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An Empirical Analysis of Timber Trade in India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Forests are renewable resources that contribute significantly to economic growth. The economic contribution by forest is through the valuable commodities including wood, paper and non-timber forest products. One among this is timber, it has been the primary material for house construction and furnishings of all kinds over the years. Timber plays a vital role in international trade in India. This study was focused on finding growth pattern in export and import of timber using Compound Annual Growth Rate (CAGR). Over the period of 2005-2019, the production of timber has been increased at the rate of 0.07%. The import performance was dominant over the export due to over requirements of raw materials. Although export showed positive growth rate at 0.15%, import of timber shot up at 4.09% from 2005-2019. Therefore, it is necessary to introduce adequate due diligence system to meet domestic demand of timber production in India.

Keywords: Timber; import; export; CAGR.

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1. INTRODUCTION

Forests, as a valuable natural resource and a part of the environment, can have an impact on international relations. With time, the emphasis on benefits shifts from tangible to intangible. The forest products include timber, fuel wood, and several other non-wood forest products. Among these, there exists a huge demand for a variety of timber species. Timber is a versatile raw material with a number of benefits that allow it to be used in a variety of applications. An analysis of historical patterns of timber production and marketing technologies can be used to identify the economic and demographic relations to the timber sector. Globally, the output of timber and trade in timber products has increased many folds during the last few decades [1].

India has two per cent of the Global Forest area, standing at 10th position among the top ten countries in terms of forest area with a cover of 72 million hectares [2]. India has around 80.72 m ha of forest land (forest and tree cover), which constitutes to 24.56 per cent of the total land area. India's annual change rate is positive and varies between 0.4 and 1.0 per cent per year, indicating a constant expansion in forest area by about 0.66 to 1 million ha per year through regeneration and afforestation projects [3]. India is one of the top producers of tropical logs in the world, but it is also among the largest users of wood products. It is also among the top importing countries of tropical woods since it cannot match its own demand for wood products with domestic supplies [4]. The bulk of imports have traditionally come from countries like Malaysia, Myanmar, Ghana, Ecuador, Costa Rica, Congo, the Solomon Islands and Papua New Guinea. Currently, the quality of teak from Burma and Africa is declining rapidly [5]. The export from India is in value added form of wood and wood products. The top three export markets are the USA (35.6 per cent), China (10.7 per cent) and Nepal (5.2 per cent) [6]. Timber is produced in different Indian states like Andhra Pradesh, Tamil Nadu, Maharashtra, Madhya Pradesh, Bihar, and Uttar Pradesh. The common species grown are Teak, Sal, Rosewood, Eucalyptus, Jack, Casuarina, Oak, Arjuna tree, Mahogany etc.

According to IMF, India is the 19th largest exporter and the 10th largest importer in the world [7]. Uddin [8] analysed the time series behaviour of imports and exports of Indonesian trade. Zajac [9] analysed the structural changes in export and import of wood and wood-based products in Poland. The knowledge of wood and wood product import is of prime importance to the national economy [10]. As domestic demand and consumer spending remained reasonably high to support economic growth, India's exports dropped [11]. Upadhyay et al. [12] studied trend of import and export of Indian wood panel during 1990-2013 using CAGR and reported that India has increased CAGR at 10.52 per cent in production. The CAGR on import and export were 24.54 per cent and 9.66 per cent respectively. The present study was taken up to find the growth structure of export and import of timber in India.

2. DATA AND METHODOLOGY

Fifteen years (2005 to 2019) of time series data collected from Food and Agricultural Organization website was used to calculate the growth rate of the selected timber wood in India using statistical tool, Compound Annual Growth Rate (CAGR). The compound annual growth rate (CAGR) is the mean annual growth rate during the defined period of time. The defined period of time is typically more than one year.

$$Y = a \beta x e u$$

$$\text{Log } Y = \log a + x \log \beta + u$$

$$\text{CGR} = (\text{Antilog of } \beta \text{ i } -1) \times 100$$

Where, Y= Dependent variable (production/ value)
a & β = Parameters of exponential model.

In order to study growth pattern in export and import of timber, compound annual percentage over period is assessed. The negative CAGR indicates the decreasing growth rate over time.

3. RESULTS AND DISCUSSION

Data on production, export (quantity and value) and import (quantity and value) of selected timber with Compound Annual Growth Rate (CAGR) is presented in Table 1. In order to meet domestic needs, production has been varying over the decades. The production and production growth of selected timber wood viz., fuel wood (coniferous and non-coniferous), sawlogs and veneer logs (coniferous and non-coniferous), pulpwood (coniferous and non-coniferous), industrial roundwood (coniferous and non-coniferous), sawn wood (coniferous and non-coniferous), veneer sheets and plywood were

calculated from 2005 to 2019 and results are presented in the Table 1.In 2005, production has been recorded with 367.65 million m^3 which was reduced to 363.34 million m^3in 2007. According to Kaur and Sharma [13], the production of timber from government forests increased from 2005-06 to 2007-08, then declined in the following years of 2008-09 and 2009-10. In 2014-15. Since 2008, the production gradually rises till 2015 then it slides down (Fig. 1). The CAGR of production recorded in past with increased trend at 0.07% during 2005-2019.

Table 1. contains export and import data of industrial roundwood (coniferous, tropical non-coniferous and non-tropical non-coniferous), sawn wood (coniferous and non-coniferous), veneer sheets and plywood. The export of wood was observed in 2005 at 0.07 million m^3, then it suddenly jumped down to 0.16 million m^3 in 2008 from 0.17 million m^3 in 2007. The following years showed steady increase in export quantity till 2014, then it differed based on its production from 2015. The CAGR of export quantity is 0.15%. In import quantity statistics, it picturized with continuous raising from 3.85 million m^3 in 2005 to 6.96 million m^3 in 2016, then it fluctuated. It recorded compound annual growth rate of 4.06%. On comparing CAGR of export and import quantity, it implies that import is more than export. Therefore, it states that country brought raw material across the borders to meet the domestic demand.

It also recorded export and import value in US dollars. During 2008-2009, The Great recession affected US dollars which decreased its value. After 2010, it made steady raise till date. The trade balance (Difference between value of export and import) during 2005-2019 show negative surge, which inferred import becoming more dominant than export in timber products in India. (Fig. 2.).

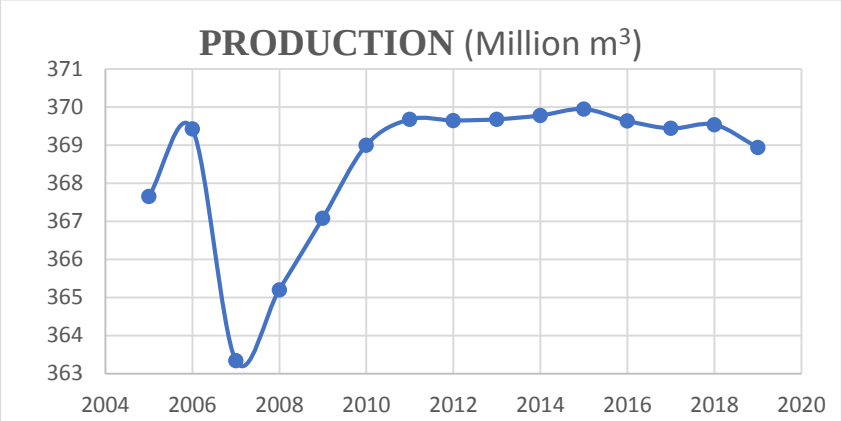

Fig. 1. Production of selected timber wood in India
Source: FAOSTAT

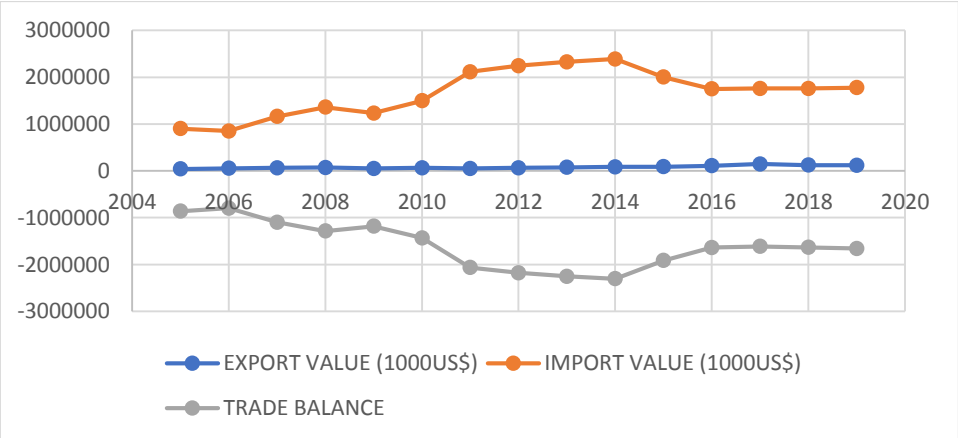

Fig. 2. Export and Import value of selected timber wood

Table 1. Production (million m^3), export and import quantity (million m^3), export and import value(1000US$) and trade balance

Year	Production (Mn m^3)	Export Quantity (Mn m^3)	Export Value (1000US$)	Import Quantity (Mn m^3)	Import Value (1000US$)	Trade Balance
2005	367.65	0.07	39891	3.85	901612	-861721
2006	369.43	0.09	53716	3.37	850385	-796669
2007	363.34	0.17	64009	4.34	1161767	-1097758
2008	365.20	0.16	71270	4.36	1358177	-1286907
2009	367.08	0.11	51066	5.18	1233393	-1182327
2010	369.00	0.09	63590	5.73	1497539	-1433949
2011	369.68	0.09	50885	7.21	2115817	-2064932
2012	369.65	0.16	64282	7.31	2243099	-2178817
2013	369.68	0.12	73888	7.38	2328043	-2254155
2014	369.78	0.11	83680	7.89	2387213	-2303533
2015	369.95	0.11	86967	6.96	2001735	-1914768
2016	369.64	0.13	109145	6.54	1747820	-1638675
2017	369.44	0.13	145698	5.88	1758802	-1613104
2018	369.54	0.10	123950	5.71	1757621	-1633671
2019	368.94	0.09	120418	6.22	1776807	-1656389
CAGR	0.07%	0.15%	-	4.09%	-	

Source: FAOSTAT,2019

Table 2. Production of Wood fuel, Sawlog, Pulpwood, Industrial roundwood, Sawn wood, Veneer sheets, Plywood (in million m^3)

Year	Fuel wood	Sawlog	Pulpwood	Industrial roundwood	Sawn wood	Veneer Sheets	Plywood
2005	305.49	43.41	1.21	0.35	14.78	0.28	2.13
2006	306.25	44.14	1.22	0.35	14.79	0.28	2.39
2007	307.01	44.87	1.25	0.36	6.88	0.28	2.67
2008	307.78	45.60	1.27	0.36	6.88	0.29	2.99
2009	308.54	46.34	1.29	0.37	6.88	0.29	3.35
2010	309.31	47.07	1.31	0.37	6.88	0.29	3.75
2011	308.78	47.80	1.33	0.38	6.88	0.29	4.21
2012	308.24	47.80	1.33	0.38	6.88	0.29	4.71
2013	307.71	47.80	1.33	0.38	6.88	0.29	5.27
2014	307.17	47.80	1.33	0.38	6.88	0.29	5.91
2015	306.63	47.80	1.33	0.38	6.88	0.29	6.62
2016	305.53	47.80	1.33	0.38	6.88	0.29	7.41
2017	304.44	47.80	1.33	0.38	6.88	0.29	8.30
2018	303.34	47.80	1.33	0.38	6.88	0.29	9.50
2019	302.24	47.80	1.33	0.38	6.88	0.29	10.00
CAGR	-0.08%	0.64%	0.63%	0.63%	-3.48%	0.30%	11.94%

Source: FAOSTAT,2019

Table 2. contains production data of fuel wood (coniferous and non-coniferous), sawlogs and veneer logs (coniferous and non-coniferous), pulpwood (coniferous and non-coniferous), industrial roundwood (coniferous and non-coniferous), sawn wood (coniferous and non-coniferous), veneer sheets and plywood. The production of fuel wood fluctuated over the years and shows negative CAGR value of -0.08% to imply decreased growth rate caused by deforestation or desertification during 2005-19. Sawlog and veneer logs recorded increased progression and shows increased growth rate of 0.64%. The steady growth of production and positive CAGR of 0.63% by Pulpwood was noticed. Malik and Dhanda [14] studied trends of forest products and interpreted that total roundwood production shown positive growth of 2.03% during 1970-2000. The fuelwood had also shown increased growth rate of 1.98% per annum. Even though, production of roundwood was increased with rate of 0.63%, it was declined from the production rate. The reason for positive growth in pulpwood and roundwood was because people switch on for the wooden based furniture for their durability, aesthetic and traditional look. The sawn wood stood up at 14.78 million m3 in early years and fell down to 6.88 million m^3 and shows negative growth rate of -3.48% at decreased trend in production during 2005-2019.The veneer sheets showed gradual raise in production over the years with increased CAGR of 0.30%. The plywood showed up increasing trend in production and compound annual growth rate of 11.94% during 2005-2019. Plywood, one of the housing and furniture woods from timber had found high consumption pattern among Indian people.

Table 3. presents the export data of Industrial roundwood, Sawn wood, Veneer sheets and Plywood. Fuel wood, Sawlogs and Pulpwood are used only for domestic consumption. Therefore, they didn't participate in export. Industrial roundwood picturized fluctuation in the quantity and value of export and showed low amount in last two years. It recorded decreased growth rate over the years at the rate of -1.18%. Based on demand requirements of value-added form of wood and wood products, there is change in consumption pattern in sawn wood during 2005-2019 in western countries. Kaur and Sharma [13] investigated trade structure of timber in India and found that wood exports accounted for nearly 85 % of overall exports and imports for 96.1 % of all imports in 2014-15 with 3.9 % increase in growth. With positive CAGR of 0.72% shows increasing trend in export quantity. Veneer sheets also inferred oscillation in export trend that led to decreased compound annual growth rate. The value of US dollar has dropped during the great economic recession 2008-2009 and subsequently fluctuates for various reasons. Plywood evidenced slight extend of variation in the trend of export and posed increased CAGR of 2% during 2005-2019.

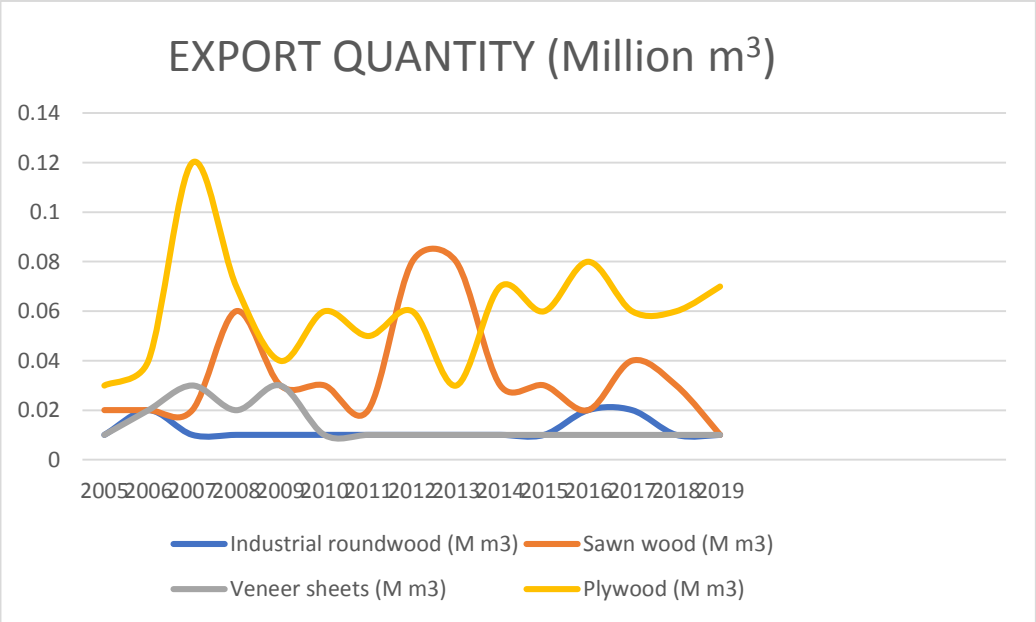

Fig. 3. Export of selected timber from India
Source: FAOSTAT

Table 3. Export Quantity of Industrial roundwood, Sawn wood, Veneer sheets, Plywood (million m^3) and its value (1000US$)

Year	Industrial roundwood (Mn m^3)	Industrial roundwood (1000US$)	Sawn wood (Mn m^3)	Sawn wood (1000 US$)	Veneer sheets (Mn m^3)	Veneer sheets (1000 US$)	Plywood (Mn m^3)	Plywood (1000 US$)
2005	0.01	3235	0.02	4137	0.01	11735	0.03	20784
2006	0.02	5358	0.02	7106	0.02	16138	0.04	25114
2007	0.01	2141	0.02	9960	0.03	23120	0.12	28788
2008	0.01	2978	0.06	28729	0.02	19109	0.07	20454
2009	0.01	1762	0.03	13700	0.03	19184	0.04	16420
2010	0.01	1616	0.03	17600	0.01	16919	0.06	27455
2011	0.01	2538	0.02	15545	0.01	14122	0.05	18680
2012	0.01	1916	0.08	18708	0.01	18121	0.06	25537
2013	0.01	2101	0.08	31003	0.01	18236	0.03	22548
2014	0.01	4695	0.03	32011	0.01	16050	0.07	30924
2015	0.01	4652	0.03	30609	0.01	17193	0.06	34513
2016	0.02	20166	0.02	17928	0.01	18729	0.08	52322
2017	0.02	70012	0.04	21388	0.01	15037	0.06	39236
2018	0.01	54199	0.03	18356	0.01	15068	0.06	36324
2019	0.01	55798	0.01	14672	0.01	16303	0.07	33411
CAGR	-1.18%		0.72%		-8.53%		2.00%	

Source: FAOSTAT,2019

Table 4. Import Quantity of Industrial roundwood, Sawn wood, Veneer sheets, Plywood (million m^3) and its value (1000US$)

Year	Industrial roundwood (Mn m^3)	Industrial roundwood (1000US$)	Sawn Wood (Mn m^3)	Sawn Wood (1000US$)	Veneer Sheets (Mn m^3)	Veneer Sheets (1000US$)	Plywood (Mn m^3)	Plywood (1000US$)
2005	3.74	867094	0.09	22025	0.01	4991	0.01	7502
2006	3.25	799730	0.07	21859	0.02	13237	0.04	15559
2007	4.17	1089848	0.10	25961	0.02	15696	0.05	30262
2008	4.17	1240512	0.11	43139	0.02	22977	0.06	51549
2009	4.90	1122055	0.16	37876	0.03	19955	0.08	53507
2010	5.29	1326729	0.23	66839	0.03	26994	0.17	76977
2011	6.34	1803056	0.59	159960	0.08	46067	0.20	106734
2012	6.53	1947128	0.54	159013	0.12	56040	0.13	80918
2013	6.52	2002409	0.57	183165	0.16	65983	0.12	76486
2014	6.99	2015926	0.56	203123	0.22	91408	0.12	76756
2015	5.78	1523002	0.69	226742	0.38	174016	0.11	77975
2016	5.24	1232877	0.75	237424	0.43	199947	0.12	77572
2017	4.38	1111204	0.95	331800	0.41	219131	0.14	96652
2018	4.07	1022010	1.06	381453	0.39	233659	0.16	120391
2019	4.23	999394	1.38	388240	0.43	283015	0.17	103728
CAGR	1.61%		23.87%		36.97%		13.31%	

Source: FAOSTAT,2019

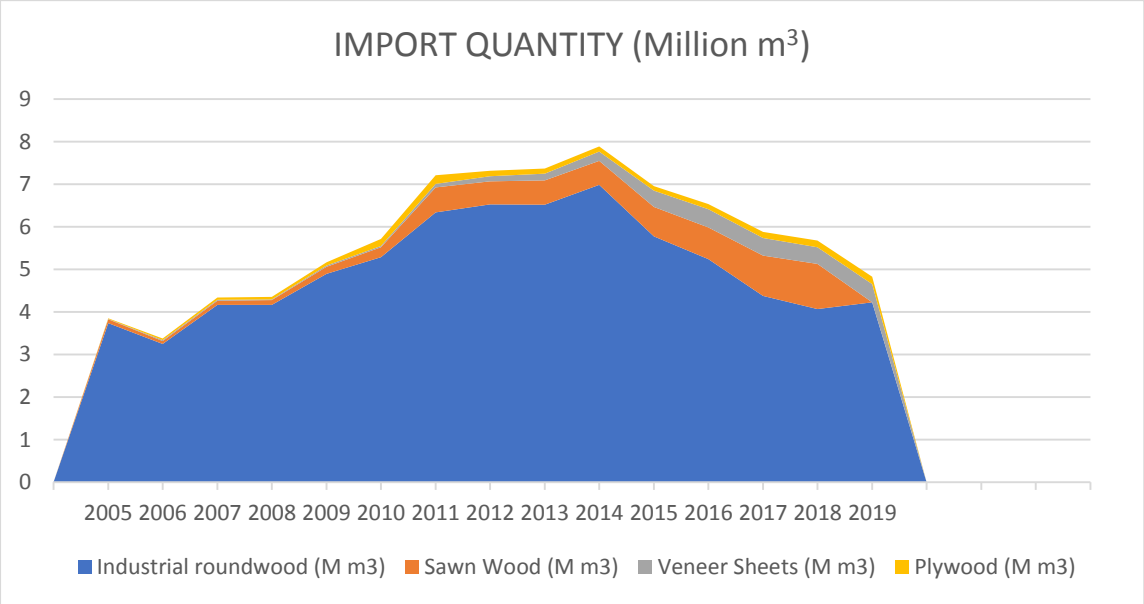

Fig. 4. Import of selected timber to India
Source: FAOSTAT

Table 4. emphasis on import quantity and value of Industrial roundwood, Sawn wood, Veneer sheets and plywood. From 2005 to 2014, Industrial roundwood showed continuous trend and shrinked to 5.78 million m^3 which resulted in downward movement in import (Fig. 4). Amid fluctuations, it has increased growth rate of 1.61%. Nautiyal and Verma (2017) [15] said that reason for decline in import of roundwood would be use of alternatives to wood which could be either imported or within the country. Increased demand in the construction sector for furniture and wood-based interior applications, sawn wood is mainly used which had driven material from other countries to meet the domestic need. It has increased CAGR of 23.87 per cent during 2005-2019. Veneer sheets also recorded steady increase in import till 2017 and collapsed in the last two years. But it shows increased growth rate 36.97 per cent of all items. Plywood recorded gradual increase from 2005 to 2019 with the growth rate of 13.31 per cent.

4. CONCLUSION AND SUGGESTION

The production of timber in India could not meet the domestic need with a constant raise in the standard of living. In order to meet consumption, there has been a steady increase in the import during the last two decades. The growth rate of increase in imports surpassed that of exports. This demand supply gap provides more scope to increase the domestic production of timber in India. Imports of timber mostly include tropical hardwoods from Africa, Myanmar, Malaysia, Indonesia. This can be sort out by planting more tropical hardwoods and incentivising cultivation of such trees outside forests. The trend poses increase demand for fast growing productive tree plantations with the help of enabling governance. In other words, popularising these species through sustainable forest management programmes or Biodiversity project etc., would help in meeting the domestic demand without much dependence on imports. Otherwise switch on to the renewable materials like plantation wood, bamboo etc., Thus, more number projects on growing trees outside forests need to be planned not only in the farmers land to increase the income of the farmers but also in the wastelands with the help of government programmes to attain self-sufficiency in timber production and consumption in the long run.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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