



Statistical analysis of export and import of wood based panel in India

V.K. Upadhyay

Indian Plywood Industries Research and Training Institute (IPRTI), HMT Link Road off Tumkur Road, Yeshwantpur, Bangalore-560022.

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ABSTRACT

This study offers a brief overview of the export and import of wood based panel in India. The statistical parameters such as descriptive analysis, trends, graph and regression analysis have been computed to understand the nature of wood based panels export and import with top 25 countries on the basis of five year assessment, which is accounts 87.7% (1997-1998 to 2001-2002), 89.5% (2002-2003 to 2006-2007) and grow to 91% (2007-2008 to 2011-2012). The result of regression analysis demonstrate high R^2 0.86 in export and 0.97 in import with correlated GDP, FDI and PC-NDP. The wood based panel's viz. veneers, plywood, fibre boards, particle boards have also been examined for their trends.

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Introduction

The world forest covers about 4 billion hectares about 31% of the earth's land surface and resource of the forest products. The forest products sector is estimated to contribute about 1% of World GDP and approximately 3% of international merchandise trade. Forest product industry's annual turnover exceeds US \$ 200 billion for four products categories: Round wood & Sawn wood, Wood based panels, Pulp and Paper. The forest products industry is employing over 10 million people in the world and 1 billion people depend on forestry resource of income (State of the World's forest 2012). Out of the world forest area in top 10 countries, Russia is in top position share with 20.01% and India is in 10th position accounts 1.69%. India's forest and tree cover of the country is 78.29 million ha., which is 23.81% of total geographical area. India's annual estimated production of wood from forest is 3.175 million m³ and consumption is 48.0 million m³ (FSI Report 2011).

The economy of India is the tenth-largest in the world by nominal GDP and the third-largest by purchasing power parity (PPP). According to IMF India is the 19th –largest exporter and the 10th –largest importer in the world (Economy India 2012 Wikipedia). Uddin (2009) studied that time series behavior of imports and exports of Indonesian trade. Zajac (1998) studied that analysis of 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 (Tajdinet *al.* 2011). India's exports declined however, domestic demand and consumer spending remained relatively strong to support economic growth (British Columbia Forest Products 2008 Annual Report). In this paper studies have been taken on wood based panel (WBP) such as veneers, fiber boards, hard boards and plywood. The wood based panel industry in India posted a healthy growth during the review period 1996 to 2012 and the trend is expected to continue over the future.

Methodology

The study considers yearly data of i) import value (Imp), and ii) export value (Exp) of India during year 1996-1997 to 2011-2012. The WBP data for the study were collected from the

Ministry of commerce and Industry, Gov. of India, Trade Statistics: Export Import data bank as on 25 January 2013 (<http://commerce.nic.in/eidb/default.asp>). Other sources of data collected from different publications of the India, Ministry of External affairs, Ministry of Environment and Forest and Ministry of Statistics and Programme Implementation. Data are compiled according to trade classification as harmonized system code 4 digits coding on the basis of veneer HS code-4408, Particle board HS code-4410, Fiber board HS code-4411 and Plywood HS code-4412. The regression analysis is apply to evaluate relationship between export and import are taken as dependent variables and some economic factors Foreign Direct Investment (FDI), Gross Domestic Product (GDP) and Per Capita Net Domestic Product (PC-NDP) are independent variables during 2001-2002 to 2011-2012. We have taken two models following as:

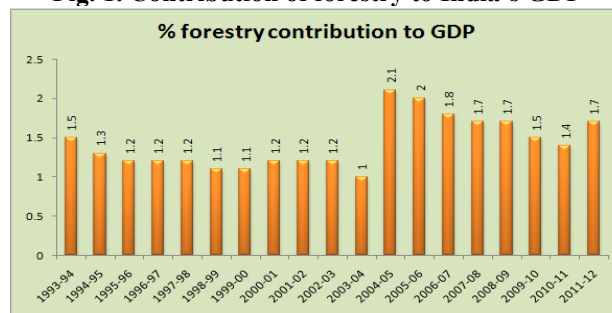
$$\text{Export} = \beta_0 + \beta_1 \text{GDP} + \beta_2 \text{FDI} + \beta_3 \text{PC-NDP}$$

$$\text{Import} = \beta_0 + \beta_1 \text{GDP} + \beta_2 \text{FDI} + \beta_3 \text{PC-NDP}$$

Analysis and assessment of wood based panels

Plan-wise outlay under forestry sector is still much less significant than total public outlay sector. According to the latest eleventh plan report 2007-12, the share of forestry sector in the overall allocated outlay is only 0.46% (Table 1). Forestry contribution as percentage of GDP is 1.5% during 1993-94 and decrease to 1.0% in 2003-04, which has been jumped to 2.1% in 2004-05 and again decrease to 1.7% in 2011-12. See Fig 1 for the pattern of changes in the forestry share of GDP.

Fig. 1. Contribution of forestry to India's GDP



Source: 1. MOSPI (1993-94 to 2002-03), 2. Workshop in IPIRTI, Bangalore 2004-05 to 2002-03 and 3. 2009-10 & 2010-11 from MoEA, GoI

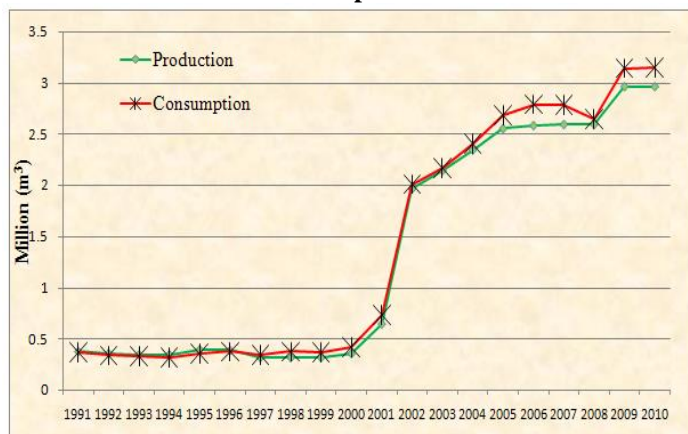
Global trends in production, export and import of forest wood based panel, 1991-2010

Among top 5 countries, production share of USA is 20.4% (803.9 million m^3) which is the leading; China is second with 18.2%. But India's position is 24th with 0.7% (26.6 million m^3) during the period 1991-2010 of global share. Top five countries accounted for 48.6% of world exports of WBP and Indonesia is leading country accounted for 11.8% (48.8 billion\$) followed by second position Canada 10.8%. But India is in 54th position accounted for 0.1% (0.45 billion \$). On the import side, five countries accounted for 47.4% and the USA contributes 16.9% (69.1 billion\$) highest rank but interestingly Japan alone were responsible for 11% (44.8 billion\$) dependent on the import of WBP, followed by Germany, China and the United Kingdom. India has contributed only 0.21% (0.88 billion \$) with 50th position (Table 2).

Trends in production and consumption of wood based panel, 1991-2010

Production and consumption are driven by many factors, of which demand- supply, population and income are the most important. Consumption of Indian wood based panel has been expanded by 26.7 million m^3 over the past twenty years, which is 0.37 million m^3 in 1991 to grow 3.15 million m^3 in 2010. The consumption exceeds from production about 6.4% in 2010 i.e. excess of 0.19 million m^3 . The trend of consumption growth higher than the production of Indian wood based panel (fig. 2). Production of WBP has been dynamic and it has grown more than eight-fold. According to Asia Pacific country report 50% of wood supply in the country comes from non-forest sources dependent on import and public forests/plantation. The projected demand for wood based panel reported in table (3). But this target is not achievable in next seven years, this would mean about 5 fold additional WBP required to achieve 2020 target. The projected Indian wood based panel scenario will be 1.38% and accounted for 5.34 million m^3 by 2020 of global output (Upadhyay *et al.* 2012).

Fig. 2. Trend of production and consumption of Indian wood based panel



Discussion

Trade of Wood-based panels in India, 1996-97 to 2011-12

Major feature of trade was a declining since 2000 to 2002, and the continuous sharp increase and annual growth of 73% from 2003 to 2012. During 1996-97 to 2011-12 total exports accounted for 28% of total trade of WBP and in 2011-12 accounted for 12%. On the import side, total imports accounted for 72% of trade of WBP and in 2011-12 accounted for 88%.

The percentage of wood based panel contribution of total wood products share are accounted 75.5 to 22.1% declined pattern and on import side, 5.5 to 13% increasing trend reported during 1996-97 to 2011-12 (Table 4). It means Indian WBP is aggressive in import direction compare to export.

Regression Analysis

The relationship is between export/import with economic factors GDP, FDI and PC-NDP. In the table 5 depicts that R^2 value is 0.863 using export as the dependent variable. It means model explains 86.3% of the variance in the export is explained by the independent variables. It explains that there is a negative significant relationship between PC-NDP and export. However GDP is a more significant relationship with export. FDI also shows that positive non-significant relationship with export. In the import case model R^2 value is 0.973, as a dependent variable which means that 97% of the variance in the import is explained by the independent variables. PC-NDP shows that the positive most significant relationship with import. However GDP shows negative significant relationship with import. FDI also shows that positive highly non-significant relationship with import as well as export (Table 6).

Trade of veneers, particle boards, fiber boards and plywood

Veneer export showed increasing trend which accounted for 2371 lakh INR in 1996-97 and reached to 6884 lakh INR in 2011-12 followed by fiber boards accounted 709 lakh INR in 1996-97 and reached to 5643 lakh INR in 2011-12 and plywood accounted for 7021 lakh INR in 1996-97 and reached to 9759 lakh INR in 2011-12. But in case of particleboard, it showed decreasing trend from 1021 lakh INR in 1996-97 to 344 lakh INR in 2011-12 (Table 7). The annual growth rates are 2.4% in plywood, 11.9% in veneers and more interestingly 43.5% in fiber board but it showed declined growth in particle board annually by 4.1% (negatively). All WBP import trend are representing increasing growth, veneer import jumped to 2281 lakh INR to 24501 lakh INR with a 61% annual growth rate followed by particle boards 1280 lakh INR to 39234 lakh INR with 185%, Fiber boards 2984 lakh INR to 41287 lakh INR with 80% and Plywood 2653 lakh INR to 54776 lakh INR with 130% annual growth rate respectively (Table 7). In figure 3, among WBP total trade trend depicted higher growth rate from 1996-97 to 2011-12. Among these, plywood has represented eight multiple times 1997-98 period from 7524 to 64536 lakh INR followed by fiber boards nearly 13 times from 3640 to 46930 lakh INR, Particle boards 17 times from 2300 to 39579 lakh INR and Veneers 5 times from 6035 to 31385 lakh INR.

Fig. 3. Trade of Veneers, Fibre boards, Particle boards and Plywood

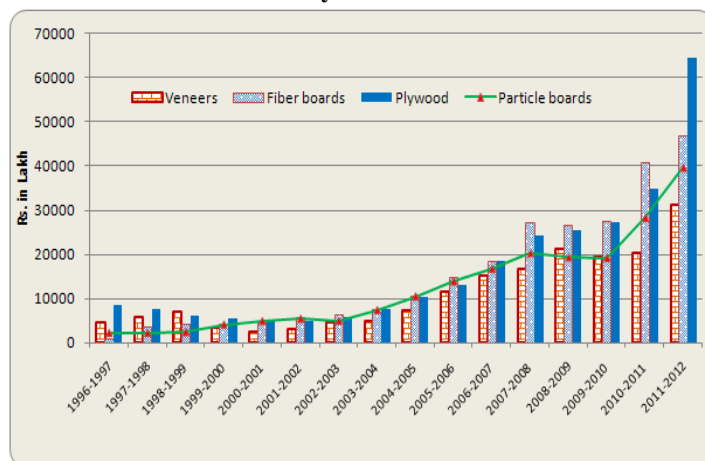


Table 1. Plan-wise outlay under forestry sector

Plan	Period	Total Public Sector (crores)	Forestry Sector (crores)	% of plan outlay
First	1951-56	2069.0	7.64	0.37
Second	1956-61	4800.0	21.21	0.44
Third	1961-66	7500.0	45.85	0.61
Post third	1966-69	6687.0	41.93	0.63
Fourth	1969-74	15901.0	89.42	0.56
Fifth	1974-79	38853.0	208.84	0.53
Annual	1979-80	12550.0	68.33	0.54
Sixth	1980-85	97500.0	692.49	0.71
Seventh	1985-90	180000.0	1859.10	1.03
Post seventh	1990-92	139197.0	1413.00	1.01
Eighth	1992-97	434100.0	4081.87	0.94
Ninth	1997-02	859200.0	8189.09	0.95
Tenth	2002-07	1484131.3	8893.01	0.60
Eleventh	2007-12	2156571.0	10000.00	0.46

(Source: Forests & Wildlife Statistics, INDIA, 2004 and MoEF, GoI (10th & 11th Plan)**Table 2. Global trends in production, export and import of forest WBP, 1991-2010**

Country	Position	Production		Country	Position	Export		Country	Position	Import	
		million m ³	%			billion \$	%			billion \$	%
USA	1	803.9	20.4	Indonesia	1	48.8	11.8	USA	1	69.1	16.9
China	2	715.6	18.2	Canada	2	44.9	10.8	Japan	2	44.8	11
Germany	3	262.9	6.7	Germany	3	40.6	9.8	Germany	3	30.8	7.6
Canada	4	247.3	6.3	China	4	33.7	8.1	China	4	29.1	7.1
Indonesia	5	153.3	3.9	Malaysia	5	33.6	8.09	UK	5	23.8	5.8
India	24	26.7	0.7	India	54	0.45	0.1	India	50	0.88	0.21

Source: IPIRTI, International conference, September 2012

Table 3. Projected demand of wood based panel of India in the year 2020 (million m³)

Plywood	Veneer	Particle Board	MDF Board	Wood based Panel
29.20	0.70	0.35	0.28	30.53

Table 4. Trade of Wood-based panels in India (In Lakh Indian Rupees: INR)

Year	Export	Import	Total Trade	% of Export WBP in Wood and wood articles	% of Import WBP in Wood and wood articles
1996-1997	11123.16	5282.76	16405.92	75.5	5.5
1997-1998	8502.27	10998.47	19500.74	71.9	7.0
1998-1999	5853.50	14131.79	19985.29	49.5	8.8
1999-2000	7072.80	10652.92	17725.72	65.3	5.3
2000-2001	7370.42	10563.29	17933.71	51.9	4.7
2001-2002	7130.55	12291.18	19421.73	49.8	4.7
2002-2003	10351.84	11627.50	21979.34	50.4	5.8
2003-2004	12005.49	15679.26	27684.75	45.6	4.7
2004-2005	18556.11	20403.31	38959.42	49.7	5.0
2005-2006	20630.96	32740.96	53371.92	47.3	7.8
2006-2007	25890.28	43038.88	68929.16	44.6	8.9
2007-2008	27804.72	60529.01	88333.73	43.1	10.7
2008-2009	27610.75	65220.96	92831.71	36.0	10.4
2009-2010	23464.42	70250.52	93714.94	35.1	9.2
2010-2011	18460.79	106108.00	124568.76	24.4	13.7
2011-2012	22731.29	159800.20	182531.45	22.1	13.0

Source: Ministry of Commerce & Industry, New Delhi, Compilation by author

Table 5. Model summary of ANOVA**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.929 ^a	.863	.812	3287.95499

Predictors: (Constant), PCNDP, FDI, GDP

ANOVA^b

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.465E8	3	1.822E8	16.851	.001 ^a
Residual	8.649E7	8	1.081E7		
Total	6.330E8	11			

Dependent Variable: Exp

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-45493.656	13684.976		-3.324	.010
GDP	.041	.009	5.331	4.435	.002
PCNDP	-2.586	.592	-5.094	-4.367	.002
FDI	.063	.044	.481	1.442	.187

a. Dependent Variable: Exp

Table 6. Model summary of ANOVA

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.986 ^a	.973	.963	8788.72730

Predictors: (Constant), PCNDP, FDI, GDP

ANOVA^b

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.218E10	3	7.394E9	95.730	.000 ^a
Residual	6.179E8	8	7.724E7		
Total	2.280E10	11			

Dependent Variable: Imp

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	52012.616	36580.038		1.422	.193
GDP	-.070	.025	-1.515	-2.830	.022
PCNDP	7.375	1.583	2.421	4.660	.002
FDI	.049	.117	.062	.419	.686

a. Dependent Variable: Imp

Table 7. Trade of veneers, particle boards, fiber boards and plywood (In Lakh INR)

Year	Veneers		Particle boards		fibre boards		Plywood	
	Export	Import	Export	Import	Export	Import	Export	Import
1996-1997	2371.64	2281.47	1021.14	1280.27	709.17	240.97	7021.21	1480.05
1997-1998	2210.03	3825.14	765.74	1534.97	656.33	2984.48	4870.17	2653.88
1998-1999	1860.51	5227.35	883.14	1627.59	837.57	3532.49	2272.28	3744.36
1999-2000	1837.60	1709.27	1328.82	2859.39	754.45	3660.5	3151.93	2423.76
2000-2001	1614.15	1109.22	941.09	4023.38	1415.22	3570.23	3399.96	1860.46
2001-2002	2125.73	1173.68	1444.85	4089.28	1096.95	4688.64	2463.02	2339.58
2002-2003	3202.71	1599.34	1587.08	3464.13	1535.66	4875.87	4026.39	1688.16
2003-2004	3525.31	1655.62	1379.47	6087.04	1454.66	6005.07	5646.05	1931.53
2004-2005	5292.50	2261.78	2883.5	7673.18	2386.58	8132.36	7993.53	2335.99
2005-2006	6630.35	4924.41	2181.09	11786.99	2362.33	12378.39	9457.19	3651.17
2006-2007	8906.68	6425.38	1885.82	14863.50	2472.48	15987.69	12625.3	5762.31
2007-2008	9335.84	7432.54	1518.78	18721.79	4267.31	22927.07	12682.79	11447.61
2008-2009	12194.54	9246.05	1513.46	17830.61	4524.03	22008.75	9378.72	16135.55
2009-2010	9254.66	10355.80	752.48	18462.09	5150.71	22514.14	8306.57	18918.49
2010-2011	7184.32	13353.69	741.24	27546.64	4241.35	36585.54	6293.88	28622.10
2011-2012	6884.36	24501.57	344.60	39234.23	5643.00	41287.40	9759.33	54776.90

Table 8. Country wise export of the wood based panels (in Lakh INR)

S.No.	Country	97-98 to 01-02	%	Country	02-03 to 06-07	%	Country	07-08 to 11-12	%
1	U ARAB EMTS	6894.06	20.3	U ARAB EMTS	26693.21	30.9	U ARAB EMTS	29386.65	25.1
2	U S A	4447.13	13.1	U S A	11002.09	12.7	TURKEY	18442.86	15.7
3	SINGAPORE	1956.05	5.8	SRI LANKA DSR	4403.9	5.1	U S A	7426.43	6.3
4	SRI LANKA DSR	1650.02	4.9	BANGLADESH PR	3488.79	4	QATAR	6017.63	5.1
5	HONG KONG	1574.4	4.6	QATAR	3027.67	3.5	SAUDI ARAB	5526.97	4.7
Share of top 25 countries		33969.8	87.7		86407.2	89.5		117131.2	90.9
Others countries		4178.97	12.3		9079.95	10.5		10567.64	9.03
Total		33969.8			86407.2			117131.2	

Country wise export

Top 25 countries covers 87.7% of the total export of WBP and the country wise were as follows: 20.3% UAE, 13.1% USA and 5.8% Singapore during 1997-98 to 2001-02. During the next 5 year periods 2002-03 to 2006-07 covers 89.5% of the total export and the share of UAE is 30.9% with first position followed by 12.7% USA and third place of Singapore replaced by Sri Lanka with 5.1%. Lastly for recent 5 years period 2007-08 to 2011-12 contribution of total export share are increased accounted to 90.97% of top 25 countries. UAE again highest importer of Indian WBP, which is accounted to 25.1% followed by Turkey 15.7% replaced to USA and USA slipped to third position with 6.3%. The UAE deserves special attention reported that it has highest buyer and USA, Turkey, Sri Lanka and Bangladesh have prominent markets for Indian WBP products (Table 8).

Conclusion

The export and import are showing increasing trend, however import is 2.5 multiple times higher than export of WBP in overall periods. It means result shows more import and less export of WBP in India. Regression models provide a relatively high R^2 of 0.86 in export and 0.97 in import; it means results indicate that the relationship between GDP, Per capita NDP and the exports and imports are highly significantly correlated. Among WBP, plywood is having higher export value and followed by veneers and regarding import, fibre board is highly importing and secondly particle board. Out of total trade of WBP, plywood is more significant and followed by fiber board, but it is noticeable that, the above analysis trend represents the Indian WBP converting to fibre board direction, because of the problem of resources of raw material and forest policy restriction. The country wise major buyer partners are UAE, USA, Turkey, Sri Lanka, Bangladesh, Saudi Arab and Nepal.

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