Articles

The Role of the Forestry Sector and Processed Forestry Industry on the Economy in West Java, Indonesia

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Abstract

The contribution of the forestry sector is still very small in the West Java region. The continuation of the forestry and processing sector needs attention to improve and develop the sector. This study aims to (1) analyze the role of the forestry sector and wood processing industry (2) analyze the effect of changes in final demand on the output of the forestry sector and the wood processing industry and (3) the right policy formula to develop the forestry sector in West Java. The method used in this study is the input output method supported. The data is sourced from the West Java Regional Development Planning Agency (Bappeda) in the form of a soft copy of the input output table where the year of publication is 2015. The results show the contribution of the forestry sector is only 0.85 % of the agriculture and forestry sector. The wood processing industry only grew by 0.04 % and the forestry sector only grew by 0.01 % if investment had increased between 5–10 %. The role of the forestry sector and wood processing industry can be improved if the government tries to pay attention to regulations that have the potential to overlap which inhibits the growth of investment and licensing of the forestry business and processing industry. The government also needs to involve the community in managing community-based community forestry areas. Benchmark prices need to be regulated to avoid the risk of price uncertainty that can harm society.

Keywords: economy, forestry sector, forestry industry, government.

1. Introduction

The forestry sector in general has not contributed much to economic growth. The contribution of the forestry sector to the GRDP of the agricultural sector was only 0.86 % in 2016. The value even decreased when compared to 2015 which was 0.93 % (BPS, 2019). In detail the contribution of the forestry sector over the past 5 years is presented in Table 1.

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Table 1. Contribution of the forestry sector in the period 2014-2018 forestry

Sector	2014	2015	2016	2017[*]	2018[**]
Agriculture, Livestock, Hunting and Agriculture Services	88.47	88.19	88.36	87.83	88.18
Food Crops	47.75	48.2	48.63	45.97	47.14
Horticultural Crops	18.55	18.08	18.43	19.38	19.45
Plantation Crops	8.42	7. 72	7.15	7.75	6.92
Livestock	12.23	12.68	12.64	13.22	13.15
Agriculture Services and Hunting	1.52	1.51	1.51	1.51	1.5
Forestry and Logging	0. 96	0.93	0.86	0.86	0.82
Fishery	10.56	10.88	10.78	11.3	10.99
Agriculture, Forestry and Fishery	100	100	100	100	100

Source: BPS, 2019
*provisional numbers
**temporary numbers

The contribution of the forestry sector is still small, indicating that the role of the forestry sector is still very small in the economy of West Java. Indeed, the role of the sector can be optimized if the forest area is utilized by a State-Owned Enterprise together with the community. Purbawiyatna et al. (2012) the policy framework does not yet support sustainable community forest management, especially the clarity of the legal status of forest rights, institutional forest management, forest management techniques and incentive frameworks needed. Communities have economic motives and good perceptions about the importance of the function of forest protection. This can be the capital of the government and a State-Owned Enterprise (BUMN) inviting the community to develop community forests and government forests managed by SOEs.

The West Java Provincial Forestry Service has a Strategic Plan to increase production of forest products. The Forest Service Strategies are (1) Increasing timber production through intensive silviculture systems, (2) Increasing the efficiency of forest product production, (3) strengthening and building commitments of all forestry business actors and (4) increasing marketing of forest products. The strategy to increase wood production through a silvicultural system is formulated into 2 policies, namely (1) increasing knowledge and skills through counseling, education and training on intensive silviculture systems and (2) facilitating agroforestry/social forestry models in forest management. The strategy to increase the efficiency of the production of forest products is implemented through a policy of developing and increasing the efficiency of the processing industry of timber and non-timber forest products. The strategy to strengthen and build the commitment of all forestry business actors is implemented through policies (1) monitoring and evaluation of wood production in state forests and (2) fostering forest product entrepreneurs. The strategy to increase the marketing of forest products is carried out through (1) policies for developing a business network for marketing forest products and (2) promotion of forest products (Dinas Kehutanan, 2013).

Furthermore, local governments have sought economic development of communities around the forest. Perum Perhutani (State-Owned Enterprises) has conducted a populist program called Community-Based Forest Management (PHBM). Etzkowitz and Ranga (2010); Arman et al. (2018) collaboration of government, industry and universities are expected to help in developing the people's economy. This program is very important to revive the hopes of the people who live around the forest. They can voluntarily use the forest area as a sustainable source of the economy. Forest utilization provides added value if the results of forest management are related to the forestry industry. Mattila et al. (2011) the forest industry is closely related to other economies. This happens because the multiplier effect of the supply chain is greater than the origin sector. This shows that the economic system has interdependent relations to various parts (Leontief, 1936).

The forest sector modeling approach seeks to use wood in synergy with the forestry industry and the bioenergy sector consistently (Trømborg, Solberg, 2010). Munday and Roberts (2001) found that forestry and the forestry industry have a degree of interdependence between the rural

economy. The wood processing industry has strong links with other parts of the economy. From this analysis, it was concluded that joint development of the forestry and wood processing industries could increase economic development in rural areas (Psaltopoulos, Thomson, 1993). Forestry development in Scotland has very different long-term consequences, especially in terms of output and job creation in rural areas (Thomson, Psaltopoulos, 2005). The wood pellet industry in Vienna contributed to the economy through the creation of a number of workers in the region. Providing the wood waste market as an industrial bio-material can increase the creation of workforce (Joshi et al., 2012). Local governments have a significant opportunity if the value of most of the industrial forest area can be used well managed. This can have a significant influence on rural development and regional development in West Java, Indonesia.

Demand and use of forest resource inputs varies greatly across industrial sectors including for paper products and the furniture manufacturing industry (Chen et al., 2015). This shows that forest management must pay attention to ecosystems to avoid over-exploitation. The Forest Service in the strategic plan also pays attention to ecological-based forest management. Korhonen et al (2001) the Finnish forest industry developed a recycling model for building ecosystems. Industrial ecosystems are built through the flow of matter, nutrition, energy and carbon. Santoso (2006) Extraction of natural resources (forests) should be followed by recovery of nature (forests) to protect the ecosystem.

2. Research Methods

This study uses the input output (IO) method combined with descriptive analysis. Descriptive analysis using secondary data from the Central Statistics Agency (BPS) is supported by a literature review that reinforces the research findings. The OI data used are 2015 data obtained from the Regional Planning Agency (Bappeda). The data is obtained in the form of tabulations and is presented in exel documents. Data calculations use the formulas presented in the exel dashboard. IO data used in this study consisted of 52 sectors. The main sectors discussed in this study are (1) forestry and logging, (2) wood industry, wood and cork goods, woven goods from bamboo, rattan and the like (wood processing industry) and furniture industry. Other sectors discussed are sectors that have close links with other sectors.

Miller and Blair (2009) Leontif lays down 3 basic principles or assumptions on IO, namely (1) linearity, (2) homogeneity and (3) additivity. Linearity requires changes in output caused by changes in proportionality. If it is not proportional, it will have an effect on the excess number of inputs so it is not used in certain sector activities. Homogeneity means that each sector produces a single output with a single input structure (Bureau, 2016). Mathematically IO has matrix nxn, it can be simply presented a technology matrix, Matrix A:

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ a_{31} & a_{32} & \cdots & a_{3n} \\ \vdots & \vdots & \ddots & \cdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \quad \text{..} \quad (1)$$

Value of $a_{11} \cdots a_{nn}$ on matrix A is the direct input coefficient obtained from equation (2)

$$a_{ij} = \frac{Z_{ij}}{X_j} \quad \text{..} \quad (2)$$

$$Z_{ij} = a_{ij}X_j \quad \text{..} \quad (3)$$

Furthermore equation (3) can lowered into the new formula into equation (4)

$$\begin{matrix} X_1 = & Z_{11} & Z_{12} & \cdots & Z_{1n} & Y_1 \\ X_2 = & Z_{21} & Z_{22} & \cdots & Z_{2n} & Y_2 \\ X_3 = & Z_{31} & Z_{32} & \cdots & Z_{3n} & Y_3 \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots \\ X_n & Z_{n1} & Z_{n2} & \cdots & Z_{nn} & Y_n \end{matrix} \quad \text{.......................................} \quad (4)$$

Equation (4) can then be modified to equation (5)

$$
\begin{aligned}
X_1 &= a_{11}X_1 + z_{12}X_2 + \cdots + z_{1n}X_n + Y_1 \\
X_2 &= a_{21}X_1 + z_{22}X_2 + \cdots + z_{2n}X_n + Y_2 \\
X_3 &= a_{31}X_1 + z_{32}X_2 + \cdots + z_{3n}X_n + Y_3 \\
&\;\;\vdots \qquad \vdots \qquad \vdots \qquad \ddots \qquad \vdots \\
X_n &= a_{n1}X_1 + z_{n2}X_2 + \cdots + z_{nn}X_n + Y_n
\end{aligned} \tag{5}
$$

By using algebraic maneuvers, equation (5) can be made at home in equation (6)

$$
\underbrace{\begin{bmatrix}
a_{11} & a_{12} & a_{13} & \cdots & a_{1n} \\
a_{21} & a_{22} & a_{23} & \cdots & a_{2n} \\
a_{31} & a_{32} & a_{33} & \cdots & a_{3n} \\
\vdots & \vdots & \vdots & \ddots & \vdots \\
a_{n1} & a_{4n} & a_{4n} & \cdots & a_{nn}
\end{bmatrix}}_{\mathbf{A}}
\underbrace{\begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ X_4 \\ X_n \end{bmatrix}}_{\mathbf{X}}
+
\underbrace{\begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \\ Y_4 \\ Y_n \end{bmatrix}}_{\mathbf{Y}}
=
\underbrace{\begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ X_4 \\ X_n \end{bmatrix}}_{\mathbf{X}}
\tag{6}
$$

Equation (6) can be simplified by using matrix notation into equation (7), equation (8) equation (9).

$$AX + Y = X \tag{7}$$
$$X - AX = Y \tag{8}$$
$$[I - A]X = Y \tag{9}$$

The result is equation (10) which results in a matrix multiplier or more dinal with the Leontief Inversion matrix. This matrix describes the exogenous changes that change the value of final demand Y versusoutput. X Furthermore, it can be written in the form of equation notation (10)

$$X = [I - A]^{-1}Y \tag{10}$$

The magnitude of the change in Y to the change in output X is reflected in the delta symbol (Δ). This shows what the value of ΔX for each change in final request is ΔY. Notation can be presented in equation (11)

$$\Delta X = [I - A]^{-1}\Delta Y \tag{11}$$

IO can record how the interrelationships between input-output. The linkage through two ways, namely backward linkage and forward linkage. The two linkages explain how the effect of (1) an increase in sector i output affects sector output j and (2) an increase in sectoroutput i can increase the distribution of output to the sector itself, namely sector i and other sectors j. If a sector has a backward linkage index and forward linkage index greater than 1, the sector is very good and strategic in improving the economy in West Java. The formula used to produce Backward Linkage Index (IBL) and Forward Linkage Index (IFL) values is presented in equations (12) and equation (13).

$$IBL = \frac{\sum_{i=1}^{n} b_{ij}}{{}^{1}/_{n} \sum_{i=1}^{n} \sum_{j=1}^{n} b_{ij}} \tag{12}$$

$$IFL = \frac{\sum_{j=1}^{n} b_{ij}}{{}^{1}/_{n} \sum_{i=1}^{n} \sum_{j=1}^{n} b_{ij}} \tag{13}$$

3. Results and discussion

Forestry sectors based has not been able to appear as a mainstay sector in West Java. This is reflected in the value of the forestry sector, the wood industry (processing) and the furniture industry having a forward linkage index value of one, only a backward linkage index value of one. These results indicate that the forestry-based sector's production capacity is still small while the inter-sectoral linkages, although quite good, are of relatively small value. The detailed results of the analysis of the forest-based sector are presented in Table 2.

Table 2. Value of Backward Linkage Index and Forward Linkage Index

Sector		BL	Index Backward Linkage	FL	Index Forward Linkage
6	Forestry and Logging	1.216	0.610	1.239	0.622
16	Industrial Wood, Articles of Wood and Cork and Woven Goods from Bamboo, rattan and the like	2.074	1.041	1.821	0.914
25	Furniture Industry	2.555	1.282	1.456	0.731

Results of Table 2 is sufficient to illustrate that the forestry-based sector has not yet become a strategic sector in West Java. Its role is still relatively small when compared to other sectors and industries. Only the wood industry, wood products and woven goods from bamboo, rattan and the like (wood processing industry) which have index value of *backward linkage* more than 1, that is 1.282. These three sectors have index value *forward linkage* of less than 1. These results reflect that the three sectors have not been able to produce greater production output when compared to other sectors. This also reflects that the human resources involved in these activities are relatively small. Furthermore, the production of forest products does not yet have a market buffer, both in the processing sector and in exporting companies.

The other side of the farmers also faces the problem of obtaining high quality seeds. The export market has specifications of the types of quality seeds to produce good wood. Quality wood can only be realized if farmers have quality seeds and good cultivation. Market, human resource and input issues are factors that have caused the forestry sector and the processing industry not to function properly. This issue needs to be addressed by increasing the participation of the Ministry of Forestry in determining the local benchmark wood prices (HPS), by using the export price of logs or international prices. This can increase community income and maximize or protect state revenues from management fees for timber forest products.

Furthermore, industrial business licenses (IIU) are still experiencing problems. These constraints are caused by differences in regulations between the ministry level and the region. The granting of permits for the use of forest products is still considered inefficient because of overlapping authority which results in high costs and permits felt to be long and many costs must be incurred both in the district and province. Astana et al (2014) concerning permit regulation that came from Minister of Forestry Regulation Permenhut.P.11/2008 Regarding the Second Amendment to the Forestry Minister's Regulation Number P.19/Menhut-II/2007 concerning Procedures for Granting Permits and Expansion of Work Areas for Utilizing Timber Forest Products in Industrial Plantation Forests in Plantation Forests in Production Forests (Pemerintah Indonesia, 2018) by the Minister of Agriculture Decree No.357/ KMS/HK.350/5/2002 concerning Settlement of Plantation Business Permits shows a great potential for overlapping (Pemerintah Indonesia, 2002).

The overlap lies in the licensing mechanism of oil palm plantations where there is a clause stating that the granting of permits in one regency / city area through the Regent or Mayor with a copy to the Minister of Forestry. Another regulation states that the issuance of a cross permit through the Governor with a copy to the Minister of Agriculture. The regulation can cause overlapping land management. Land that was originally located in one unit of management area can be difficult for management if the land is to be expanded to manage 2 areas. Overlapping issues can lead to legal uncertainty which results in small investment performance. The small amount of investment causes the sector's leverage to become small. The small leverage with investment and export growth scenarios of 5 % in the wood industry and furniture industries accompanied by investment leverage increases 10 % in the forestry sector is reflected in Table 3.

Table 3. Changes in the leverage of the forestry-based sector with various scenarios

Sector		Initial Output (IDR)	Final Output (IDR)	Growth (%)
6	Forestry and Logging	4,504,150.00	4,555,267.00	0.0112
16	Manufacture of Wood, Goods from Wood and Cork and Woven Goods from Bamboo, Rattan and the like	43,967,624.00	45,831,596.00	0.0407
25	Furniture Industry	14,320,408.00	14,326,102.00	0.0004
31	Trade Cars, Motorcycles and reparation	52,205,041.00	52.259,680.00	0.0010
32	Wholesale and Retail, not Cars and Motorcycles	301,175,758.00	301,457,051.00	0.0009
38	Warehousing and Supporting Services Transport, Postal and Courier	7,005,152.00	7,010,861.00	0.0008
45	ServicesFinancial Support	1,178,755	1,179,790.00	0.0009

Research results show that when the output of forestry and logging sector inventor change became positive and accompanied by an increase in exports by 10 % had an effect on the growth of the wood forestry sector by 0.01 %. The growth of the forestry and logging sector did not have much influence on the performance of other sectors. Although the scenario of investment growth and exports in the forestry sector is very high at 10 %, the effect on other sectors and the forestry sector itself is very small. This means that the contribution of the forestry sector to aggregate economic activity in West Java is still small. Furthermore, the forestry sector does not provide much added value, both to the forestry sector itself and other sectors. This sector only had an influence on the retail trade sector by 0.0009%, the wood goods industry sector by 0.003 %.

But the results are different if the sectors that are encouraged to grow are the wood industry, wood products, and woven goods from bamboo, rattan and the like (wood processing industry) and the furniture industry. Increased investment by 5 %, and exports by 5 % had an influence on the economic growth of the wood processing industry by 0.04 % in the sector. The influence of the growth of the wood processing industry has broad implications for various economic sectors in West Java. The sectors that gained the most influence were the forestry and logging sectors by 0.01 %. This shows that the forestry sector can grow well if the government encourages investment and exports of the manufacturing industry accompanied by the growth of private consumption in the sector. Growth in private consumption in the wood processing industry is very possible because investment growth of 5 % can have an influence on employment and value added of labor wages.

The growth of the furniture sector is apparently not so influential with an increase in exports and investment of 5 %. The sector can only grow by 0.004 %. This gives a signal that the furniture industry is not yet large in economic relations with the wood processing industry and the forestry sector. The growth of the industrial sector more affected the large trade sector by 0.0009 %, the warehousing and transportation services sector by 0.0008 %, financial support services by 0.0009 % and the car trade sector by 0.001 %.

The wood processing and forestry industry has an important role and contribution to several economic sectors in West Java. Although small in number but the forestry industry has links with several sectors. This shows that the manufacturing sector has quite a wide spread effect, although its value is small. The size is influenced by the volume of production. If the production volume is large, it can produce a fairly large spread of power.

The contribution of the forestry sector is still very small towards the economy of West Java. The economic prospects of Jabon and Sengon plants are quite good, but the market constraints are still relatively limited. Furthermore, the relatively large amount of investment and the long waiting period for the harvest meant that farmers who had limited capital were unable to develop Jabon and Sengon cultivation. Cultivation of forestry plants is more developed for large enough capital

owners. This is one of the reasons that the cultivation of forestry plants is small so that the effect on economic activities is also small.

The government needs to optimize the use of production forest land and cultivation land to develop the forestry and logging sector as well as the processing industry. The management of log industry and trade is based on ministerial regulation 55/Menhut-II/2006 concerning the administration of forest products originating from state forests.

The scale of the forest processing business based on the research results of Astana et al (2014); Sari (2016) is still very economically feasible. This shows that the forestry sector is able to overcome social problems and provide solutions to development. The government needs to synergize the management and processing of forests between entrepreneurs and the community. Industrial Forest Land owned by State-Owned Enterprises (BUMN) can be managed by utilizing the community around the forest. Their involvement is expected to reduce the risk of forest encroachment, on the other hand increase community income. Community-based community involvement where they are not only involved as workers but as managers. The government provides assistance especially in terms of maintenance and cultivation to marketing. This pattern can increase the existence of state-owned companies and increase people's income and reduce social problems. Utilization of state-owned forests has been realized as the findings of Panlevi (2019) where land owned by Nusantara VII Limited Company (PTPN) was lent to the surrounding community to be managed on a community-based basis. The community conducts cultivation and development of Ciwaluh coffee in Bogor, West Java. The use of the land is to maintain the function of the forest as well as to build community youth communities to have jobs. The land is managed voluntarily and all profits are left to the community.

In addition to increasing land use optimally, the government also needs to develop a wood processing industry. The wood processing industry has economic links with various sectors. Increased output of the wood processing industry can revive other economic activities such as the financial services sector, trade, warehousing, transportation services and forestry. This shows that the development of the forestry sector must be done in parallel with the processing industry and the study of legislation. The government must conduct a review of legislation to address regulatory issues that can "hinder" investment. Inter-ministerial regulations must in fact be synergistic in order to avoid legal problems. Legal certainty and legal protection are important instruments to guarantee the implementation of investments, workers' rights and environmental sustainability. There are many regulations that need to be integrated between regulations relating to forestry, the environment and the workforce.

4. Conclusion

The forestry sector and wood processing industry in West Java have not contributed much to development. Its contribution is still very small compared to the agricultural sector. The wood processing industry only grew by 0.04 % and the forestry sector only grew by 0.01 % if investment had increased. This low growth shows that the economic activity of the forest processing sector and industry has little effect. Furthermore, low growth in the forestry sector and wood processing industry still has hope in helping the economy of West Java. The growth of the manufacturing industry has an influence on the growth of the sectors of transportation, warehousing, financial services and trade.

The role of the forestry sector and wood processing industry can be improved if the government tries to pay attention to regulations that have the potential to overlap which inhibits the growth of investment and licensing of the forestry business and processing industry. The government also needs to involve the community in managing community-based community forestry areas. Community participation in forest management can reduce illegal forest encroachment, on the other hand increase community income. Benchmark prices need to be regulated to avoid the risk of price uncertainty that can harm society. The price benchmark is intended so that profits can be received by the public and companies. This effort can increase the role of the power sector in the economy of West Java.

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