Yrigoyen, 2013). These factors interact with each other and can have both positive and negative impacts on the production of wood products (Ahenkan & Boo, 2011). Overall, the production of wood products is a complex and dynamic process that requires careful navigation of market dynamics, technological changes, and industry practices (Herawati et al., 2021). Looking ahead to the future, it is imperative to continue monitoring and analyzing the trends in wood products in East Java Province. This will provide valuable insights for shaping and refining sustainable forest industry policies, ensuring that the province maintains its pivotal role in the national wood industry. Moreover, further research and analysis are needed to delve deeper into the specific factors driving the fluctuations in processed wood production and to identify opportunities for improvement and innovation. By doing so, the forest industry in East Java Province can continue to evolve in a sustainable and impactful manner, contributing positively to the overall national productivity of the wood industry.

Based on the analysis of wood raw materials production and supply in East Java Province, we have concluded that there is a significant growth potential in the wood processing sector. The province can meet both local and international raw material needs, but there are disparities in wood production and distribution in certain regions. The inter-regional collaboration in resource fulfillment and the dynamics of timber trade in regional markets demonstrate the efficiency and sustainability of forest management. The plywood and LVL industries, in particular, have great growth potential. However, the production of veneer and sawn-timber has fluctuated in response to market demand and government policies related to the timber industry. Nevertheless, East Java Province remains Indonesia's wood industry hub. To enhance the efficiency and sustainability of the timber industry in the future, we recommend gaining a better understanding of production capacity and the factors that influence production.

2) Export market

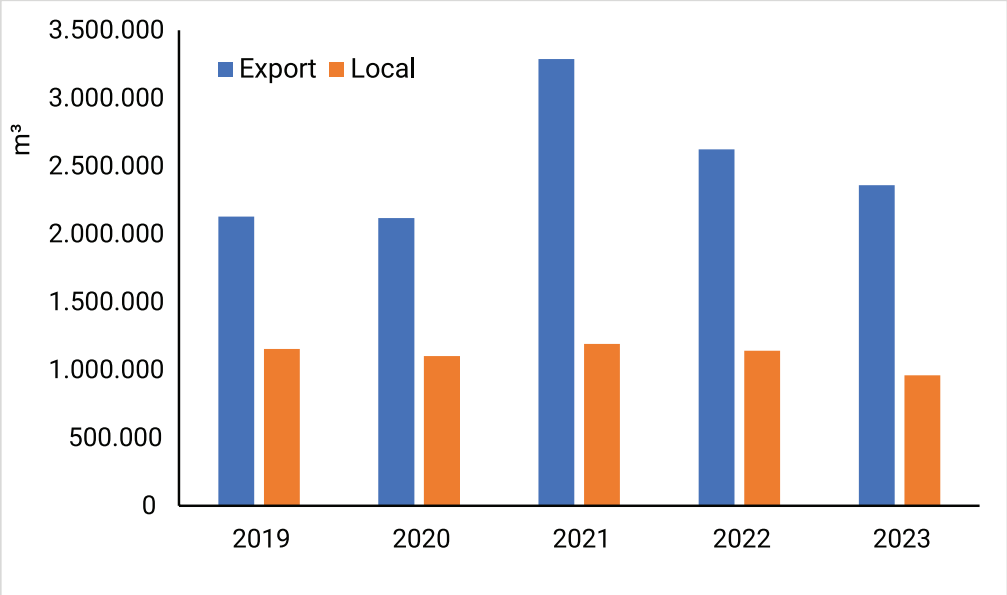


Figure 48 Export market from East Java Province

The graph illustrates the export market in East Java Province from 2019 to 2023, comparing export sales with local sales. It is evident that export sales consistently surpassed local sales throughout the observed period. A notable trend is the significant increase in export sales in 2021, reaching a peak of over 3 million m^3. This surge suggests a substantial expansion in the province's export market during that year. However, export sales slightly declined in the following years, albeit remaining considerably higher than local sales. Local sales, while consistently lower than export sales, also displayed fluctuations. A minor increase occurred in 2020, followed by relative stability in subsequent years.

The export market for timber in East Java Province has been a key driver of economic growth and development in the region (Wibawa et al., 2021). As indicated by the graph, export sales consistently surpassed local sales from 2019 to 2023. This suggests that the province has been successful in accessing international markets and satisfying the demand for timber products. This trend may be attributed to several factors (Pasaribu, 2020). Firstly, the province boasts abundant natural resources, including substantial forest areas that provide a dependable supply of timber. Secondly, the government has made efforts to enhance infrastructure and connectivity in the region, which has facilitated the transportation and export of timber products (Wibawa et al., 2021).

Additionally, the availability of sufficient human resources and the development of institutional mechanisms in the timber supply chain have contributed to the success of the export market (Pasaribu, 2020). Further factors driving the global demand for timber products include population growth, urbanization, and increased construction activities (Haryono et al., 2021). However, challenges and opportunities also exist in the timber export including sustainable resource management and environmental concerns, as well as navigating international regulations and certifications related to sustainable sourcing and forest conservation (Haryono et al., 2021). Several factors contribute to these trends. Abundant natural resources, government support, and infrastructure development have fostered a robust export market. Locally, the five biggest districts domestically (Lumajang, Jombang, Jember, Gresik, and Pasuruan) have emerged as key players in wood product sales. While Lumajang leads in sales volume, all districts experienced a decline in 2023, suggesting

potential shifts in market dynamics or external influences play a crucial role in domestic production, with varying sales patterns influenced by market dynamics and external factors.

The increase in demand for sustainable and certified timber products has created opportunities in the timber export market. East Java Province can establish itself as a dependable supplier of environmentally favourable timber by implementing sustainable practices and obtaining certifications. East Java Province is well-positioned to meet the evolving demands of the international timber market while upholding environmental stewardship by aligning with global sustainability trends and instituting proactive measures. In general, the data emphasizes the East Java market's reliance on export sales, suggesting a significant emphasis on international commerce. The province's considerable increase in export sales in 2021 indicates a substantial opportunity for economic development through exports. Nevertheless, the subsequent decline necessitates additional research to identify potential obstacles and guarantee the export market's ongoing expansion.

The timber market in East Java is characterized by its dynamic nature, as evidenced by the data. Although the province's initial surge in exports suggests its significant potential in international trade, the subsequent decline and the increase in domestic production underscore the significance of diversifying markets and meeting local demand. This equilibrium is essential for the timber industry in East Java to expand sustainably, as it guarantees the satisfaction of domestic requirements and economic development. In order to comprehend the precise factors that are responsible for these fluctuations and to devise strategies for sustainable growth in both domestic and export markets, additional analysis is required. This entails the examination of the varieties of timber products that are in demand on a local and international scale, the identification of potential trade barriers, and the exploration of opportunities for value addition in the timber processing industry. In summary, the domestic market is a promising opportunity for development, despite the fact that the export market remains a substantial contributor to East Java's economy. To guarantee the province's timber industry's long-term sustainability and resilience, it will be essential to maintain a balance between both markets.

3) Domestic market

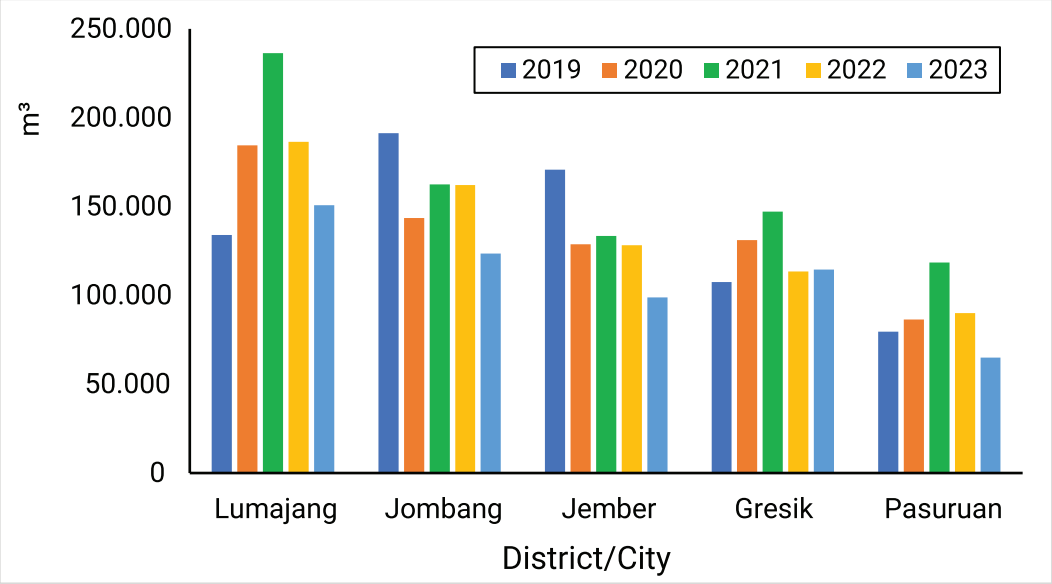


Figure 49 Domestic market of wood products in East Java Province

Figure 49 illustrates the domestic sales of wood products in the fifth biggest districts/cities in East Java Province from 2019 to 2023. The products of the domestic market are plywood and LVL, veneer, sawn-timber, and other products. According to data on the realized Use of Industrial Raw Materials from 2019 to 2023, there are variations in local sales at the district/city level. In general, Lumajang regularly had the largest sales volumes, reaching a total production of 891.6 thousand cubic meters, with the highest point being in 2020. This constituted 16% of the total wood production in East Java Province, a result of the heightened demand for wood products during that timeframe. Jombang Regency ranks second in terms of total output with a volume of 782,800 m3. This amount represents 14% of the total output in East Java Province. Jombang is changing, with a significant decline in 2023, possibly due to shifts in local market dynamics or increased competition in the region (Ahenkan & Boo, 2011).

Jember, Gresik, and Pasuruan showed relatively stable sales, with minor variations throughout the years, suggesting a consistent demand for wood products in these regions. Notably, 2023 witnessed a decline in sales across all regions compared to previous years. This could be attributed to various factors, such as economic fluctuations, changes in consumer preferences, or shifts in the wood product industry's overall landscape. To gain a deeper understanding of the factors impacting the domestic sales of wood products in East Java Province, additional research and analysis are needed (Haryono et al., 2021). For instance, a decrease in construction activities or a shift towards alternative materials could have contributed to this decline. Additionally, external factors like changes in government policies or regulations related to the wood industry could have also played a role. Further investigation is needed to pinpoint the exact causes behind this decline and to understand its potential implications for the wood product industry in East Java Province.

The characteristic of consumer data was obtained through the application of the online convenience sampling method. The questionnaire was designed using the Google Forms platform and distributed through the WhatsApp short message application on various social media. Participation in this study involved 112 respondents. Before respondents answered the essential questions in this study, they were first given screening questions related to their domicile location. The respondents from East Java were excluded from the data analysis.

It is important to note that the sample size included in this study isn't intended to represent general consumption behavior in East Java. Instead, the study focuses more specifically on consumer preferences for wood products. Therefore, the data collected can provide significant insights into detailing consumer preferences for wood products in the East Java region.

Table 12 Respondent Profile

Variable		Frequency	Proportion
Gender	Male	63	**0.56**
	Female	49	0.44
Marriage Status	Unmarried	29	0.26
	Widowed or Widower	5	0.04
	Married	78	**0.70**
Education Level	College	82	**0.73**
	Elementary School	1	0.01

Variable		Frequency	Proportion
	High School	28	0.25
	Junior High School	1	0.01
Primary Job	Lecturer	1	0.01
	Housewife	7	0.06
	Private employee	12	0.11
	College student	13	0.12
	Civil servant / BUMN employee	1	0.01
	Civil servant or BUMN employee	54	**0.48**
	Retired	1	0.01
	Civil servant retired	1	0.01
	Self-employed	22	0.20

The survey results of wood products consumers in East Java show a diversity in the demographics of respondents but with some notable trends. Most survey participants were male, reaching 56.250%, and had a married marital status at 69.643%, indicating that this group is likely to be the primary consumers of wood products. In terms of education level, the survey was dominated by respondents with higher education backgrounds, with 73.214% of them having completed college, indicating that consumers of these products tend to have higher education levels. Although the occupational profile of the respondents is very diverse, there is a significant percentage of civil servants or state-owned employees at 48.214%, as well as self-employed at 19.643%. This may reflect economic stability or involvement in commercial activities that allow them to use or purchase wood products frequently. This demographic analysis provides significant insights for companies operating in this sector, particularly in targeting and tailoring their products to the needs and preferences of their customers' key demographic (Heryana et al., 2023).

The consumer survey results on East Java's wood products provide indications that can form the basis for designing effective business strategies. There were significant gender differences in survey participation, with males dominating the number of respondents, signaling a potential for greater involvement in purchasing or decision-making related to engineered wood products. Furthermore, most respondents indicated a marital status of 'married,' suggesting that engineered wood products may have high relevance in household use, such as furniture or renovation projects, which correlates with family stability.

The importance of a high level of public education among respondents reflects a heightened awareness and appreciation of the quality and sustainability of wood products. It also indicates the potential for higher purchasing power among these consumers. The occupational profile of respondents, which includes many civil servants or state-owned employees and the self-employed, suggests a diversity of product needs and preferences among these occupational groups. The results of this survey provide valuable insights that can guide companies in directing more targeted marketing strategies, developing products that suit customer needs, and better understanding the economic and social dynamics in East Java.

Table 13 Profile of respondents based on their preference for wood products

Variable		Frequency	Proportion
Wood Type	Teak	78	**0.70**
	Any wood	32	0.28
	Mahogany	1	0.01
	Pine	1	0.01
Use of Woodcraft Furniture	Not at all	5	0.04
	Yes	107	**0.96**
Way of shopping	Offline	89	**0.79**
	Online	23	0.21
Where the Respondent Lives	In Village	50	0.45
	In City	62	**0.55**
Place of Residence	Bangkalan	9	0,08
	Banyuwangi	2	0,02
	Batu	4	0,04
	Bojonegoro	2	0,02
	Bondowoso	2	0,02
	Jember	1	0,01
	Blitar Regency	1	0,01
	Jombang Regency	1	0,01
	Kediri Regency	1	0,01
	Madiun Regency	1	0,01
	Malang Regency	20	0,18
	Mojokerto Regency	2	0,02
	Probolinggo Regency	1	0,01
	Sidoarjo Regency	1	0,01
	Blitar City	2	0,02
	Malang City	22	**0,20**
	Lumajang	1	0,01
	Nganjuk	2	0,02
	Pacitan	1	0,01
	Pamekasan	3	0,03
	Ponorogo	1	0,01
	Sampang	4	0,04
	Sidoarjo	6	0,05
	Sumenep	9	0,08
	Surabaya	4	0,04
	Tulungagung	9	0,08

Table 13 presents an overview of respondents' profiles based on their preference for wood products within the framework of this survey. Analysis of the survey shows that most respondents, around 70%, preferred teak wood as material for wood products. In contrast, about 28% of the respondents chose wood without specific species specifications. Meanwhile, a relatively small proportion of respondents, about 1% each, expressed a preference for mahogany and pinewood.

Furthermore, the data shows that around 96% of the respondents have wood furniture, while about 4% stated that they have none. When surveyed on how to shop for furniture or appliances, most % of respondents, 79% preferred shopping offline rather than online. Regarding residential location, around 55% of respondents live in cities, while 45% live in villages. This analysis provides significant insights into understanding consumer preferences and profiles related to wood products. This information can be an essential guideline in product design and marketing strategy formulation that aligns more with the market dynamics (Ministry of Finance Directorate General of Treasury, 2018).

Most survey participants preferred using teak wood as an ingredient in engineered wood products, signaling the importance of integrating products with teak wood in marketing strategies. In addition, most respondents actively use engineered wood furniture, allowing marketers to emphasize its quality, design, and uniqueness to meet demand in an established market. The dominance of offline shopping emphasizes the importance of managing attractive physical stores and enhancing positive offline shopping experiences. Differences in preferences between respondents living in villages and cities may affect their needs and preferences. Therefore, marketers need to consider market segmentation according to these geographical characteristics to tailor marketing strategies to the differences in consumer environments (CIMB Niaga, 2023).

The dataset obtained from IFLS plays a central role as a vibrant and representative source of information, involving approximately 83% of the overall Indonesian population (IFLS, 2012). By involving more than 30,000 individuals spread across 13 provinces, including East Java, this dataset provides a broad scope for understanding consumer preferences for wood products. The focus on construction materials and furniture for household use gives a deeper dimension to the analysis. IFLS captures the reality of wood product consumption at the household level, allowing researchers to analyze consumer choices and decisions closely. By detailing these preferences, the dataset creates a solid foundation for formulating more targeted policies, marketing strategies, and product innovations (Hermawan, 2012). Therefore, the data contained in IFLS provides a broad picture of consumer preferences and becomes an invaluable tool to support the growth and development of the timber industry, especially in the East Java region.

In analyzing the IFLS data, Table 14 provides an overview of the distribution of respondents through descriptive statistics. The results show that the demographic data contained in the IFLS offers a rich context related to consumer preferences for wood products in East Java. The analysis shows that respondents have an average of 4 household members, with around 60% coming from rural environments. The fact that 35% of respondents do not have internet access at home can be valuable information for designing marketing strategies accessible to various consumer segments. With the average income level of respondents at around IDR 1,109,876 per month, this information gives an idea of the purchasing power of potential consumers.

An in-depth analysis of this data provides a comprehensive picture of consumer profiles relevant to wood products. With this understanding, we can identify consumption trends and consumer preferences that form the basis of more effective and sustainable marketing strategies. This analysis provides valuable insights for timber industry players in East Java to adjust their marketing approach, ensuring that their products meet consumer

needs and align with the expectations and values held by the market. In addition, the marketing approach can attract new customers by promising added value, setting attractive prices, efficiently distributing products, and promoting and sustaining existing customers while maintaining customer satisfaction (Sofiana, 2011). Thus, this data analysis is not only a market overview but also a strategic guide that helps improve the competitiveness of the timber industry in meeting consumer expectations and supporting sustainable growth.

Table 14 Descriptive statistics

Variable	Measurement	Mean	Std. Dev
Age	Age of respondent in years	38.498	18.923
Female	Dummy, 1 for female; 0 for others	0.517	0.500
Marriage Status	Dummy, 1 for married; 0 for others	0.709	0.454
Internet	Dummy, 1 if have internet accers; 0 for others	0.350	0.477
Elementary School	Dummy, 1 for elementary school; 0 for others	0.190	0.392
Junior High School	Dummy, 1 for Junior High School; 0 for others	0.188	0.391
Senior High School	Dummy, 1 for Senior High School; 0 for others	0.036	0.185
University	Dummy, 1 for university; 0 for others	0.100	0.299
Child	Children under 1 year old	0.515	0.500
Health	Likert 1 For very unhealthy - 4 for very healthy	2.952	0.676
Income	Total monthly household income in rupiah	1109876	999407
Family members	Number of family members	4.268	1.944
Urban	Dummy, 1 if respondent lives in village; 0 if not	0.601	0.490

In detailing the results of analyzing consumer preferences using the multinomial logit method revealed in Table 15, several variables are the main factors influencing the choice between forest products and their substitutes. Through a statistical approach, findings show that age, marital status, internet access, education level, health condition, income, and urban location significantly impact consumer decisions (Nisa, 2021). The negative coefficients reflect the tendency of consumers to prefer substitute products over forest

products. This tendency is more dominant among older age groups, married individuals, those with internet access, and those living in urban environments. The income variable shows a positive coefficient for forest products, indicating that consumers with higher incomes tend to prefer wood products over their substitutes. It is in line with Indrawati's (2009) research, which states that the increase in people's income and wood products becoming one of the primary human needs makes people still choose forest products over their substitutes.

An in-depth examination of these variables provides a more detailed picture of the dynamics of consumer preferences in the wood products industry. These findings are solid foundation for formulating more focused marketing strategies. This in-depth analysis becomes invaluable, providing insights into consumer preferences, market trends, and critical factors influencing purchasing decisions (Hilmi et al., 2023). The results of this analysis can be a guide for manufacturers and stakeholders in directing their marketing efforts. With a deeper understanding of consumer preferences, industry players can respond more accurately and effectively to market desires. By detailing factors such as age, marital status, internet access, education level, health, income, and location, marketing strategies can be customized to meet consumers' specific preferences and needs. It opens up opportunities to create products that are more in line with market expectations, support sector growth, and maintain the sustainability of the wood industry as a whole.

Table 15 Multinomial logit regression

Variable	Substitution product	Forest wood products		
		Coef.	Std. Err.	Prob.
Age	References Group	-0.007	0.002	0.000***
Female		-0.047	0.041	0.243
Marriage Status		-0.359	0.059	0.000***
Internet		-0.511	0.061	0.000***
Elementary School		-0.216	0.055	0.000***
Junior High School		0.056	0.057	0.324
Senior High School		-0.291	0.148	0.049**
University		0.038	0.090	0.674
Child		-0.017	0.053	0.755
Health		-0.147	0.030	0.000***
Income		0.000	0.000	0.000***
Family members		-0.013	0.012	0.278
Urban		-1.222	0.043	0.000***
Constant		-0.187	0.151	0.213
Log-likelihood	-13076.129			
LR chi2(26)	2401.31			
Prob > chi2	0.000			
Pseudo R2	0.0841			
Number of obs	2940			

Notes: *** = p value < 0.01; ** = p value <0.05; * = p value < 0.1

From the results of this analysis, the strategy of promoting forest wood products through the internet may need to be more effective. This is due to the high volume of online information, which makes consumers compare many options before purchasing. The completeness of the information provided allows consumers to be more selective in choosing the products they are interested in (Harisandi et al., 2023). In simple terms, the competitiveness of wood products with substitute products in the online media still needs to show higher efficiency. Therefore, market segments must be carefully considered, especially regarding income, as higher-income consumers choose forest timber products over their substitutes.

Income is one of the factors that influence consumption activities. This is because the size of income will be directly proportional to the level of consumption (Akrom, 2020). Consumers with higher incomes are often willing to allocate more funds to obtain products that provide maximum satisfaction. In this context, forest wood products are the leading choice in constructing or fulfilling household furniture needs. Forest wood products' authenticity and superior quality make them a more attractive option for upper-class consumers. On the other hand, consumers living in urban areas tend to choose substitute products. This may be due to the greater availability of substitute products than forest wood products in urban environments (Susanti, 2023). Therefore, it is necessary to have an in-depth understanding of consumer preferences and needs within each market segment to design more targeted marketing strategies.

Several districts in East Java Province play an essential role in producing wood products domestically. With their contributions, East Java Province has great potential in the wood processing industry, which can improve the economy and employment in East Java Province and its surroundings. In addition, the potential of the wood industry in East Java Province can also positively impact the environment if managed wisely. With organized and environmentally sound wood processing, East Java Province can set an example for other regions in preserving forests and natural ecosystems. Thus, East Java Province has the potential to become one of the centers of a sustainable and environmentally sound timber industry in Indonesia.

Based on the information from the consumers, where respondents' profiles are organized according to their preferences on certification considerations when purchasing wood products in East Java Province. According to the data, 54% of respondents said that certification is only one of the things they consider when buying wood products. In comparison, 42% said that Timber Legality Verification System (SVLK) certification is the main thing they think about when purchasing wood products. Meanwhile, around 4% of respondents said that certificates from voluntary certification are the main thing they consider when buying wood products. In this case, while most people surveyed did not consider certification a vital component when purchasing wood products, a few still considered certification necessary. Suggests that consumers must know the importance of environmental sustainability and forest conservation. As more people learn about the benefits of wood certification, the number of people considering this factor when purchasing wood products is expected to continue to increase.

3.5.2 Industry Characteristics

1) Quantity, scale of industry, and distribution

The spatial distribution of wood processing enterprises in East Java Province, as depicted in Table 16, has a complex and diverse pattern characterized by both concentration and variety (Pratiwi & Paput, 2022). The data collected from PBPHH with a production capacity > 6,000 m^3/year over the past three years indicates that the productivity of wood products, including plywood, LVL, veneer, and sawn-timber, amounted to 11 million m^3. As per Regulation 8/2021 by the Minister of Environment and Forestry of the Republic of

Indonesia, PBPHH refers to a company License issued to entrepreneurs for initiating and conducting company operations and/or product processing activities. It's important to note that this data is derived solely from industries that have completed the RPBBI application, representing a fraction of the estimated 1,300 wood processing entities in the province. RPBBI is an application developed by the Ministry of Environment and Forestry to facilitate the creation of Operational Work Plans for Forest Product Processing and the filing of Monthly Reports on the actual performance of forest product processing (MoEF Regulation number P. 43/2009). This discrepancy could be attributed to various factors, such as administrative oversight or a lack of awareness regarding the reporting requirement.

Table 16 Distribution of wood industries in East Java Province

Region	Wood Processing Industry					Total Industry	Total Production
	PT	UD	CV	KSU	PERHUTANI		
Banyuwangi	5	-	-	-	-	5	539.759
Blitar	2	-	-	-	-	2	169.957
Bojonegoro	-	-	-	-	1	1	2.306
Bondowoso	1		1		-	2	116.360
Gresik	26	1	4	-	-	31	1.751.217
Jember	6	-	-	-	-	6	729.600
Jombang	4	-	-	-	-	4	1.407.887
Kediri	4	-	-	-	-	4	318.106
Lamongan	6	-	-	-	-	6	485.348
Lumajang	19	1	4	-	-	24	1.989.092
Madiun	1	-	-	-	-	1	62.971
Magetan	1	-	-	-	-	1	24.171
Malang	3	2	-	-	-	5	821.432
Mojokerto	5	-	-	-	-	5	93.079
Pacitan	4	-	-	-	-	4	131.699
Pasuruan	14	1	4	-	-	19	959.063
Ponorogo	-	-	1	-	-	1	15.239
Probolinggo	10	2	1	1	-	14	1.159.722
Sidoarjo	5	-	-	-	-	5	399.713
Situbondo	1	-	-	-	-	1	11.954
Surabaya	11	-	1	-	-	12	378.664
Total	**128**	**7**	**16**	**1**	**1**	**153**	**11.567.339**

Nevertheless, the available data reveals a clustering of industries in specific regions. Gresik emerges as a major hub with 31 industries, followed by Lumajang with 24, and Pasuruan with 19. This concentration likely stems from a confluence of favorable conditions in these areas, including proximity to raw materials, well-developed infrastructure, a skilled labor pool, market demand, and government policies (Wirawan et al., 2018). Conversely, several regions exhibit a minimal industrial presence, with a solitary industry documented in Bojonegoro, Madiun, Magetan, Ponorogo, and Situbondo. An examination of company

types reveals the dominance of PT (Perseroan Terbatas), the Indonesian equivalent of a limited liability company, which accounts for 128 out of the 153 industries surveyed. This preponderance suggests that larger, well-established enterprises are the primary drivers of wood processing in East Java. In contrast, other business structures like UD (Usaha Dagang), CV (Commanditaire Vennootschap), and KSU (Koperasi Serba Usaha) play a relatively minor role, implying potential barriers to entry for smaller players or cooperatives.

Total production figures further underscore the regional disparities within the sector. Gresik, with its high concentration of industries, leads in production with 1.7 million units. Interestingly, Lumajang, despite having fewer industries than Gresik, surpasses it in production with 1.9 million units, indicating a higher average output per industry. This disparity could be attributed to various factors, such as differences in industry size, technological capabilities, or the types of wood products manufactured. A comprehensive understanding of these multifaceted factors is crucial to ensuring efficient and sustainable wood processing operations throughout the region. The comprehensive understanding of factors influencing sustainable wood processing operations is underscored by the consumer perception of environmentally sustainable wood products (Malá et al., 2019).

The dominant timber species in the timber industry in East Java include sengon, teak, mahogany, and pine. The main timber production centers are in the Probolinggo and Lumajang areas, but the fastest growth of the timber industry is recorded in Lumajang. During the COVID-19 pandemic, timber exports have increased, especially for products such as plywood and furniture. Most of these exports went to countries such as the United States, Japan, China, Australia, and Korea. While there is no valid data on domestic timber consumption, provisional data suggests that plywood and sawn-timber are the main choices of local consumers. The wood industry in Indonesia includes more than 1,200 registered companies, while around 600 companies are still in the process of registration. While raw materials from community forests are still abundant, the Forestry Service has a strategic role in maintaining a sustainable supply for the timber industry. One approach that can be taken is through a supply contract scheme with community forests, where the Forest Service can play a role in ensuring certainty of supply for the timber industry; with these steps, it is hoped that the timber industry in Indonesia can continue to develop sustainably.

The availability of raw materials is a serious concern as the area of rights forests is increasingly being degraded and converted to sugarcane. To address this change, it is essential to take initiatives to protect the surviving rights of forests, provide incentives for those who choose to maintain the forests, and prevent land conversion. Another challenge in the timber industry is that most companies have yet to adopt the Timber Legality Verification System (SVLK). It is due to the lack of economic impact felt by the industry; industries that do not yet have SVLK certificates argue that the high sample assessment, complex procedures for making certificates, lack of understanding of the industry related to making SVLK certificates, and other reasons make them less motivated to participate (Pratama, 2018). Further efforts are needed to increase understanding of this verification system's benefits and provide more apparent economic incentives for companies to join in the timber legality process. Meanwhile, the domestic timber market has shown certainty with steady demand.

Community forest land continues to decline due to conversion to sugarcane land. Although the industry has been required to plant trees, implementing the SVLK has not had a significant economic impact, especially for creative industries (Ferdian et. al., 2016). In addition, there is a tendency for SVLK implementation to only run for one year and not be continued (Obidzinski et al., 2014). The significant demand for mahogany wood is an important point, and some industries have export markets that could be further opportunities. However, special attention needs to be paid to industries that do not have official licenses. The suggestion to hold an interior design competition using plywood with a maximum product life of 5-6 years is a positive step to encourage the sustainable use of wood.

Constraints in limited wood processing technology are a challenge, and creating markets by building trends can be a strategy to increase the competitiveness of the wood industry in Malang. It is also important to note that timber traders numbering in the thousands can be a strong distribution channel, ensuring timber products are absorbed in the market. The linkages between the timber industry in Malang and the housing industry, particularly building materials and interiors, demonstrate the importance of synergies between these industries. Although the price of SVLK-certified timber tends to be higher, the additional cost of certification and the complicated administrative process mean that many industries and farmers do not feel the need for SVLK certification (Suryandari et al., 2015). Therefore, efforts are needed to simplify the assessment process and increase industry awareness of the long-term economic benefits of SVLK implementation.

Furthermore, several conditions characterize the situation of the timber industry in the area. First, the SVLK is optional, so many industries feel free to administer it. It is one of the obstacles to ensuring the sustainability of timber resources and the industry's legality. In addition, timber products face competition from substitute products. This competition can further challenge the timber industry to maintain its market share. Therefore, there is a need for marketing strategies or product innovation to increase the competitiveness of wood products in the market. Another issue highlighted is the need for more public interest in planting trees, with more preference for annual crops. It could indicate a need for more awareness or incentives for people to engage in sustainable tree-planting activities (Mukson et al., 2021). Efforts should be made to increase community understanding of the importance of natural resource sustainability and the long-term benefits of planting trees. Some of the challenges faced by the timber industry in East Java, including a lack of SVLK-related regulations, competition with substitute products, and a lack of community interest in planting trees. Remedial efforts could involve regulatory measures, marketing strategies, and educational approaches to improve the timber industry situation in Trenggalek.

Figure 50 depicts the raw material fulfillment plan for East Java, showcasing the 5 largest sources of materials from 2017 to 2023. The data is displayed in cubic meters (m^3) and classified according to several sources, such as community forests, wood cultivation, IPHHK/other industries, TPT-KB/TPK-RT, Perum Perhutani, forest plantations, and other sources. Throughout the examined time, there were fluctuations in the overall quantity of raw materials. The overall volume in 2017 amounted to around 4.5 million m^3, primarily sourced from community forests and wood cultivation. The contribution from other sources, such as IPHHK/other industries, TPT-KB/TPK-RT, Perum Perhutani, and forest plantations, was comparatively minor.

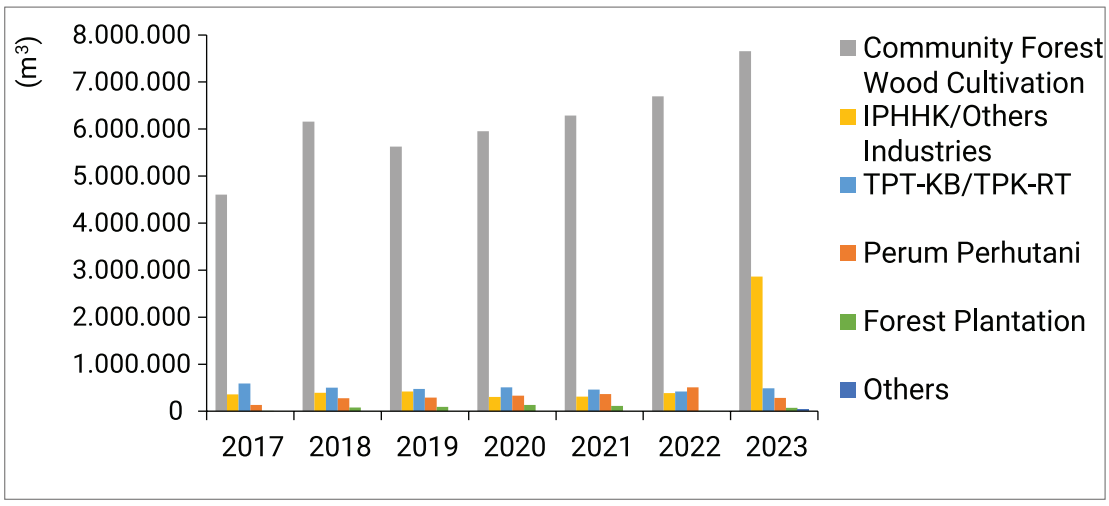


Figure 50 Raw material fulfillment plan based on material sources in East Java

ver the following years, there was a consistent upward trend in the overall quantity of raw materials. In 2022, it attained its maximum capacity of around 7.5 million m^3. The main factor behind this rise was the substantial increase in contributions from community forests and wood cultivation. The contribution from Perum Perhutani also witnessed a significant increase, namely in 2022. Nevertheless, in the year 2023, there was a minor decrease in the overall volume of raw materials, reaching a value of around 7 million m^3. The decline in contribution was mostly due to a reduction in the involvement of community forests and wood cultivation, while the contribution from Perum Perhutani remained relatively constant.

Overall, the raw material fulfillment plan in East Java had changes from 2017 to 2023. It showed a general upward tendency until 2022, followed by a little decrease in 2023. Throughout the period, community forests and wood culture continually remained the primary sources, although their contributions fluctuated annually. The involvement of Perum Perhutani also had a notable impact, especially in the final stages. The findings offer useful insights into the dynamics of acquiring raw materials in East Java and can guide future planning and management strategies in the forestry sector.

A comprehensive overview of the raw wood material fulfillment in East Java Province during 2023 emphasizes both intra-provincial and inter-provincial dynamics. The data indicates that the province primarily sources its raw material requirements for wood products from internal sources, indicating a robust internal supply chain. This emphasizes East Java's substantial capacity for self-sufficiency in timber production. The raw material supply is influenced by a network of critical communities and districts that operate within a province. Surabaya and Gresik are significant centers, collectively accounting for 13% of the total supply and a substantial flow of 118,800 m^3 between them. Furthermore, Malang, Jember, Blitar, and Lumajang are critical sources that contribute to the province's internal production capabilities.

Nevertheless, the data also reveals a substantial inter-provincial dimension. Although East Java exhibits a high degree of self-reliance, external contributions are essential in meeting the overall demand for natural wood materials. Key external suppliers are identified as Central Java, East Kalimantan, North Kalimantan, Maluku, and West Papua. Cities such as Semarang in Central Java, Berau and Samarinda in East Kalimantan, and Nunukan in North Kalimantan are notable contributors to this inter-provincial network. The intricate and ever-changing nature of raw material fulfillment in East Java Province is emphasized by these discoveries. The supply chain is guaranteed a certain level of stability and resilience as a result of the province's internal capacity for timber production. Nevertheless, the dependence on external sources, particularly from neighboring provinces and regions, underscores the interconnectedness of the wood processing industry and the significance of preserving a variety of supply channels.

In summary, the raw material landscape in East Java Province is distinguished by its dual dependence on internal and external sources. The province's internal production capacity is substantial, with key cities and districts playing a critical role. Nevertheless, external contributions are essential to satisfy the entire range of demand. This dynamic system is influenced by market forces, resource availability, and regional cooperation as a result of the interplay of internal and external factors. It is imperative to comprehend these complexities in order to cultivate a resilient and competitive wood processing industry in East Java, engage in sustainable resource management, and make effective policy decisions.

Figure 51 a & b Fulfillment of wood raw materials to East Java Province in 2023

Figure 52 illustrates complex patterns in the movement of raw material fulfillment in East Java Province, as shown by the data from BPHL for the year 2023. The analysis uncovers an intricate interaction between the production capacities of different regions, the consumption patterns of industries, and the commerce that occurs between regions. The initial pattern emphasizes a self-reliant paradigm in which a region that produces a significant amount of raw wood material simultaneously acts as the main consumer. The Lumajang District serves as a prime example of this trend, as it consumes an astonishing 495.5 thousand cubic meters of unprocessed timber under its jurisdiction. This pattern highlights the district's strong internal capability for both production and consumption, reducing dependence on other sources.

The second pattern illustrates a highly integrated model, where a region that produces a substantial amount of raw materials serves as a supplier for areas that have more extensive wood processing industries. Once again, Lumajang District stands out as a significant contributor, exporting significant quantities of unprocessed timber to other areas within East Java Province. This pattern indicates the crucial role of the district in the provincial supply chain, serving as a central point for the delivery of raw materials.

The variety of these patterns highlights the intricate dynamics of the transportation of raw materials in East Java Province. The province has a varied terrain of production capabilities, industrial capacities, and consumption patterns, resulting in a range of solutions for meeting raw material needs. While several areas prioritise self-reliance, others

participate in inter-regional commerce to maximise resource utilisation and fulfil industrial requirements. Moreover, these patterns have wider ramifications for the local economy and timber processing sector. The existence of both self-sufficient and interconnected models indicates that the supply chain has a certain level of resilience, allowing areas to adjust to changes in demand and supply. Moreover, the exchange of raw materials between different regions encourages cooperation and reliance, so stimulating economic integration and facilitating the expansion of the wood processing industry. To summarise, the transportation of unprocessed timber in East Java Province in 2023 demonstrates a diverse array of patterns. The presence of both self-sufficient and interconnected models demonstrates the different production capabilities, industrial landscape, and regional collaboration in the province. Comprehending these trends is essential for efficient resource allocation, environmentally friendly growth, and promoting a strong and adaptable timber processing sector in East Java.

Figure 52 Fulfillment of wood raw materials from East Java in 2023

2) Commodity

Based on the data collected, the primary timber forest products industry, with a capacity of less than and more than 6,000 m^3/year, consists of several commodities such as plywood, LVL, veneer, and sawn-timber. The primary forest products industry, which has a capacity of less than 6,000 m^3/year, typically uses manual and conventional wood processing. The direct timber forest products industry has a capacity of more than 6,000 m^3/year. It conducts mass and efficient production processes and more complex management systems to meet the needs of a larger market (Wahyudi, 2013). On the other hand, small artisans using simple equipment usually produce wood products such as furniture, building materials, and handicrafts with relatively small production quantities. Building materials for construction, paper, and other industrial materials made from wood products produced on a large scale. Further discussion of primary timber forest product industries by commodity with capacities of < 6,000 m^3/year and > 6,000 m^3/year is found below.

1. Primary industry of timber forest products with capacity < 6,000 m^3/year

   a. Plywood and LVL

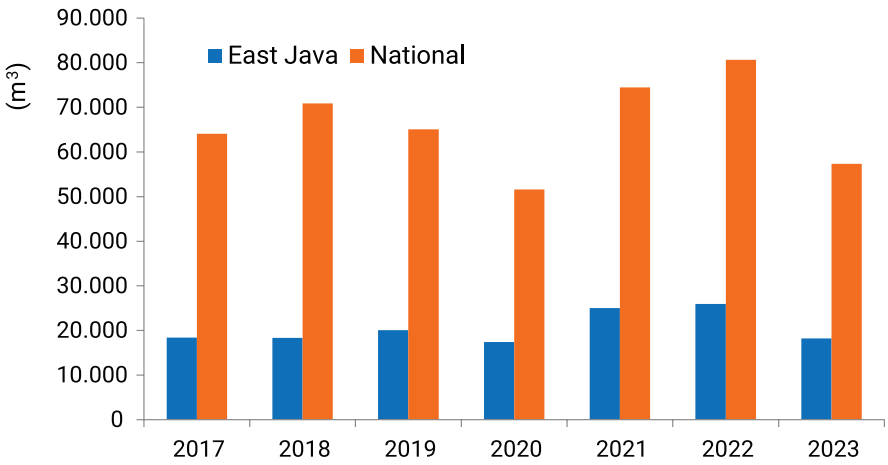


Figure 53 Plywood and LVL industry productivity with capacity of < 6,000 m^3/year

Figure 53 illustrates the production realization of plywood and LVL in the primary timber forest products industry with a capacity of < 6,000 m^3/year in East Java and national scale from 2017 to 2023. Throughout the examined period, the national production constantly exceeded the production of East Java. In 2017, the plywood and LVL output in East Java amounted to roughly 15,000 m^3, while the national production reached over 65,000 m^3. The trend persisted in the following years, with the national output reaching its greatest point at roughly 80,000 m^3 in 2022, while East Java's production peaked at around 25,000 m^3 in the same year.

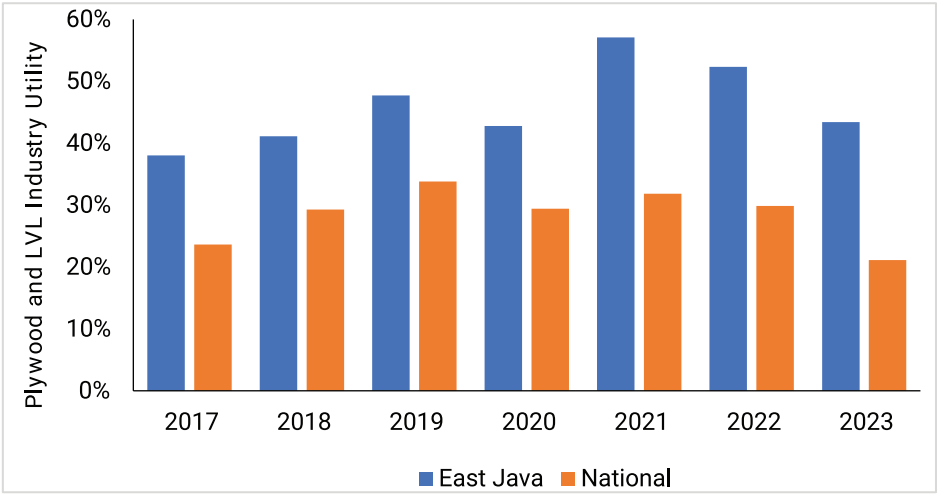


Figure 54 Utility level plan of plywood and LVL production capacity of > 6,000 m^3/ year in East Java Province

The data reveals a notable discrepancy between the production of East Java and the national production, indicating that other regions in Indonesia make a large contribution to the overall output of plywood and LVL. These variations can be ascribed to a range of variables, including disparities in the availability of resources, infrastructure, investment, and market demand. Furthermore, both the production in East Java and at the national level have changed throughout the years. There was

a significant rise in production in East Java from 2017 to 2018, followed by a minor decrease in 2019. The production exhibited a modest incline until 2022, followed by a subsequent decline in 2023. Likewise, the country's overall output showed variations, reaching its highest point in 2022 and then seeing a following decrease in 2023. These oscillations may be impacted by a multitude of reasons, such as economic conditions, government policies, and shifts in the worldwide market.

Figure 54 offers significant information on the production of plywood and LVL in the wood industry. This industry operates at a capacity of < 6,000 m^3/year in East Java and across the country from 2017 to 2023. The data indicates a persistent disparity between the production of East Java and the national production, emphasizing the substantial contribution of other regions to the overall output. Moreover, the variations in production across the years highlight the ever-changing nature of the industry and the impact of many internal and external forces. The plywood and LVL industries are experiencing growth despite recent variations in production. Forecasts of heightened production in the upcoming years provide promising growth prospects for the business. The major catalysts for this forecast might be advancements in technology, rising demand, and investments aimed at expanding production capacity. Therefore, the plywood and LVL industry can persist in making a valuable contribution to the economic expansion and advancement of the building sector in East Java Province, as well as in Indonesia as a whole.

b. Veneer

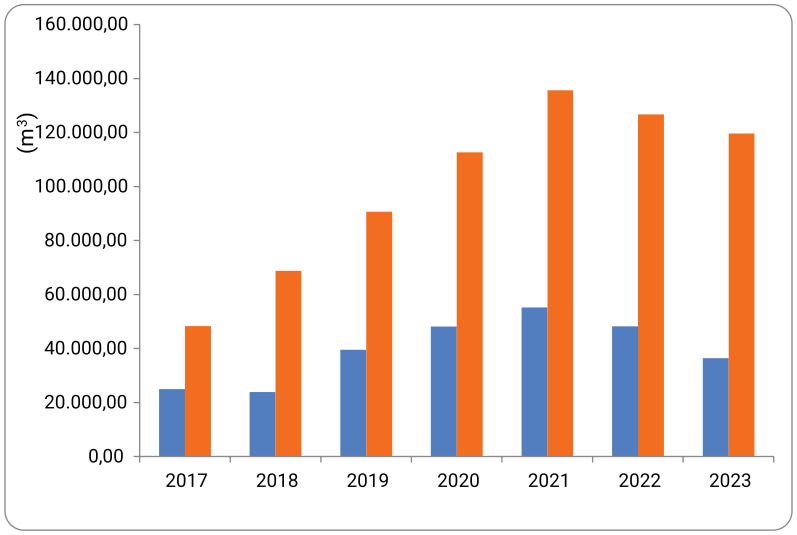


Figure 55 Realization of veneer industry productivity with capacity < 6,000 m^3/year

Figure 55 uncovers a fluctuating pattern in the manufacturing of veneer in the primary forest products sector in East Java and across the country from 2017 to 2023. Significantly, East Java consistently surpassed the national average in veneer output for the whole monitored period. In 2017, the veneer output in East Java amounted to roughly 20,000 m^3, and the nationwide production reached around 45,000 m^3. In the following years, there was a significant rise in the production of veneer in both East Java and at the national level. The highest point was reached in 2021, with 55,000m^3 in East Java and 135,000m^3 at the national level. Nevertheless, both regions witnessed a substantial decrease in 2023, as East Java generated 36,400 m^3 while the national output amounted to 120,000 m^3. The constant outperformance of East Java suggests a

strong and competitive veneer business in the province. Various factors may influence this pattern, including volatility in the cost of raw materials, alterations in government laws of the wood sector, seasonal variations, and the production process's capacity (Wahyudi, 2013).

The variability in veneer production, namely the decrease witnessed in 2023, can be ascribed to a range of internal and external variables. These factors may encompass variations in the prices of raw materials, alterations in government regulations, economic recessions, and changes in the global demand for goods and services. Moreover, the COVID-19 pandemic and its consequential interruptions may have had an impact on production levels and supply chains. Various factors are expected to influence the trend in the domestic veneer market.

The increasing need for wood-based products in the construction, furniture, and interior design industries may lead to a rise in the demand for veneer. Nevertheless, the accessibility and cost-effectiveness of substitute materials, such as laminates and engineered wood, may present a difficulty for the veneer industry. Furthermore, environmental considerations and efforts towards sustainability could potentially affect consumer preferences and regulatory structures, so exerting a significant influence on the market for veneer.

Veneer is mostly used as a surface layer for a variety of wood-based items. The popularity of this material in the furniture and interior design sectors stems from its aesthetic appeal, adaptability, and capacity to enhance the appearance of more affordable wood substrates. Veneer is also employed in the fabrication of plywood, doors, panels, and other ornamental components. Figure 55 offers significant insights into the developments of veneer manufacturing in East Java and across the country from 2017 to 2023. The data emphasizes East Java's continuous dominance in veneer production, demonstrating the province's robust industry presence. Nevertheless, the variations witnessed in output levels underscore the necessity for ongoing surveillance and adjustment to tackle the difficulties and prospects in the dynamic market environment. An essential aspect of promoting sustainable industry development and maintaining its ongoing contribution to the regional and national economy is comprehending the elements that impact veneer production and consumption trends.

c. Sawn-Timber

Figure 56 demonstrates a substantial discrepancy in sawn-timber production between East Java and the national level for the observed period. The national production constantly exceeded the output of East Java, frequently by a significant margin. East Java's sawn-timber production in 2017 amounted to around 250,000 m^3, but the national production reached nearly 900,000 m^3. This pattern continued in the following years, with the whole national output reaching its greatest level of about 1 million m^3 in 2020, while East Java's production reached its top of approximately 25,000 m^3 in 2021.

The substantial disparity between the production of East Java and the whole national output highlights the notable contribution of other regions to Indonesia's sawn-timber industry. Multiple variables may contribute to this discrepancy, such as changes in the availability of forest resources, differences in infrastructure, varying levels of investment, and regional policies. In addition, both the production in East Java and at the national level have changed throughout the years. Production in East Java exhibited a consistent level from 2017 to 2019, with a marginal rise in 2020 and

a pinnacle in 2021. Nevertheless, there was a decrease in production over the years 2022 and 2023. The national production displayed a comparable pattern, reaching its highest point in 2020 and subsequently seeing a slow decrease. The oscillations can be linked to multiple reasons, including shifts in market demand, economic situations, government laws, and environmental considerations.

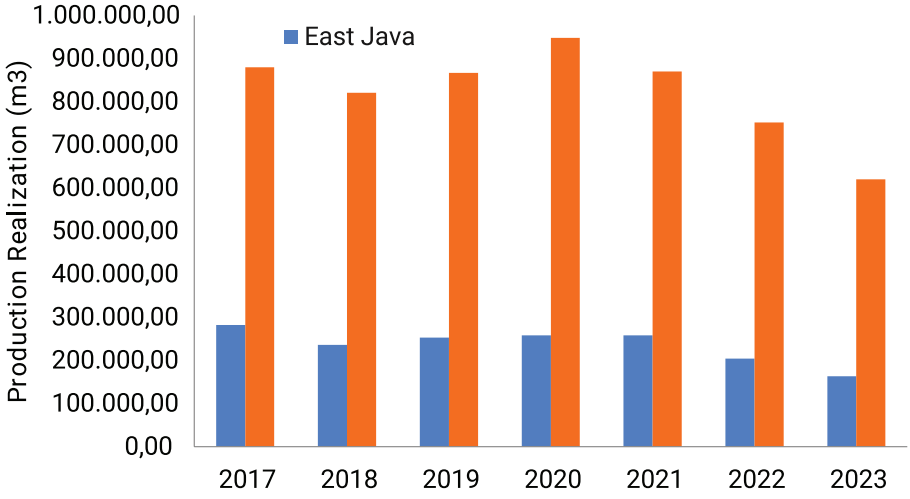


Figure 56 Sawn-timber production in the primary industry of timber forest products with capacity < 6,000 m^3/year in East Java Province

The data highlights a clear difference between the production in East Java and the national output, emphasizing the substantial contribution of other regions to the total industry landscape. The oscillations observed in output levels over the years indicate that the industry is dynamic and vulnerable to both internal and external variables. The decrease in sawn-timber production in East Java starting from 2021 suggests a possible change in the industry's overall situation. The decline in forest resources can be ascribed to multiple factors, such as evolving governmental policies regarding forest management, shifting market dynamics, and environmental factors that affect the availability of raw wood products (Mutaqin et al., 2022). In addition, increased competition from other places that produce timber may also contribute to the observed decrease. To revive sawn-timber production in East Java Province, it is crucial to establish extensive plans for sustainable forest resource management and ecosystem restoration in the future. Implementing these measures will not only bolster the province's role in the national timber industry but also advance efforts in environmental preservation and economic resilience.

2. Primary industry of timber forest products with capacity of > 6,000 m^3/year

a. Plywood and LVL

Figure 57 illustrates the production realization of plywood and LVL in the primary timber forest products industry with a capacity greater than 6,000 m^3/year in East Java and nationally from 2017 to 2023. It offers unique perspectives on the plywood and LVL production industry in Indonesia. Between 2017 and 2023, the nationwide production of plywood and LVL constantly surpassed that of East Java. In 2017, the

production of East Java amounted to almost 700,000 m^3, although the national output was significantly larger, reaching nearly 4,5 million m^3. This trend remained consistent over the years, with the national output reaching its highest point at approximately 4,5 million m^3 in both 2018 and 2021. On the other hand, the highest level of output in East Java reached over 1,5 million m^3 in 2022.

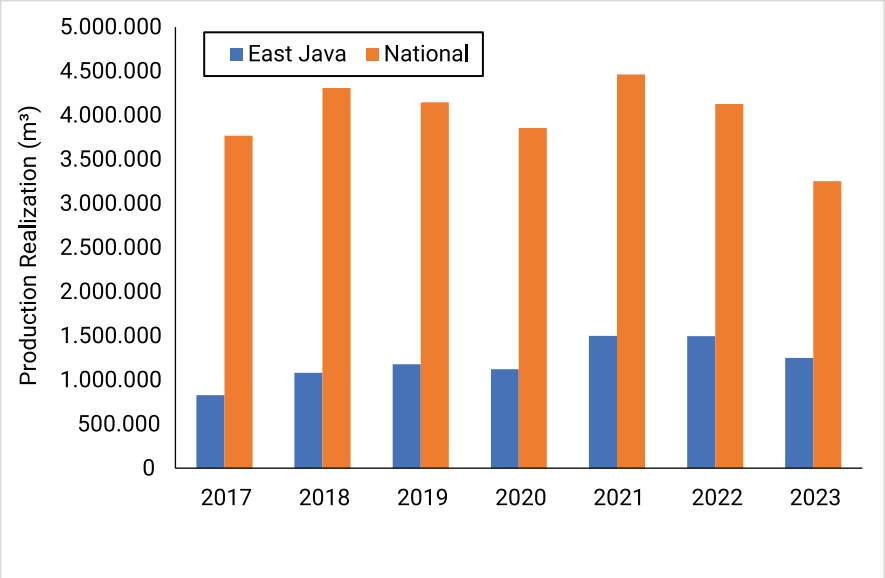


Figure 57 Production realization of plywood and LVL industry with capacity of > 6,000 m^3/year

Moreover, the graph demonstrates variations in production levels for both East Java and the national level across the years. Although national output generally stayed within a narrower range, the production in East Java showed more significant changes. It had a substantial spike in 2018, followed by a fall in the following years. However, it reached its high again in 2022 before declining once again in 2023. The oscillations may arise from variables such as shifts in market demand, availability of raw materials, economic circumstances, and government regulations. The data emphasizes the substantial contribution made by regions other than East Java in stimulating national output, while simultaneously underlining the variability and difficulties encountered by the industry in East Java. Additional inquiry into the fundamental elements that impact these patterns could provide significant insights for policymakers, industry stakeholders, and researchers who are interested in the wood forest products sector.

The variations seen in the production of plywood and LVL in East Java (Figure 57), have important consequences for the local market. The recent decrease in output, particularly in 2023, may result in a reduction in supply, thus causing price increases and affecting consumer affordability. This might have a significant impact on the construction and furniture industries, as plywood and LVL are widely utilized in these sectors. However, a reduction in supply may also incentivize demand, opening up possibilities for smaller producers to meet the demand and potentially resulting in heightened rivalry and innovation within the industry.

Plywood is primarily used for its versatility as a construction material. Due to its robustness, longevity, and cost-efficiency, it is widely employed for flooring, wall sheathing, roofing, and formwork. However, LVL is commonly employed for structural beams, columns, and headers because of its superior strength-to-weight ratio and dimensional stability. The variability in production may consequently influence the accessibility and expense of these vital construction materials, thereby impacting

project schedules and financial plans. The decrease in production could potentially result in environmental consequences. If the reduction is attributed to issues such as limited resources or more stringent restrictions, it may indicate a necessity for implementing more sustainable forestry methods and exploring alternative materials. This has the potential to stimulate greater investment in the study and creation of environmentally friendly construction materials, so fostering a more sustainable and robust building sector in the future.

b. Veneer

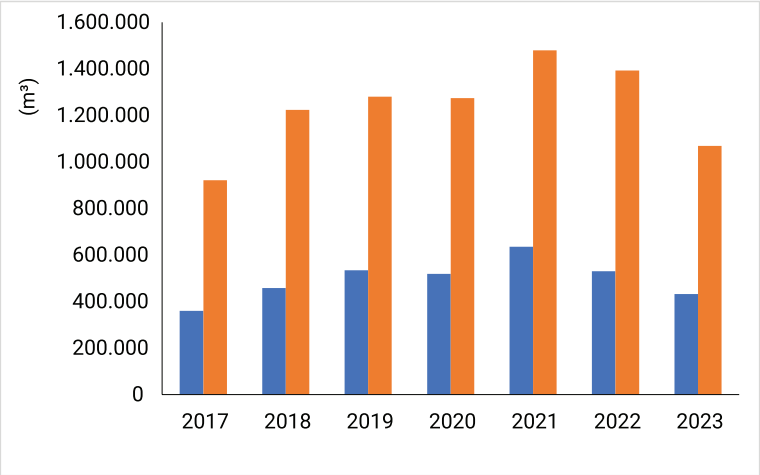


Figure 58 Veneer production in the primary industry of timber forest products with a capacity > 6,000 m^3/year

Figure 58 illustrates the production realization of veneer in the primary timber forest products industry with a capacity greater than 6,000 m^3/year in East Java and nationally from 2017 to 2023. Figure 58 analysis indicates a constant discrepancy between veneer output in East Java and the national level over the examined period. The national production constantly exceeded the output of East Java, frequently by a significant margin. In 2017, the veneer output in East Java amounted to almost 300,000 m^3, whilst the national production reached nearly 900,000 m^3. This trend continued in the following years, with the national output reaching its maximum at approximately 1.5 million m^3 in 2022, while East Java's production reached its top at around 600,000 m^3 in 2021. The notable disparity between the production of East Java and the whole national output highlights the substantial contribution of other regions to Indonesia's veneer sector. Multiple variables may contribute to this discrepancy, such as changes in the availability of forest resources, differences in infrastructure, levels of investment, and regional policies.

In addition, both East Java and national production have changed throughout the years. Production in East Java experienced an upward trend from 2017 to 2018, but then experienced a minor decrease in 2019. The production exhibited a moderate upward trend until 2021, followed by a subsequent decline in 2022 and 2023. The national production displayed a comparable pattern, reaching its highest point in 2022 and thereafter seeing a decrease in 2023. The oscillations can be ascribed to diverse variables, including shifts in market demand, economic circumstances, government laws, and environmental considerations. The volatility in production, especially the recent downturns, could worsen supply shortages, affecting industries such as building and furniture manufacturing. Nevertheless, these variations could also offer prospects for smaller companies in East Java to augment their market share, potentially resulting in heightened rivalry and innovation.

c. Sawn-Timber

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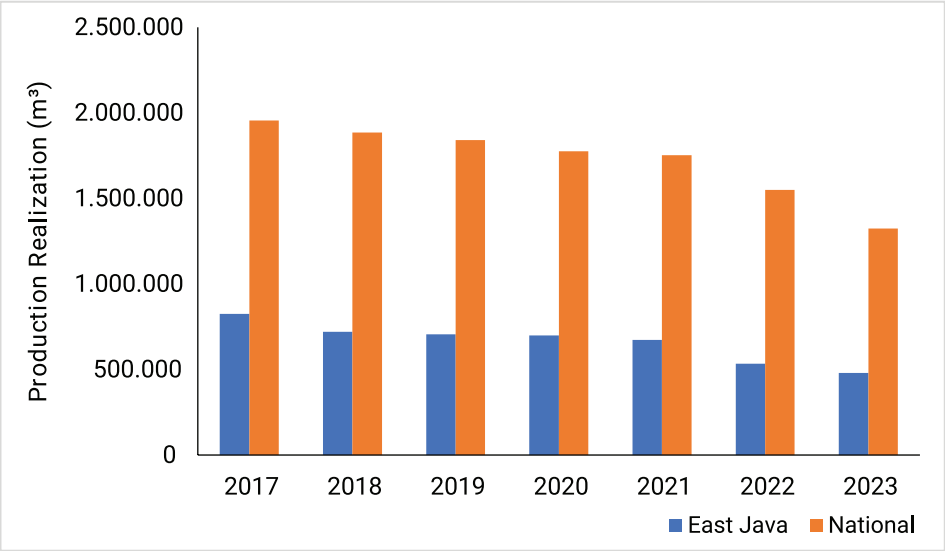

Figure 59 Realization of sawn-timber industry with capacity > 6,000 m^3/year

Figure 59 illustrates the production realization of sawn-timber in the primary timber forest products industry with a capacity greater than 6,000 m^3/year in East Java and nationally from 2017 to 2023. Upon doing a thorough examination of Figure 59, it becomes apparent that there is a continuous difference between the production of sawn-timber in East Java and the national level for the whole observed period. The national production constantly exceeded the output of East Java, frequently by a significant margin. In the year 2017, the region of East Java generated an estimated volume of 750,000 m^3 of processed timber, while the overall production for the entire country amounted to about 2 million m^3. This pattern continued in the following years, with the overall national output reaching its maximum level of over 2 million m^3 in both 2018 and 2019. Similarly, East Java's production reached its peak of roughly 750,000 m^3 in 2021.

In addition, both the production in East Java and at the national level have changed throughout the years. Production in East Java exhibited a consistent level from 2017 to 2019, with a marginal rise in 2020 and a pinnacle in 2021. Nevertheless, there was a decrease in production in the years 2022 and 2023. The decline in sawn-timber production in East Java Province since 2018 could be due to several factors, such as reduced raw material supply or policy changes in the timber industry (Adil et al., 2020). The national production displayed a comparable pattern, reaching its highest point in 2018 and 2019, and subsequently seeing a slow decrease. The data underscores the substantial disparity between the production of East Java and the national output, showing the significance of other regions in the broader industry landscape. The oscillations can be ascribed to multiple variables, including shifts in market demand, economic circumstances, government laws, and environmental considerations. The difference between the production levels at the national and regional levels indicates the possibility of growth in East Java's sawn-timber sector. Policymakers and industry stakeholders in East Java should consider various strategies to maximize production output. These strategies may include providing incentives for investments in sustainable forestry practices, enhancing infrastructure for processing and transportation, and promoting value-added wood products to improve competitiveness in both domestic and global markets.

3) Capacity

The wood processing business can transform raw wood materials into finished wood products that are ready for sale. Encompasses the mill's capacity to precisely cut, refine, and transform wood into various dimensions and configurations as demanded by the market. Furthermore, the wood processing business possesses the capability to effectively and proficiently fulfill evolving market requirements by producing top-notch items. Production capacity refers to the highest possible amount of output that may be generated using the available resources during a specific duration of operation (Kusuma, 2004). Alternatively, the term refers to the highest capacity of an industry to manufacture wood products during a specific timeframe, whereas production realization is the quantification of the number of goods manufactured within that timeframe.

This text will examine the capacity and implementation of the wood processing sector in East Java Province. The province possesses significant potential in the wood processing sector due to its plentiful natural resources, including extensive forests and diverse wood species. In order to maximise the potential of something, it is imperative that we comprehend its production capability and the quantity that has already been created. In recent years, the wood processing industry in East Java Province has experienced a rise in production capacity, primarily due to heightened investment and improved industrial infrastructure. It is crucial to assess the degree to which production has achieved the intended capacity in order to safeguard the survival of the East Java timber sector. In order to enhance the wood industry's economic impact at both regional and national levels, it is crucial for stakeholders to analyse the potential for growth, as well as the challenges and opportunities that must be addressed. This can be achieved by gaining a comprehensive understanding of the capacity and production performance of the wood processing industry in East Java Province. The wood industry is recognised to have significant potential and is expected to be a burgeoning sector for both the regional and national economy, as stated by Dinesta (2023).

a. Plywood and LVL production capacity

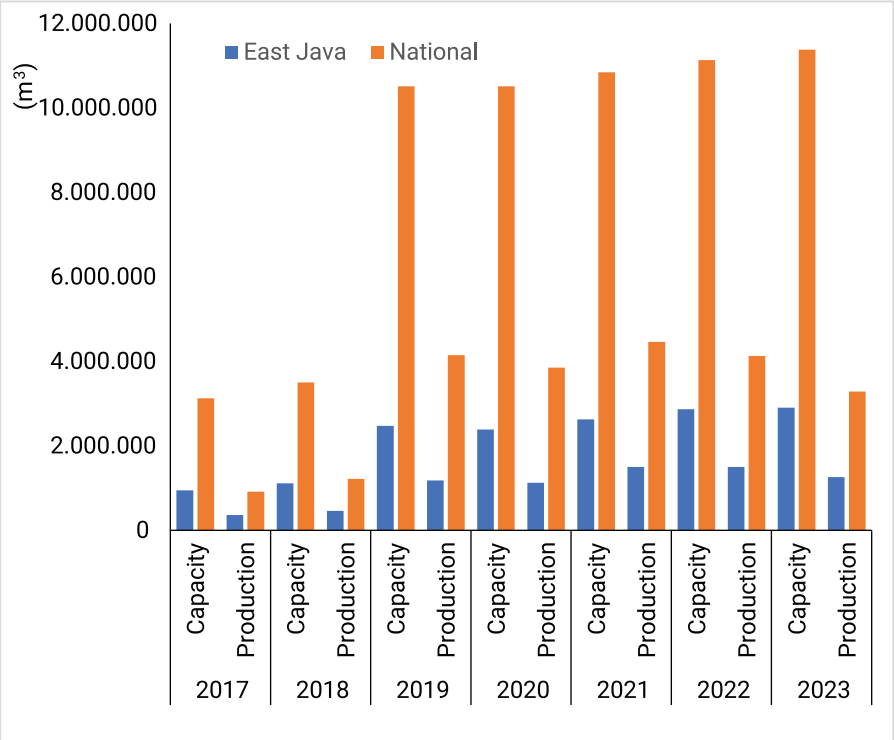

Figure 60 Realization of the level of utility of plywood and LVL industry with capacity of > 6,000 m^3/year

The utilization rate of production capacity, which exceeds 6,000 m^3/year, in East Java Province, exhibits significant variation, as depicted in Figure 60. Over the past nine years, there has been a consistent upward trend in the production capacity of plywood and LVL. Nevertheless, there was a decline in capacity for the period of 2019-2020, resulting in a total of 80,800 m^3. Nevertheless, there is an annual fluctuation observed in the production of plywood and LVL. From 2017 to 2019, the graph exhibits a steady upward trend for four years. From 2018 to 2023, East Java Province boasts the highest capacity and production levels in Indonesia. Nevertheless, the capacity in 2017 secured the second position. The average utility value of East Java Province was 45.02% from 2017 to 2023. The annual utility value of plywood and LVL experienced an increase from 40.18% in 2017 to 43.41% in 2023. Indicates that the East Java Province has effectively enhanced the utilization of plywood and LVL manufacturing capacity over the specified period. Although there is room for further improvement in the utility value, the province's constant rising trend demonstrates its attempts to optimize output and meet market demands. Due to its largest capacity and production in Indonesia, East Java Province can maintain its leadership position in the plywood and LVL industry.

The data collected indicates a substantial rise in plywood and LVL capacity at the national level, from 2017 to 2023, reaching a total of 8.7 million m^3. At the national level, the production value of capacity utility realization fluctuated over the period from 2017 to 2023, averaging 2.7 million m^3. In 2021, the production peaked at 4.5 million m^3. The yearly utility value of plywood and LVL had fluctuations between 2017 and 2023. The mean national utility value is 30.27%, with the greatest attainment of 44.33% in 2017. Consequently, it is imperative to thoroughly optimize and enhance the manufacture of plywood and LVL. To enhance the practical worth of plywood and LVL, it is important to assess and execute more efficient ways to attain superior outcomes in the future. To enhance the wood industry's impact on the regional and national economy, the key stakeholders must identify potential areas of growth, as well as obstacles and opportunities that require attention. Furthermore, the government may contribute by offering incentives and implementing policies that bolster the growth of the wood processing sector. This can be achieved through measures including streamlining investment processes, enhancing infrastructure, and assuring a steady supply of raw materials (Rapitasari and Dwiarta, 2022).

b. Veneer production capacity

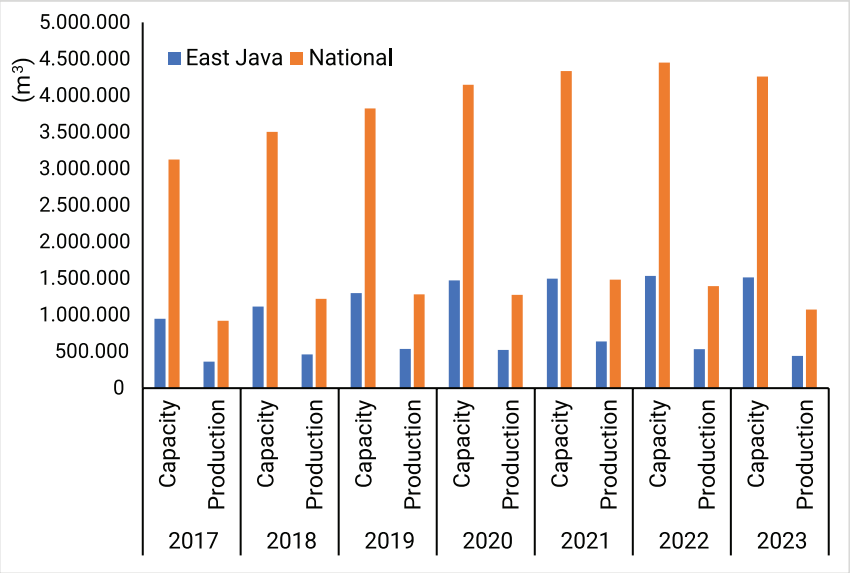

Figure 61 Realization of the utility level of veneer industry with capacity of > 6,000 m^3/year

The data is classified into capacity and production, denoting the highest possible output and the actual output, respectively. According to Figure 61, which presents a summary of the utilization level of veneer production capacity from 2017 to 2023, the capacity value in East Java Province shows a substantial rise from 2017 to 2022, reaching 937,100 m^3. Subsequently, between 2022 and 2023, it underwent a little decrease of 23,000 m^3. At the national level, the capacity value has experienced a substantial rise of 2.1 million m^3 between 2017 and 2022.

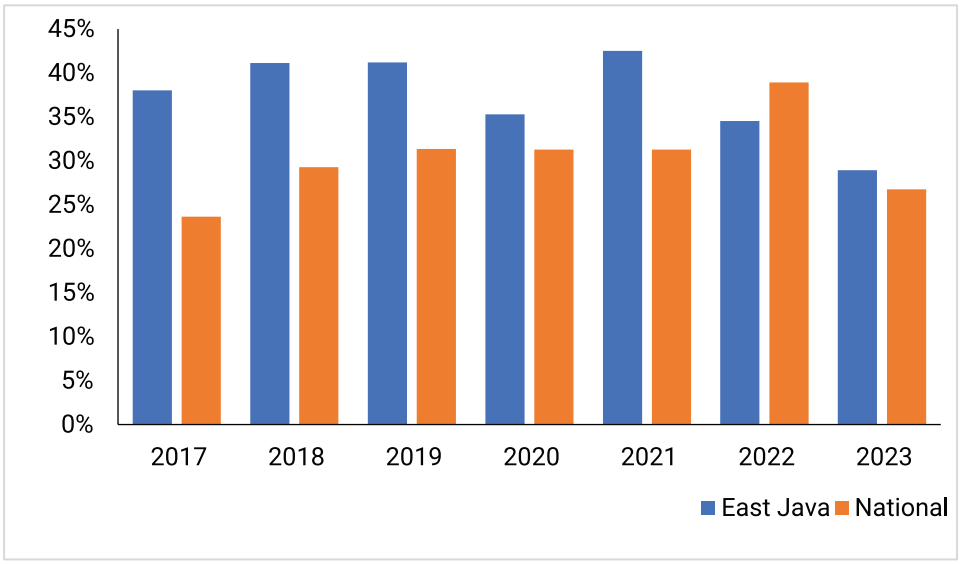

Figure 62 Utility level plan of veneer industry with capacity of > 6,000 m^3/year

The capacity value had a drop of 192.2 thousand cubic meters from 2022 and 2023. The production volume in East Java Province experienced a significant growth of 368.2 thousand cubic meters between the years 2017 and 2021. Furthermore, there

was a further decline of 198,300 m^3 from 2021 to 2023. These findings indicate that the production capability and timber production in East Java Province experienced fluctuations over this time frame. While there was a notable rise on a national scale, there were fluctuating declines and rises at the provincial level. On a national scale, there was a substantial rise in production volume from 2017 to 2021, amounting to an increase of 668,400 m^3. Between 2021 and 2023, there was a further decline of 408,600 m^3. These data indicate that the output of veneer has varied during this era. While there was a decline between 2021 and 2023, the output of veneer witnessed substantial growth from 2017 to 2021. This suggests a shift in the demand and supply of veneer at the national level within the specified period.

Based on the data results obtained from the capacity value and production value, the utility value in East Java Province has seen fluctuations, with an average utility value of 39.73%. At the national level, the utility value experiences a substantial rise from 2017 to 2023, reaching a value of 15.23%. The mean value obtained between 2017 and 2023 is 32.26%. Based on these findings, the East Java Province is among the top 7 regions with the highest utility value on a national scale. This indicates that the East Java Province exhibits a more elevated degree of resource utilization in comparison to other provinces in Indonesia. The utility value in East Java Province consistently and substantially increases each year, despite occasional fluctuations. The East Java Province possesses significant potential for using its natural resources to enhance the well-being of its communities and foster economic growth on a national scale.

The veneer manufacturing capacity in East Java was reasonably consistent, with few changes during the examined period. Nevertheless, the actual output exhibited substantial variation, suggesting that the available capacity was not fully utilized. The peak production was attained in 2021, followed by a subsequent decrease in 2022 and 2023. This indicates possible difficulties in effectively utilizing the entire production capacity, which may be caused by several circumstances, such as fluctuations in the supply of raw materials, market demand, or operational limitations.

On a national level, both the capacity and actual output of veneer followed a similar pattern as in East Java, although on a bigger scale. At the national level, there was clear evidence of capacity being underutilized, as the difference between capacity and production increased in certain years. This indicates a more extensive pattern in the business, maybe impacted by macroeconomic variables or issues specific to the industry. Figure 62 illustrates the inadequate utilization of veneer production capacity in both East Java and the entire country. This could have ramifications for the industry's capacity for expansion and its economic contribution. Additional examination of the root reasons for this underutilization could yield significant insights for policymakers and industry stakeholders to formulate strategies for optimizing production and maximizing the industry's potential.

c. Sawn-timber production capacity

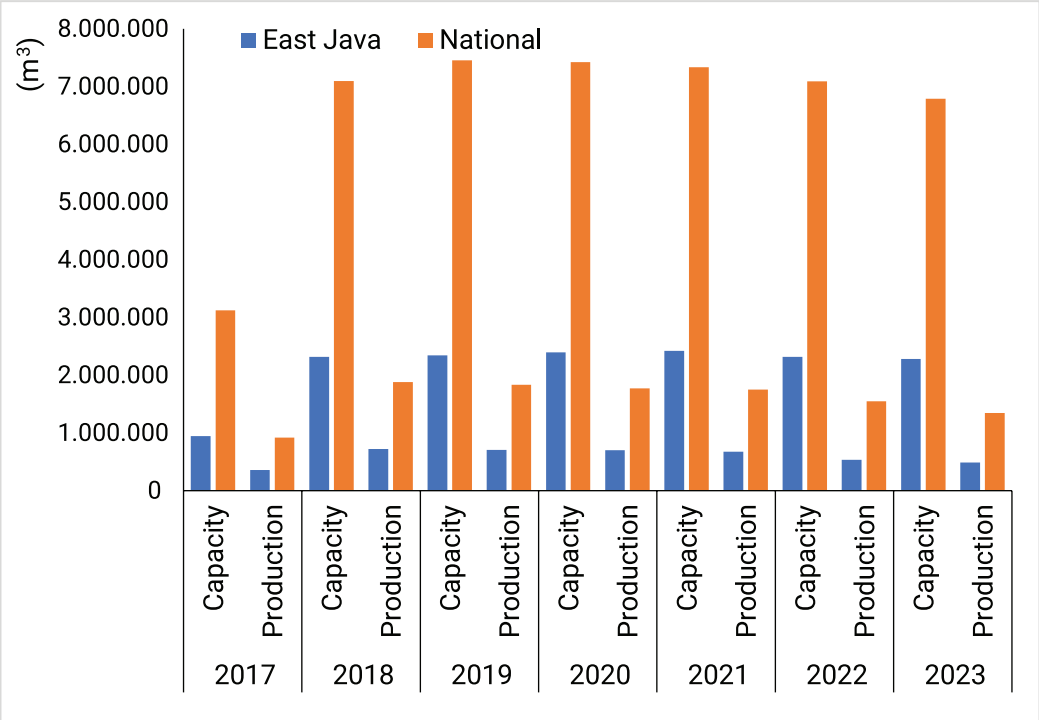

Figure 63 Realization of the utility level of sawn-timber industry with capacity of > 6,000 m^3/year

The data indicates a persistent lack of efficient use of production capacity in both East Java and the national level across the examined period. The installed production capacity in East Java has remained relatively constant, at approximately 2 million m^3/year. Nevertheless, the tangible output displayed significant variations, reaching a peak of around 750,000 m^3 in 2021 and thereafter declining in the following years. This indicates a substantial disparity between the maximum possible output and the actual output, signaling that existing infrastructure and resources are not being fully utilized. At the national level, there is a comparable trend, albeit the output volumes are higher. The national production capacity exhibited a consistent level, although the actual output had fluctuations, reaching its highest point at 2 million m^3 in both 2018 and 2019. Although output levels are higher in comparison to East Java, there is still clear evidence of underutilization of capacity at the national level.

According to the summary of the assessment of the sawn-timber industry with a capacity of > 6,000 m^3/year from 2015 to 2023, East Java Province has shown a substantial rise in capacity value from 2017 to 2021. Subsequently, between the years 2022 and 2023, there was a drop of 39,800 m^3. In terms of the national level, the capacity value has experienced a substantial increase from 2017 to 2021. The output value in East Java Province experienced a substantial decline from 2018 to 2023, amounting to 230,700 m^3. This demonstrates that throughout that time frame, there were notable variations in the output and utilization of sawn-timber industry capacity in East Java Province.

The rise signifies a growth in economic activity within the province. Nevertheless, the substantial decrease observed between 2018 and 2023 suggests alterations in economic circumstances or other variables impacting the production and utilization of sawn-timber in East Java province. At the national level, the assessment of the

actual utilization of sawn-timber production capacity resulted in an 893,300 m^3 increase in production value from 2017 to 2018. Between 2018 and 2023, there was a substantial decline of 535,300 m^3 in the graph.

According to the data collected on the capacity value and production value in East Java Province, the utility value had a considerable decline of 18.69% from 2017 to 2023. The utility value fluctuates between 40% and 21% from 2017 to 2023, with an average value of 30.92%. The national utility value experienced a substantial decline from 2017 to 2023, decreasing by 7.57%. The national utility value varies between 30% and 21%, with an average value of 22.56%. Based on the data analysis results, it can be inferred that the East Java Province is among the top 8 provinces with the greatest percentage of utility values in the entire country. East Java Province exhibits a comparatively elevated degree of utility compared to other provinces in Indonesia. Although the national utility value has decreased significantly, East Java Province continues to hold its place as one of the provinces with the highest utility percentage.

The recap of the assessment of the practical usefulness of plywood, LVL, veneer, and sawn-timber production capacity exceeding 6000 m^3/year from 2015 to 2023 demonstrates that the actual production capacity and output of wood products were lower than the original plan. These potential outcomes must be thoroughly evaluated. Initially, it may lead to the company's incapacity to fulfill market demand. Put simply, if production falls short of the intended target, the company runs the risk of losing market share to rivals or eroding customer trust as a result of insufficient product availability (Nurprabowo dan Rahayu, 2023). Furthermore, failing to achieve planned production levels can lead to a decline in both revenue and profit, as increased product sales are directly correlated with higher revenue. This might cause disruptions to the company's financial forecasts and result in challenges in achieving financial commitments, such as loan repayments or staff salaries.

The inadequate utilization of production capacity has substantial ramifications for both the industry and the area economy. It signifies a lost chance for economic expansion and progress, as the sector has the potential to generate greater income and jobs if it functions at maximum capacity. Moreover, the failure to fully utilize resources may result in inefficiencies and higher production expenses, which could potentially affect the industry's competitiveness. This situation necessitates additional inquiry to ascertain the underlying causes and devise solutions for enhancing production and maximizing the industry's potential. Identifying and addressing the causes that contribute to the underutilization of resources could improve the industry's ability to compete, drive economic growth, and encourage the sustainable use of resources.

IV. CONCLUSIONS AND RECOMMENDATION

4.1 Conclusion

The wood industry in Indonesia is spread across various provinces. The center of the wood industry is in East Java and Central Java. Industrial development is needed in areas that are sources of raw materials, such as Kalimantan and Sumatra. Wood products in Indonesia are very diverse in design and function, ranging from wood poles to finished products. National primary industry productivity with a capacity of > 6000 m^3/year is the largest type of plywood & LVL producers, while on an industrial scale of < 6000 m^3, the largest is sawn-timber producers while the production of plywood & LVL and sawn-timber contributed 7% and 5%, respectively, to the total national production.

The largest national export of wood products by product type is wood panel products, which contribute 28% of total exports. Meanwhile, exports of wooden furniture products contributed 12% of total exports. The disadvantage of wood products in Indonesia is in terms of quality. The realization of national wood production is still far from its capacity, it does not reach 50% of its total production capacity.

Wood products in West Java are dominated by plywood & LVL, veneer, and sawn-timber. Production of plywood & LVL and sawn-timber experienced a fluctuating development trend, while veneer production experienced a significant downward trend. Exports of wood products in West Java are dominated by furniture reaching 2.6 million m^3 in 2022. This indicates the potential for the development of the furniture industry in West Java. The wood industry in West Java is spread across nine regencies/cities. The most significant number of industries is in Cirebon Regency, and the highest productivity is in Banjar City. Commodities located in Cirebon Regency include bare core, blockboard, sawn-timber, plywood & LVL, Medium Density Fibreboard (MDF), and veneer. Meanwhile, commodities produced in Banjar City consist of plywood & LVL, veneer, and sawn-timber. The main source of industrial raw material fulfillment in West Java comes from Community Forests, which contribute 91%, while sources from Perhutani only contribute 4%. Local industry players consider Perhutani wood to have inappropriate SNI sorting rules and higher wood prices than Community Forest wood. Timber from Community Forests is better able to adapt to market needs. This case can be duplicated outside Java, which has more land, but the timber industry is still underdeveloped. The actual production of the wood processing industry in West Java is much smaller than its installed capacity for all types of industries. The capacity utilization rate is generally less than 50%. This condition has been going on for several years. Surprisingly, the industry's capacity continues to grow, so the industry's utilization rate remains less than 50%.

Exports of wood products in Banten are dominated by plywood & LVL reaching 172,000 m^3 in 2020, followed by molding products reaching 23,000 m^3 in 2019 and housing components reaching 24,000 m^3 in 2019. According to the Banten Provincial Forestry Service, the need for raw materials for the timber industry in Banten is 1.2 million m^3/year,

but the availability of raw materials in Banten is only able to meet 400 thousand m^3/year. This causes a raw material supply deficit of 800,000 m^3/year. The source of raw materials for the timber industry in Banten comes from community forests with a contribution of 98.7% while from Perhutani it is only 1.3%. Industry players use more people's wood because of the ease of transactions and flexibility over the price of wood from agreements between farmers and wholesalers. People's forest timber is better able to adapt to market needs. The dominant types of folk wood planted are albasia (sengon), mahogany, and teak. However, the circulation of folk wood in Banten is still difficult to be recorded by the government so the actual potential of folk wood circulating in the market is still unknown. The timber industries in Banten supply their raw materials through imports, in addition to bringing them in from Kalimantan and Sumatra.

In Central Java, the amount of log consumption or log used by the wood industries in Central Java is 3,437,460 m^3 in 2023 (calculation until November). This value decreased by 18% compared to the log consumption of 2022, which was 4,194,278 m^3. Interestingly, log consumption in 2021 was 4,361,208 m^3, which was larger, around 17.7%, than that in 2020. The proportion of log consumption or log used of the industries with a production capacity of < 6000 m^3 is only 9-13% than that of the industries with production capacity > 6,000 m^3. Considering the type of wood products reported by wood primary industries and integrated wood industries, plywood, and LVL show the highest contribution to wood products from Central Java Province, followed by sawn-timber, veneer, blockboard, bare core, particle board, and wood pellet. Wood products that are exported are dominated by panels, woodworking, and furniture, based on the weight of the products. Based on product type, the export value of furniture products dominates the export value from Central Java, which is 673.5 million USD or 41.9%, followed by panel (582 million USD or 36.5%) and woodworking products (222.3 million USD or 13.9%). The volume of wood products for the domestic market reached 7,603,983.65 m^3 which is 69% compared to the export market. A declining export market should be anticipated with smart strategic development. Improving the domestic market is one of the important strategies to support wood industries.

Based on data on production, exports, and domestic sales of wood products in East Java Province, it can be concluded that this province has a very significant role in the national wood industry. The analysis of wood product production and consumption in East Java reveals a dynamic industry with promising growth potential. Production has steadily increased, contributing significantly to the national output, with a notable surge in 2019. Production has generally aligned with national trends, showcasing East Java's significant contribution to the national output, averaging 35%. Notable fluctuations in production occurred, with a substantial increase in 2019, followed by a decline in 2020, and subsequent recovery in 2021 and 2022. The export market has consistently outperformed local sales, indicating strong international demand for East Java's wood products. However, fluctuations in both export and domestic markets highlight the need for diversification and adaptability. The wood processing industry in East Java demonstrates a complex interplay of self-sufficiency and interconnectedness in raw material sourcing, predominantly relying on internal resources while also benefiting from a network of external suppliers. This strategic balance ensures a consistent supply of raw materials for both domestic consumption and export, contributing to regional economic stability.

4.2 Recommendation

Raw materials for the industry come from community forests. The supply of raw materials from community forests is greater than the supply from state forests. With the existing wood supply, it has not been able to encourage an increase in the production capacity of the wood industry in Java. With this situation, the policy challenge is how to provide incentives to develop forests both in Java and outside Java. When land availability in Java is limited, community forests should be built outside Java, at least for timber centers that have transportation routes close to Java.

The realization of LVL, veneer, and sawn-timber nationally and in West Java shows the same indicator, namely having a production capacity that is lower than the installed capacity. Therefore, it is necessary to ensure open information on raw material sources. This will be a reference for business actors to build new industries.

Industry suppliers in West Java are spread across 9 districts. However, the distribution flow of the supply chain has not been mapped properly. For this reason, an information flow system for the supply chain distribution of wood raw materials is needed. The role of stakeholders such as the forestry service is needed to build a supply chain information flow system. The largest supply of raw materials comes from community forests. However, updating information on community forest mapping has not been done properly. The Forest Service can be involved in mapping community forests starting from ownership, address, potential, and types of stands and sales channels.

Quality improvement needs to be done to compete in national and international markets. To increase furniture exports, policymakers must be able to provide information to furniture producers regarding regulations, standards, and international market conditions. Meanwhile, domestic sales focus on woodchips, plywood & LVL, veneer, and sawn-timber products. The government needs to assist and provide information so that wood products in West Java can compete in the international market. Compared with the national scale, West Java's role as a producer of the timber industry is relatively small.

Similar to the industrial ecosystem in West Java, raw material suppliers for the timber industry in Banten are also dominated by community forests. Further, the policy challenge is how to provide incentives to develop community forests both in Java and outside Java. If the availability of land in Java is limited, then community forests should be developed outside Java, at least for timber centers that have transportation routes close to Java.

In increasing wood products in furniture, craft, and construction wood, it is necessary to improve the type of quality wood so that it has a long service life at an affordable price for the middle-class community. Furthermore, product innovation development also needs to be improved by creating attractive and functional designs. The recommendation is to educate the public that using wood products is not an activity that destroys forests but plays a role in protecting the environment. In addition, promotional media should be used to develop the wood industry and its productivity through social media and product exhibition events held weekly. In addition, the realization of the production of the wood processing industry in Banten is smaller than its installed capacity. The capacity utilization rate is generally less than 50%. This condition has been going on for several years. Surprisingly, the timber industry continues to grow while the industrial utilization rate remains less than 50%.

In addition, even though Banten has several problems such as the availability of raw materials, marketing, and capital. Business actors continue to apply for a timber industry business license in Banten. In addition, the permits and industrial realization

are also at most 30%. This is an anomaly that is not by the business feasibility analysis. According to the Banten Provincial Office, there are at least 700 industries that have applied for permits in Banten. However, the agency also experienced difficulties in collecting data on timber circulation. For example, the use of SAKR (People's Timber Transportation Letter) forms are made in 4 layers to be reported to the District Dishut, Provincial Dishut, Ministry of Environment and Forestry, and the rest are brought by the community so that the agency also gets data that can be recorded. After that, the SAKR was replaced with a transport note. This aims to make it easier for the community to make their timber transactions. This memorandum is made independently by the community with a form provided by the village by attaching proof of land ownership and proof of valid documents. The transport memorandum does make it easier for people to sell their timber legally, but the drawback is that the government does not have data to track the circulation of wood produced by people's timber in Banten. Therefore, industry players feel that the supply of raw materials for their industries is still insufficient because, between farmers and industry players, there is no place or platform to make it easier.

To support policymakers in regulating the timber industry in Banten, precise, neat, and structured data is needed. For example, the data recording process from the Tangerang CDK (Forestry Service Branch) is neat and structured. The data collection process that occurs at CDK Tangerang is based on the reports of each company. Companies that are members of the Tangerang CDK area are involved in data reporting for BPHL (Technical Unit of SFM) in the Lampung region. Starting in 2008 when a new Ganis (Tenaga Teknis) was formed, forestry industries were required to have Ganis. Ganis is a worker who has competence in the field of forest management. There is an assessment of the Ganis and the one who issued the registration number of the Ganis area is in Lampung. If there are no forestry technical personnel, the industry cannot issue transport documents because it concerns the reporting of LMK (Timber Mutation Report) to BPHL Region 6 Bandar Lampung.

Each region has BPHL, but the data collection is not as comprehensive as in the Tangerang CDK. Reports from the industry are not only placed on the table but recapped annually until they become a habit and administrative order. BPS is also proactive in reminding and requesting data so that CDK Tangerang also actively participates in collecting data as a control over the forestry industry in its work area. In addition, there are no sanctions for the disorder of industrial administration that makes the CDK office. Based on information from the Tangerang CDK, this concerns the activeness of each officer at the CDK office. The reporting system is contained in the Regulation of the Minister of Environment and Forestry no. 8 of 2021 but is not intended to be mandatory to report. There needs to be clear rules and strict implementation in the field from the ministry. It is required to report data on the Wood Mutation Report (LMK), a control system from CDK for the timber industry. And the incentive and disincentive system for CDK who are diligent in collecting data. If these processes are also applied in other CDKs, the data related to the timber industry will be more complete so that the government can also make policy interventions to improve the timber industry nationally.

Recommendations to enhance the domestic market for wood products in East Java consist of several inputs. Firstly, there is a need to increase awareness of natural resource sustainability, especially in terms of forest management and replantation. This requires encouraging communities to take an active part in maintaining existing forests and conducting replantation. Secondly, a need to provide incentives to implement the SVLK throughout the wood industry supply chain. This can be achieved by simplifying assessment procedures and offering clear monetary benefits to businesses that comply with timber legality standards. Thirdly, promoting and improving product quality and choice, as well as

organizing design competitions, can help increase the domestic market for wood products. Fourthly, government, industry, and society must work together to create an enabling environment for the sustainable growth of the timber industry. Finally, the development of the timber industry requires a broad approach involving economic, social, and environmental aspects. This means building strategies that benefit both the business and the surrounding community.

Further research could delve into the underlying causes of the wood industry distribution in East Java, the economic impact of the sector in each region, and potential policy interventions to promote more balanced and inclusive growth. The analysis of production and supply data reveals a promising outlook for the wood processing industry in East Java. While the plywood and LVL industries exhibit growth opportunities, veneer and sawn-timber production still face challenges. Despite these challenges, East Java Province maintains its leading position in Indonesia's wood industry. To ensure the industry's future efficiency and sustainability, a deeper understanding of production capacity utilization and the factors influencing production is essential. By addressing these issues, stakeholders can enhance the industry's competitiveness, foster sustainable practices, and contribute to both regional and national economic growth.

While the wood processing industry in East Java shows promise due to its self-sufficiency in raw materials and established inter-regional trade networks, there are significant challenges that need to be addressed. A major concern is the discrepancy between the number of industries registered in official databases (SI-RPBBI, OSS, SIINAS) and the estimated number of wood processing entities operating in the province. This discrepancy, coupled with the presence of unlicensed operators, hinders accurate mapping of the industry's productivity and market reach, posing a significant obstacle to effective policy-making and sustainable development.

To ensure sustainable growth, East Java must address challenges such as environmental concerns and market fluctuations. This involves embracing sustainable practices, adapting to changing consumer preferences and navigating international regulations. By doing so, the region can leverage its strengths to further develop its wood industry while minimizing environmental impact and maximizing economic benefits for local communities. In conclusion, East Java Province plays a crucial role in Indonesia's wood product industry, with significant potential for further growth and development. However, sustainable practices and adaptability to market fluctuations are essential for long-term success. Further research is needed to pinpoint the precise factors influencing these trends and to develop strategies for a resilient and environmentally responsible wood industry in East Java.

More extensive educational campaigns are needed to raise consumer awareness about environmental sustainability and forest protection. By improving people's knowledge and understanding of environmental issues, these initiatives have encouraged the adoption of environmentally friendly habits such as waste reduction, recycling, and responsible consumption (Saputra et al., 2023). Producers should also be active in obtaining certification for their wood products to assure customers that the goods they buy come from sustainably managed forests. As a result, customers will be more trusting and more likely to choose certified wood products.

Weak compliance and law enforcement are significant obstacles in implementing government regulations related to wood products in Indonesia. Despite precise timber management and forest conservation rules, many violations still occur. It can be caused by

many things, such as a need for more awareness of the importance of forest conservation, corruption in the forestry sector, and difficulty gaining access to and monitoring remote areas. In addition, there needs to be better cooperation between the central and local governments. In some cases, local governments do not understand the regulations or do not have enough resources to monitor and enforce them. In addition, it is often the case that people understand and interpret the rules differently, which means violations go unpunished. It is essential to raise public awareness about safeguarding forests, fighting corruption, and strengthening monitoring and enforcement systems relating to wood products. Illegal logging is a form of deviation from proper forest utilization. The regulatory conditions and the criminal legal basis for preventing and eradicating illegal logging are not comprehensive enough to address existing violations (Irawan & Astuti, 2021). Governments should inform the public about the adverse effects of illegal logging and the timber trade. They should also encourage people to report such violations actively. In addition, the government must also make internal improvements. Includes improving employees' knowledge and capacity on regulations related to wood products enhancing inter-agency cooperation in monitoring and enforcement. This comprehensive and collaborative effort is the only way to address the challenges of enforcing regulations related to wood products. It will help the timber industry survive and protect natural resources.

East Java faces several issues related to the forestry sector, including:

1) Unfair competition arises between business actors who do not have a license or already have one. Not all wood industry have a Forest Product Processing Business License (PBPHH). PBPHH is a license for business actors to start and run forest product processing businesses and activities. In addition, many businesses have yet to understand and comply with regulations about wood products, such as sustainable wood certification requirements. Therefore, extensive and synergistic efforts are needed between the government, relevant agencies, and businesses to improve the capacity and knowledge of relevant employees and enhance inter-agency cooperation in supervising and enforcing these regulations. Therefore, obstacles to implementing wood product regulations in East Java can be adequately resolved.

2) Small and medium-scale forest product processing license holders still need SVLK; PBPHH holders must be verified. Shows that implementing regulations related to wood products is still an issue in East Java. Therefore, the government, relevant agencies, and businesses should work together to improve the capacity and knowledge of appropriate staff. Inter-agency cooperation also needs to be strengthened to monitor and enforce regulations better. In addition, small and medium-scale forest product processing license holders should also ensure that they have SVLK through mandatory verification of PBPHH holders (Suryandari et al., 2017). Thus, better regulations can be applied to everyone involved in the production chain of wood products.

3) Business actors in the forestry sector still need to implement forest product administration fully to the requirements. The orderly implementation of forest product administration is used to assess the performance of companies in the forestry sector. The orderly implementation of forest product administration is critical to evaluate the performance of companies in the forestry sector. Quality companies ensure that all wood products come from legal and sustainable sources. By having SVLK, SMEs wood industry can ensure they have complied with regulations. So, everyone in the wood product production chain can work more efficiently and comply with existing regulations.

Strict supervision and monitoring of small-scale forest product processing is the solution. In such a situation, the government can strengthen the agency responsible for supervision and increase the number of people involved. Businesses should also be educated on the importance of complying with regulations and their consequences. Strict supervision and monitoring are expected to ensure that all wood products come from legal and sustainable sources to ensure transparency and accountability in the small-scale forest products processing industry. Maintaining forests' sustainability and reducing negative environmental impacts are very important. In addition, the government should cooperate with international organizations and non-governmental organizations to improve management standards in the small-scale forest product processing industry. By doing so, a shared awareness and commitment to maintaining biodiversity and the sustainability of existing natural resources can emerge. Protecting vulnerable forest ecosystems from irresponsible exploitation is a crucial objective of this action. In addition, ensuring that all wood products come from legal and sustainable sources can encourage sustainable economic growth in the forest product processing industry. The SVLK program's support is expected to guarantee timber legality and improve the quality of wood products (Esfandiary et al., 2023). A better and more transparent management system can be achieved in the small-scale forest product processing industry through practical cooperation between the government, international agencies, and non-governmental organizations. This will help restore and preserve biodiversity and sustain our natural resources in the long run.

The development of the wood industry needs support by covering a range of strategic initiatives, including market encouragement, restructuring of machinery and equipment, and promoting the quality of East Java's wooden furniture in the export market. Wood is the third largest export commodity in East Java, after jewelry and oil. The wood industry in East Java, especially the SMEs, is quite significant in scale. However, the industry is faced with competition from imported non-wood substitutes. To overcome this challenge, the East Java Government is taking proactive measures to encourage the market through activities such as product photography competitions, building communal branding, and including furniture products in inter-island trade missions to expand market share and increase the competitiveness of local products (Atahau et al., 2019).

Furthermore, restructuring machinery and equipment focuses on improving production efficiency and quality. The policy of replacing old equipment with a value of 30% and providing a 25-30% reimbursement for SMEs that purchase new machinery can be a positive impetus for small and medium industries to improve their production technology. Based on this information, East Java wooden furniture quality has reached export quality standards; this is a significant competitive advantage and needs to be actively promoted in the international export market (Puritamara et al., 2022).

The forests in East Java are dominated by timber species such as teak, pine, and rosewood. However, it should be noted that the second plant has been affected by many diseases, so other varieties are planted, such as balsa, which produces around 300 m^3/hectare and is most widely planted in Banyuwangi and the surrounding areas. Wood production from Perhutani reaches about 400-500 thousand m^3.

Several conclusions and recommendations can be drawn to increase the consumption of wood products in East Java Province:

1. There is a need to raise awareness of natural resource sustainability, especially in

forest planting and management. It involves incentivizing communities to be more active in planting trees and maintaining existing forests.

2. Further encouragement is needed to implement the SVLK throughout the timber industry supply chain. It can be achieved by simplifying the assessment process and providing clear economic incentives for SVLK holders.

3. The importance of developing the domestic market for wood products through various initiatives such as product promotion, design competitions, and improving product quality and variety.

4. The synergy between various stakeholders, including the government, industry, and communities, is essential to create an environment conducive to the sustainable growth of the timber industry.

5. A holistic approach involving economic, social, and environmental aspects is needed in developing the timber industry. Includes the development of strategies that are not only profitable from a business perspective but also have a positive impact on the surrounding community and environment.

The industry's production capacity has shown an upward trajectory, yet the underutilization of this capacity raises significant concerns regarding its growth potential and economic contribution. This inefficiency not only represents a missed opportunity for increased revenue and job creation but also poses challenges to the industry's competitiveness due to potentially higher production costs. In the domestic market, this underutilization could lead to supply constraints, price fluctuations, and reduced affordability of essential wood products for key sectors such as construction and furniture. Furthermore, the underutilization may deter potential investors and impede the industry's overall growth trajectory. These findings underscore the need for further investigation into the underlying factors contributing to this underutilization and the development of targeted strategies to optimize production processes and maximize the industry's potential for sustainable growth and economic development. By implementing these recommendations, it is hoped that the timber industry in East Java can continue to develop sustainably and significantly contribute to the economy and welfare of the local community.

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DEVELOPMENT OF SUSTAINABLE DOMESTIC MARKET FOR WOOD PRODUCTS

- 2025 -