

The industry of forest-based products in the Philippines

Filipinler'in orman ürünleri endüstrisi

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Abstract

This review article describes the forest products sector in the Philippines in terms of its structure, production trends, and trade. This provides an overview of wood processing plants, logs produced by species and roundwood and processed wood as well as forest-based products output. The article addresses challenges and opportunities in the sector, with emphasis on trade imbalances on exports and imports of forest-based products. Developing and optimizing the production sectors in order to contribute to the Philippine economy and penetrate to the world market is possible through identifying the current statuses and production capabilities, and the areas of improvement for processing, sustainability of business, and competitiveness.

Özet

Bu çalışma, Filipinler'deki orman ürünleri sektörünün yapısı, üretim eğilimleri ve ticareti açısından değerlendirilmektedir. Çalışma, ahşap işleme tesisleri, türlere göre üretilen tomruklar, yuvarlak odun ve işlenmiş ahşap ile orman kaynaklı ürünlerin üretimine genel bir bakış sunmaktadır. Aynı zamanda, sektördeki zorluklar ve fırsatlar ele alınarak, özellikle orman kaynaklı ürünlerin ihracat ve ithalatındaki ticaret dengesizliklerine vurgu yapılmaktadır. Mevcut durumun, üretim kapasitesinin ve geliştirilmesi gereken alanların belirlenmesiyle, üretim sektörlerini geliştirmek ve optimize etmek, böylece Filipinler ekonomisine katkıda bulunmak ve Filipinler'in dünya pazarına açılmasının mümkün hale gelmesi beklenmektedir.

INTRODUCTION

Since the economy in the forest products of the country can help with the local livelihood, trading, and utilizing the land resources (Reshad et al. 2025), this natural resource should be regulated (Muradian et al. 2025) and not left at stake. Now this sector comprises a variety of activities from production and processing of timber and non-timber forest products for local and international markets (Food and Agriculture Organization 2024). And yet, despite its economic importance, the sector is facing resource depletion and trade deficits, as well as innovation bottlenecks that are preventing it from

achieving its full potential. The wood processing plants are very heterogeneous country wise (from mini sawmills, integrated, plywood, fiber board and value-adding products). This gave rise to wood processing hubs in different areas such as Caraga and Northern Mindanao, where implied local comparative advantages in processing capacity and knowledge applied were observed (Department of Environment and Natural Resources Office-Forest Management Bureau 2024). Though this is a clear development, most of the wood from around the country is of nonnative sources cited due to the existing law on the collection of native forest trees (DENR-FMB 2024).

In the Philippines, the industries mostly commercially market fast-growing species of logs, such as *Falcata* (*Paraserianthes falcata*), Yemane (*Gmelina arborea*) and Mahogany (*Swietenia macrophylla*) (DENR-FMB 2024). But all in all, roundwood production suffers its own high and low from year to year as regulation, markets and environmental consequences meet with each other (DENR-FMB 2024). Similar trails are only in the trade balance, in which the export processes of raw and semi-processed systems are high, but the imports come primarily from processed (and hence, high token) finishes of products, for example, paper, plywood, and fiberboard (Philippine Statistics Authority 2024, Food and Agriculture Organization 2024).

The objective of this review is to analyze Philippine Forest products industry by observing their production trends, their distribution into various regions, trade and other issues surrounding these products. The article intends to discover opportunities for improving the sustainability, competitiveness, and contribution to environmental growth of the sector by synthesizing previously existing data. It also seeks to use these metrics to determine where the industry's strengths and weaknesses lie, offering recommendations for initiatives that expand economic growth, while providing environmental protections.

THE OVERVIEW OF THE PHILIPPINE FOREST SECTOR

Philippine Forest Resources

The Philippines is an archipelago country located in Southeast Asia, with a total area of about 7.641 islands (Figure 1). A total cover of 7.2 million hectares of forest as well as 15.8 million hectares of forestland, moreover in 2024 it has a 5-year 3% gain on its forest cover. Forest cover is primarily distributed in Luzon (4.057.486 hectares which consist of open, close and mangrove types), next on Mindanao (2.338.723 hectares), and lastly on Visayas (830.184 hectares) (Department of Environment and Natural Resources Office–Forest Management Bureau 2023). On the east side, it shares the Philippine Sea; on the west and north, the South China Sea; on the south, the Celebes Sea; and on the southwest, Sulu Sea

(Hernandez et al. 2024). With an area of around 300.000 km² makes it is the 6th biggest country in the Southeast Asian region and places between 71 till 73 according to the area ranking in the world (Estoque 2017, Global Fire Power 2024). The Philippines is one of the world's megadiverse countries with 4.821 plant species based on the list, and it comprises 274 pteridophytes, 16 gymnosperms and 4.537 angiosperms. It also shelters some rare animals, including 138 terrestrial mammals, 97 amphibians, 262 reptiles, and 264 endemic birds (Von Kleist et al.2021; Department of Environment and Natural Resources Office-Biodiversity Management Bureau 2023).

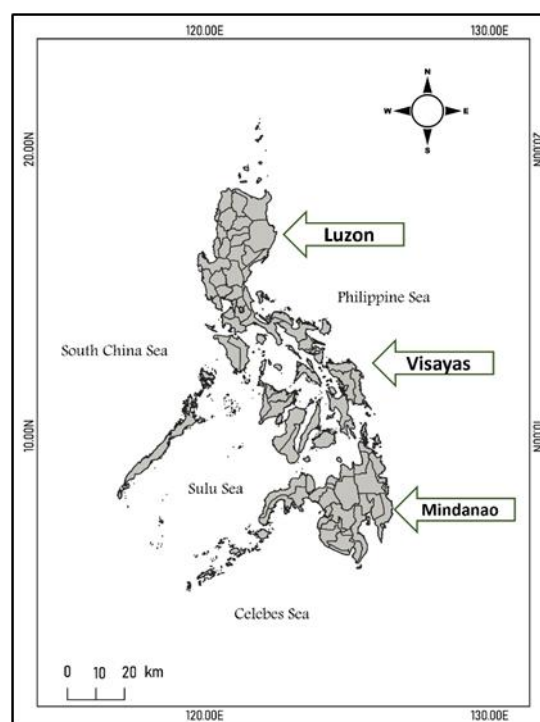


Figure 1. The Philippine map with its sea borders (generated from QGIS software)

Early uses of the wood-based industry of the Philippines are associated with its rich forest resources (DENR-FMB, 2023) It is a major entering contributor to the national economy by supplying raw materials for construction, furniture, paper, and energy (Pulhin and Ramirez 2016, Casiro and Catubig 2019, Palma-Torres et al. 2024). In 2023 valuable log species from the Philippines have been propping up the wood industry, with *Paraserianthes falcata* (71%) holding the leading position, followed by *Swietenia macrophylla* (9%) and *Gmelina arborea* (6%) in

log production. Some of the more salient problems facing the sector presently include unsustainable logging, illegal deforestation activities and pressures brought about by strict environmental protection measures to reduce forest degradation (Lasco et al. 2001, Pulhin et al. 2006, Israel and Bunao 2017, Veridiano et al. 2020, DENR-FMB 2023).

Recent initiatives by the government (DENR 2023) and private sectors (Philippine Wood Producers Association, 2023) highlight the promotion of sustainable forestry practices, forest restoration programs, and certified wood products. Among them is the National Greening Program (NGP) initiated by the Executive Order No. 23, Series of 2011, and subsequently scaled up by the Executive Order No. 193 of 2015. The NGP encouraged the establishment of 1.87 billion seedlings on an estimated 2.22 million hectares of degraded forestlands from 2011 until 2023 (DENR-FMB 2024). As of 2023, the Enhanced National Greening Program had reached 109% accomplishment of its implementation. Apart from the factor of fairly aligning them with the global sustainability frameworks, Department of Science and Technology-Forest Products Research and Development Institute (2019), Balanay et al. (2022) and Palma-Torres et al. (2024) noted that these trends also aim at amplifying productivity and minimizing the footprint to safeguard its competitive edge in the global arena (Florian 2023).

The Philippine Forest Allocations Through Tenure Instruments

The tenure instruments implemented in 2023 are crucial to the wood industry in the Philippines, impacting access to forest resources, sustainable management, and timber production (DENR-FMB 2024). Of the above agreements, the Community-Based Forest Management Agreement (CBFMA) is the most widely adopted governance instrument comprising a total of 1.566 agreements covering a combined area of 1.093.411 hectares, accounting for 62.14% of total implementations and 68.17% of the total forest area allocation. The tenure instrument of community forest management provides for the integration of local communities in forest management activities, allowing them access to small-

scale timber production and non-wood forest product harvesting (Wiset et al. 2023). The CBFMA additionally enables communities to be a part of the wood industry's supply chain whilst at the same time supporting the sustainable use of the forest. But the large area being brought under CBFMA will require significant investments for capacity development, technical assistance and monitoring to ensure long term sustainability and maximize contribution to wood industry.

The Integrated Forest Management Agreement (IFMA), despite being only 49 agreements (1.94%) of the total number of implementations, covers 442.373 hectares (27.58%) of the total allotted forest area. This instrument is decisive for the provision of the companies with large forest areas for planting and commercial harvesting, since it allows the development of this industrial scale timber activity. IFMAs are crucial to satisfy both local and international demand for wood products, but the focus on large-scale operations at the expense of smaller stakeholders provides its own challenges. It needs to make sure that these agreements are held to high environmental standards and equitable practices to achieve an appropriate balance between timber production with the environmental sustainability and social objectives of forest management. These larger-scale Regional Forest Management Agreements (RFMA) are balanced by the Socialized Industrial Forest Management Agreement (SIFMA) for smaller log production. 493 agreements for 17.760 hectares (19.56% implementations but only 1.11% of the total area) SIFMA gives opportunity for smallholder farmers and local entrepreneurs to be in the wood industry. Though its limited coverage makes the contribution to the industry less impactful, SIFMA still broadens the sector and encourages its equitable access to forest resources by marginalized groups.

Other instruments, although indirectly contribute to the wood industry, include the Forest Land Grazing Management Agreement (FLGMA) with 136 agreements covering 36.585 hectares (5.40% of implementations and 2.28% of the total area), and the Special Land Use Permit (SLUP) with 117 agreements covering 5.882 hectares (4.64% of implementations and 0.37% of the total area).

These tools facilitate certain types of land use that, when managed correctly, help avoid conflicts between timberland and the uses of surrounding areas. Likewise, FLAgT (Forest Land Use Agreement for Tourism Purposes) and SPLULA (Special Land Use Lease Agreement) are less utilized; only 262 and 30 hectares of forest areas have been allocated respectively to FLAgT and SPLULA. Not a contribution to the wood industry, per se, but options that allow for contributions to sustainability initiatives enabled by other tangential benefits like ecotourism and research conservation projects.

The link between this data and resource availability as well as stakeholder participation is both of interest and

relevance but more importantly, forest tenure instruments set the environment in which the wood industry operates. The real challenge will be to align these instruments with the sustainable management of forests to maximize the impact. Such as bolstering assistance for community-level agreements (e.g. CBFMA), facilitating investments for reforestation and sustainable practices (e.g. IFMA), and increasing the uptake of underutilized instruments (such as FLAgT and SPLULA) would assist the wood sector to respond to increasing demand while balancing ecological integrity and inclusive economic development. Through engaging these opportunities and challenges, the tenure system can considerably amplify Philippine wood industry contributions to national development and the global markets. (Figure 2).

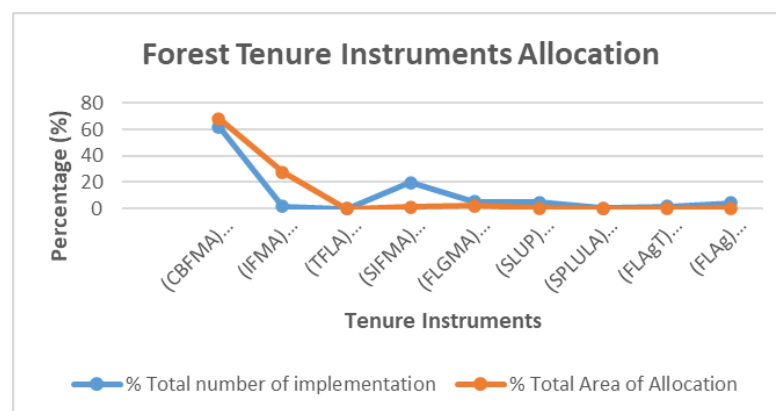


Figure 2. Percentage of the allocated area per tenure instruments in the Philippines (Source: DENR-FMB 2024).

The Philippine Forest Products Industry

The Philippine Wood Processing Plants (WPP's)

Wood processing facilities are dispersed throughout the Philippines, including veneer plywood plants found in NCR and Regions 11 and 12. There are also regular and mini sawmills in regions 1-3, Region 4-A, (MIMAROPA), and Regions 6, 8-13. These also include re-sawmills located in the Cordillera Administrative Region (CAR), Region 4-A, Region 7, and Region 10 as well as integrated plants located in regions 9-11 and 13. It also operates a wood treatment plants in Region 11, a fiberboard factory, and plywood and blockboard plants in Region 13. (DENR-FMB, 2023). In terms of veneer and log production Region 13, while Region 10 dominates lumber production and Region 11 is a plywood-producing region (DENR-FMB 2023).

A summary of WPPs in the Philippines is presented in Table 1, including WPP distribution, type, number, and daily rated capacity (DRC) by region and province (DENR-FMB 2024). In situ small size wood processing is enough in most cases, so mini sawmills are widespread. In particular at Caraga (Region 13) and Region 10, which emerged as WPP hotbeds since these areas had the most number and most varied type of WPPs, being combined WPPs, and those for the specific-oriented WPPs readily including integrated WPPs, and other such types for light application purposes like plywood, blockboard, and match splints. Note for production of plywood/blockboard, Agusan del Norte (Caraga) has the highest DRC (467.58 m³), as well as its integrated plants with substantial capacity (198.17 m³). Agusan del Sur, with a total integrated plant DRC of 399.78 m³ which also makes Caraga a wood industry center. Region 10

(Misamis Oriental) had the greatest DRC (328.42 m³) of large-scale mini-sawmill operations, whereas integrated plants had a DRC of 115.15 m³. Additionally, Region 9 (Zamboanga Peninsula) has the highest number of mini-sawmills, yet they operate as integrated plants such as Zamboanga City with a

production capacity of 90 m³, which backfills their mini-sawmills. About localized specialization in the industry; aside from the traditional sawmill-type of plants, there are also specialized facilities such as the veneering plants in Davao del Sur and Davao Oriental (Region 11) (Table1).

Table 1. The Philippine wood processing plants (WPP's) by province as of 2023

Region	Province	WPP type	No.	Daily rated capacity (DRC) in m ³
Region 1	La Union	Mini sawmill	1	48.2
Region 2	Quirino	Mini sawmill	1	18.87
Region 3	Bulacan	Re-sawmill	1	5.31
	Zambales	Mini sawmill	1	19
NCR	Metro Manila	Veneering	2	0.16
Region 4-A	Laguna	Re-sawmill	1	6
MIMAROPA	Palawan	Mini sawmill	1	4.06
Region 6	Negros Occidental	Mini sawmill	1	1.12
Region 7	Cebu	Re-sawmill	19	62.11
	Bohol	Re-sawmill	5	0.45
	Negros Oriental	Re-sawmill	2	2.48
	Siquijor	Re-sawmill	1	0.09
Region 9	Zamboanga del Norte	Mini sawmill	14	14.16
		Integrated	1	3.18
	Zamboanga City	Mini sawmill	3	4.68
		Integrated	1	90
	Zamboanga del Sur	Mini sawmill	13	9.89
	Zamboanga Sibugay	Mini sawmill	3	6.2
Region 10	Bukidnon	Mini sawmill	15	30.2
		Integrated	1	10
	Lanao del Norte	Mini sawmill	1	2.36
		Integrated	1	147.17
	Misamis Oriental	Mini sawmill	37	328.42
		Integrated	4	115.15
		Re-sawmill	1	2.36
	Misamis Occidental	Mini sawmill	17	27.98
		Integrated	1	36.37
Region 11	Davao de Oro	Mini sawmill	8	29.14
		Wood Treating Plant	1	9
	Davao del Norte	Mini sawmill	6	28.71
		Mini sawmill	5	18.5
	Davao del Sur	Veneering	3	28
		Wood Treating Plant	1	6
	Davao Oriental	Mini sawmill	1	5.9
		Veneering	2	33
Region 12	Cotabato	Mini sawmill	13	60.17
	South Cotabato	Mini sawmill	2	9.61
	Sultan Kudarat	Mini sawmill	1	4.72
Region 13	Agusan del Norte	Plywood/Blockboard	4	467.58
		Integrated	13	198.17
		Plyboard/Plywood	1	14.75
		Match Factory	1	33
		Mini sawmill	8	33.39
		Fiberboard	1	46.5
	Agusan del Sur	Integrated	14	399.78
		Mini sawmill	3	20.72
		Match Splint	1	3.49
		Mini sawmill	2	18.55
	Surigao del Sur	Plywood/Blockboard	1	9.62
		Integrated	2	37.77
Total	Philippines		243	2,512.04

Source: DENR-FMB 2024

The Philippine Log Production per Species as of 2023

The Philippine tree species contribution (DENR-FMB 2024) to the total log production illustrated that falcata (*Paraserianthes falcataria*) was significantly overrepresented, accounting for 449.928.75 m³ of the overall output. This is why falcata has significance in Philippine forestry. Mahogany (*Swietenia macrophylla*) follows in second place in significance, at 57.822.54 m³; there continues to exist a demand for it for furniture and construction. Yemane (*Gmelina arborea*) was the third most produced in volume (39.488.01 m³ produced) due to its use in plantation forestry replacing hardwood. Other species with moderate contributions were identified such as Mangium (*Acacia mangium*), Bagras (*Eucalyptus deglupta*), and Acacia (*Samanea saman*) with

the production ranging from 4.659.36 m³ to 17.486.75 m³. The species are commonly spread, and they play an economic and ecological role in agroforestry and reforestation. Narra (*Pterocarpus indicus*), Ipil-ipil (*Leucaena leucocephala*), and fruit trees contributed less to annual funding, possibly due to their local and/or specific use cases. A total of 41.425.67 m³ of assorted species with the continued generation of wood volumes indicates the diversity of tree resources in the Philippines; hence, a wider range of species also offers broader prospects for sustainable use. The total log production was 634.034.99 m³, this report shows how active the participation from the forestry industry marks in the country economy, however, also shows that there is still work needed on the species diversity and the sustainable management of this resource (Figure 3).

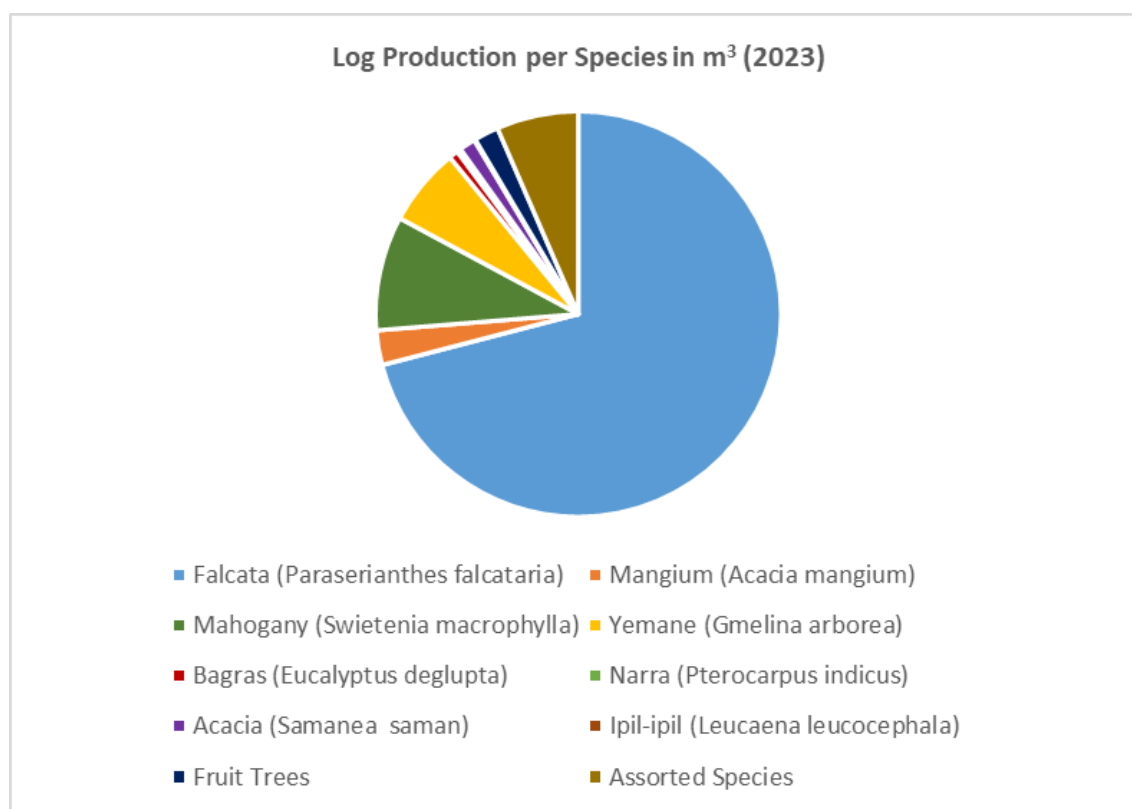


Figure 3. The production of log per species in the Philippines as of 2023 (Source: DENR-FMB 2024)

Production Trend of Roundwood (Log and Fuelwood/Firewood)

The wood-based industry, especially in the Mindanao area, contributes significantly to the Philippine economy because of its abundant forest resources (Israel and

Bunao 2017, Zaragoza 2019). The CARAGA region is the biggest lumber producer of the country having 684.503 hectares of forestlands affiliated along Surigao del Sur, Surigao del Norte, Agusan del Sur and Agusan del Norte (Israel and Bunao 2017, DENR-FMB, 2023). This accounts for the extensive spatial representation of trends in

Philippine forestry available in the log and fuelwood/firewood production data series covering 2003-2023 (DENR-FMB 2024) illustrated in Figure 4. Log production fluctuated greatly throughout the years, with the highest production observed in 2013 at 1.166 m³, while the lowest amounted to 506 m³ in 2010 yearly: From 2013 onward the log production generally declined but comparatively recent years exhibited mild levels at which it reached again approximately 634 thousand m³ 2023. It points to management practices in forests that means sustainable harvesting in forests and sustainability due to changing market demands for logs. By contrast, fuelwood/firewood construction stood out as a single type. In 2023 the maximum amount has been produced (that is 1 million m³ or even more) – this can be judged by the character of events on increasing demand for energy wood. By contrast, the years 2003 and 2004 saw it return to production levels as low as (respectively) 183.000 m³

and 166.000 m³. Fuelwood production, however, may have increased in the recent years due to increasing yield towards green energy sources particularly in rural areas as loss of affordability is driving homes and industries toward inexpensive energy forms. These results suggest a novel retrenchment in the allocation and consumption of limited resources mediated through log and fuelwood production. Logs are targeted to the timber and construction industries whereas fuelwood is meant for energy purposes, especially in areas where electricity or modern fuels still not reached or very expensive. The significant growth in fuelwood production has highlighted the importance of this energy source for many Filipinos, which is also explained by low availability and affordability of traditional or modern alternatives as well; while stabilization noticed on log production may be attributed to continuing effort in balancing economic use with sustainability action (Figure 4).

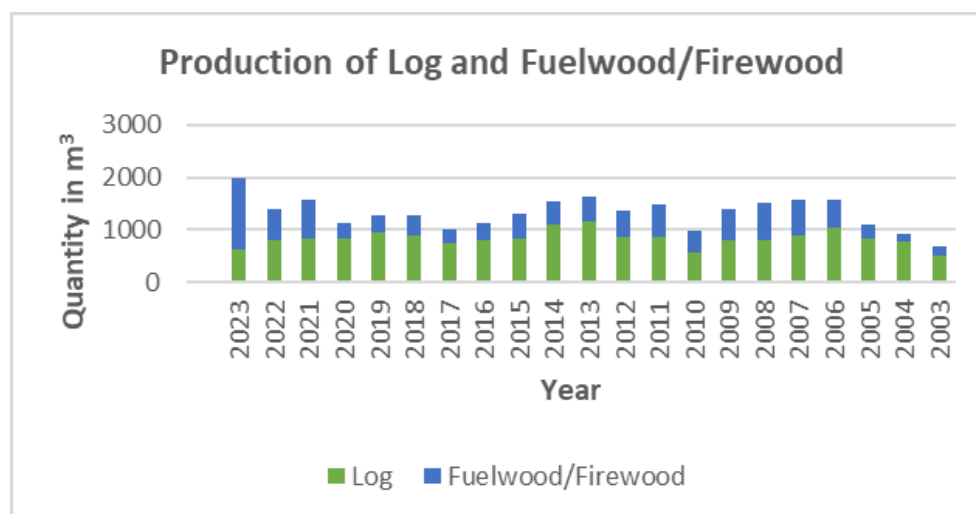


Figure 4. The trend of the production of roundwood (log, fuelwood/firewood) in the Philippines from 2003-2023 (Source: DENR-FMB 2024)

Production of Processed Forest Products in the Philippines

Wood-based forest products

The production data (FAO 2024, DENR-FMB 2024) on forest-based products as indicated in Table 2 shows the different kinds of forest-based products produced in the Philippines, demonstrating the importance of these products in the economy and a variety of businesses.

Production of wood fuel, the main source of energy in rural communities, is 10.98 million m³. Tropical hardwood

makes up about 3 million m³ of industrial round wood, as they have a lot of uses. Some of the important panel products are plywood and laminated veneer lumber while particle board and blockboard are useful in construction and furniture. Structural and manufacturing-focused products such as lumber and sawn wood are now quite significant, while veneer sheets are manufactured for value-added end use in furniture and other interior decoration. Shares of case material were most produced at 583.000 tons, recovered paper at 912.377 tons; and other paper and paperboard

at 695.000 tons. The balance was comprised of 49.000 tons of printing and writing paper, uncoated wood-free paper, carton board, household and sanitary papers, and newsprint. Moreover, with 89.430 tons of wood charcoal making it one of the largest producers of charcoal used as raw material contained in pulp production. It also produced saw and veneer logs, which points to a stable supply of raw materials for follow-up industries.

The Philippines has a great opportunity to supply forest products for the local and export markets. Backlog includes higher ticket items like fiberboard and wood furniture that could benefit from engineered wood and specialty paper expansion. Forest sustainable management is important for supplies of resource for further generations (Table 2).

Table 2. Production of processed wood-based forest products in the Philippines as of 2023

Production of other forest products	Unit	Value
Blockboard	m ³	29.000
Cartonboard	Ton	30.000
Case materials	Ton	583.000
Fiberboard	m ³	-
Household and sanitary papers	Ton	21.000
Lumber	m ³	490.000
Newsprint	Ton	11.000
Other industrial roundwood, coniferous	m ³	40.000
Other industrial roundwood, non-coniferous	m ³	3.000.000
Other paper and paperboard	Ton	695.000
Other papers mainly for packaging	Ton	61.000
Particle board	m ³	29.000
Plywood and LVL	m ³	327.110
Printing and writing papers	Ton	49.000
Printing and writing papers, uncoated, woodfree	Ton	49.000
Pulp from fibers other than wood	Ton	33.000
Pulpwood, round and split	m ³	155.796
Recovered paper	Ton	912.377
Sawlogs and veneer logs	m ³	656.714
Sawn wood	m ³	490.000
Veneer sheets	m ³	235.900
Wood charcoal	Ton	89.430
Wood Furniture	Ton	-
Wood fuel	m ³	10.975.742

Source: FAO 2024, DENR-FMB 2024

Non-wood forest products

In very rough figures, the economic value of the forest resource base is actually much larger than that of timber alone (DENR-FMB 2024); the production data on a number of different non-wood forest products (NWFPs) substantiates this conclusion. These products are the lifeblood of local livelihoods and cultural practices and small industries. Almaciga resin is a sustainable raw material used to make varnish and adhesives, provides cash income for upland communities, and encourages forest conservation. Nipa shingles for rural living and heritage preservation, leaves of anahaw is used for thatching and landscaping. Ropes and handmade papers are made from Salago fiber and split and unsplit

rattan are used for furniture and handicraft. Bamboo poles are employed for construction, furniture, and applied arts and crafts, offering an alternative to deforestation while stimulating the production of renewable resources. NWFPs have contributed to economic and cultural gains that have led to their contribution to sustainable livelihoods and traditional industries in the Philippines. In order to avoid overuse, it requires proper management. NWFPs can play a role in rural development strategies by leveraging the increasing importance of the agricultural sector as the economic contributions of that sector can be broadened through investments in technologies and expansion of the market (Table 3).

Table 3. Production of non-wood forest products in the Philippines as of 2023

Non timber forest products	Unit	Value
Almaciga resin	Kilograms	646.150
Anahaw leaves and poles	Pieces	135.941
Bamboo poles	Pieces	1.025.844
Nipa shingles	Pieces	4.694.215
Salago fibers	Kilograms	291.000
Split rattan	Kilograms	175.672
Unsplit rattan	Pieces	2.179.924

Source: DENR-FMB 2024

Trade of Forest Products

The value of forest-based products importation of the Philippines was \$2.27 Billion, a 1.80% share of the Philippines' total imports at \$126.21 Billion. Nevertheless, its export value for forest-based products reached only \$0.71 Billion or 0.97% share of total \$73.62 Billion of country exports. China, Indonesia, Japan, Canada, Finland, Germany, Malaysia, the United States, New Zealand, and South Korea rank among the top 10 trading partners of the Philippines for both import and export goods (PSA 2024). Table 4 shows the Philippines' involvement with global forest product markets by presenting data on the import and export of forest-based products for 2023 (PSA 2024, FAO 2024).

The largest tonnage of \$113.88 million was pulp and recovered paper exports. Among the products exported were forest-based products, contributing 24.63% of the country's total export value of lumber in the Philippines. According to imports, it was 466.063 m³ worth \$218.66 million. Of the exports, pulp and recover paper brought in the largest tonnage at \$113.88 million. In 2023, the country exported 46.64 million kg for 97.69 million dollars, and imported 1.57 billion kg for 1.36 billion dollars. Types of wood charcoal– a realization of \$74.50

million with an import of 486.385 kg worth merely \$1.131.420 of 134.95 million kg. Wooden furniture and other wooden manufactured products are also one of the biggest exports items worth \$65.40 million (9.20%) and \$66.48 million (9.35%) respectively for the year. Plywood and medium/high-density fiberboard (MDF/HDF), engineered wood products that have unique global trading characteristics which translated to \$43.50 million in plywood trade and \$47.52 million in MDF/HDF trade. A few other niche products with relatively low export value include docks/wharves and plywood.

Non-timber forest products (NTFPs) are a strong niche market segment with gross market value 5.145.000 (0.72% of gross value of all export activities). From the perspective of foreign trade in niche segment markets, the trade balance of the Philippines is positive. Enhancing local processing capacity of high-value exportables can be one of the ways to promote export; in addition, encouraging innovative pathways for the engineered wood and paper products. Managing forest resources for sustainable yields is still center stage, as the tradeoff between resource use, environmental protection, and long-term economic gains remains critical (Table 4).

Table 4. The Philippine export and import value of forest products as of 2023

Forest-based products	Export and import quantity unit	Export quantity	Export value (value in thousand US \$ FOB)	Percent export value (%)	Import quantity	Import value (value in thousand US \$ FOB)	Percent export value (%)
Lumber	Cubic meter	668.192.00	175.133.25	24.63	466.063.34	218.660.86	9.649
Pulp and recovered paper	gross kilogram	147.313.662.00	113.884.52	16.02	98.304.733.55	74.398.37	3.283
Paper and articles of paper and paperboard	gross kilogram	46.642.343.00	97.690.40	13.74	1.565.544.877.00	1.357.079.39	59.884
Wood charcoal	net kilogram	134.947.762.84	74.502.15	10.48	486.385.52	131.42	0.006
Other wood-based manufactured articles	gross kilogram	20.602.047.00	66.484.09	9.35	86.634.411.00	66.397.17	2.930
Forest-based furniture	gross kilogram	13.385.237.00	65.404.24	9.20	158.789.745.00	201.686.42	8.900
Medium/high density fiberboard (mdf/hdf)	cubic meter	22.615.00	47.515.00	6.68	67.454.00	30.452.00	1.344
Other fiberboard	cubic meter	0.00	0.00	0.00	28.091.00	5.724.00	0.253
Plywood	cubic meter	41.370.00	43.499.45	6.12	674.597.37	255.508.03	11.275
Selected non-timber manufactured articles	gross kilogram	1.392.451.00	12.523.81	1.76	698.424.00	883.14	0.039
Non-timber forest products	gross kilogram	1.642.191.21	5.145.15	0.72	7.809.85	65.96	0.003
Particleboard	gross kilogram	1.488.435.62	2.814.37	0.40	58.975.608.91	30.137.99	1.330
Wood continuously shaped	gross kilogram	8.796.302.09	2.652.39	0.37	1.749.390.01	2.183.82	0.096
Prefabricated buildings of wood	gross kilogram	592.931.70	2.507.10	0.35	346.480.04	414.77	0.018
Wood pellets and other agglomerates	net kilogram	759.961.00	412.9	0.06	2.018.226.71	618.27	0.027
Densified wood	net kilogram	52.802.00	411.96	0.06	986.792.93	509.6	0.022
Wood chips and particles	gross kilogram	5.488.804.00	338.84	0.05	8.172.762.53	622.94	0.027
Veneer and other wood worked	cubic meter	367	106.06	0.01	64.534.31	20.695.91	0.913

Source: Philippine Statistics Authority (PSA) 2024, FAO 2024

CONCLUSION

The Philippine wood-based industry has diverse structure and high potential, which is mirrored by the volume of wood processing plants, tenure instruments, round wood production, processed wood products and trade performance. The wood processing plants are prevalent in all regions because these are the locations where logs in the country are harvested and exported, though there

is a concentration in Caraga and Northern Mindanao. These have diverse facilities for sawmills, integrated plants, plywood, blockboard and fiber board factories. But many of these plants run at less than full capacity or use technology that dates back decades, limiting the sector's overall effectiveness and product quality. With the said situation, modernization of these facilities is of utmost importance to increase competitiveness and widen the product portfolio.

Tenurial instruments within the Philippine forestry sector, e.g., Community-Based Forest Management Agreement (CBFMA) and Integrated Forest Management Agreement (IFMA) serve as the foundation of resource allocation and sustainable forest management. CFBMA involves local communities in forestry, and IFMA targets industrial-scale operations. But in promoting impact at scale for these instruments, it requires capacity building support, technical investments and robust monitoring for sustainability and equitable use of resources.

Roundwood production (logs and fuelwood) showed some variability over time. On the other hand, log production has plateaued in the past few years owing to better forest management, but the production of fuelwood has increased substantially as it is one of the most important sources of energy to rural households. The prevalence of individual species like *falcata* also points towards the requirement for increased species diversification for optimal ecological outcome and sustainable resource utilization in the long run. Production trends of processed wood products (lumber, veneer, plywood, and fiberboard) have varied. Plywood production has increased recently but fluctuates widely, highlighting the need for a reliable supply of raw material and technological improvements in production. Increasing processing capacities and product diversification are crucial to fulfilling both domestic and global market needs.

At the industrial level, the emphasis is primarily on exporting raw and semi-processed materials followed by importing bulk volumes of processed goods. This trade deficit indicates lack of local value addition. Establishing domestic capabilities with best practices that comply with international certification can further reduce the disadvantages of Philippine wood products in the international markets. Generally, the Philippine wood-based industry has the potential for growth if its wood processing capacities are modernized and optimized, its tenure instruments are optimized, and its production systems are diversified and sustainable. Focusing on these areas from a technical standpoint can make the industry a resilient and competitive player in local and international markets.

RECOMMENDATIONS

The significance of technological advancement in enhancing efficiency and minimizing waste cannot be overstated. This can spill over even more just by investing in newer kinds of forms of processing equipment (automated sawmills, engineered wood production systems, etc.). Importance of developing engineered wood products and novel applications for wood residues and to pursue the creation of higher-value products. Infrastructure development plays a vital role in the effective functioning of the processes involved in the industry. Production can be better institutionalized, and logistics enhanced by having centralized wood processing hubs in strategic areas, such as in Caraga. Better transport and storage infrastructure will reduce waste after the harvest and allow small- and large-scale producers to supply.

The renewable energy component is also required to increase sustainability in the industry. Therefore, in order to ensure the sustainability of wood processing facilities, it is necessary to implement clean energy solutions, that is, to introduce solar energy systems that reduce the use of fossil fuels, optimally reduce energy costs and reduce negative energy impact in the process of processing wood. This transition to renewable energy is in line with the industry's long-term promise of sustainable operations. Changing market demand will force the industry to diversify its product. High Value-added products: Laminated veneer lumber, modular furniture, bio-composites, targeting niche markets (underrated species) creating sustainable avenues to fill in where a few timber species dominate the market creates sustainability & economic viability. This aspect is something that the Philippines as a nation can tap on, specifically through value addition in the NWFP sector, as well as better marketing tactics, enhanced diversification of product offerings which can further maximize the profitability of NWFP exports while being able to sustain the abundance of nature as well.

In accordance to solve the problems on low international certification level, the subject needs to put a high value on compliance to internationally accepted certification

standards such as International Forest Environmental Certification (IFEC) in order to upgrade the credibility and value of Philippine wood products. Certification programs can help assure that materials are sourced sustainably, unlock access to a global marketplace and encourage environmental accountability.

In addition, the Philippines should further shape regional specialization by making the most of the regions' competitive advantages. Strengthening regional clusters where capacities were already established (like Caraga's plywood) and enhancing supportive production practices through facilitative technologies and market linkages can improve competitiveness and productivity.

Must support the inclusion and active involvement of local communities to enable positive and sustainable growth. CBFMA should empower communities to strengthen community-based actions (CBA) and unite a tenure among local stakeholders. Training, education and capacity-building initiatives with local constituents can improve skills as well as facilitate processing of some timber and non-timber forest products for shareholdings.

Importantly, Sustainable Forest management should be adopted by the Philippine wood-based industry as a governance framework in order for it to become more capable and thrive in the long run. Increasing plantation forestry with high-value species and modern silvicultural practices will ensure a stable availability of raw material. Enhancing monitoring systems for the promotion of environmental preservation with sustainable harvesting.

And lastly sustainability must remain key to how the industry grows. Promote salvaged and reclaimed wood products to prevent resource waste and support circular economy. Partnerships with local & international institutions can also flourish to exchange best practices and bring innovation in environmentally friendly timber processing techniques. This will allow the Philippine wood-based industry to leverage economic growth while still being mindful of environmental sustainability in a balanced way, thus mitigate the risk of being left behind by what is, increasingly, the global gold standard.

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