

## GLOBAL VALUE CHAIN OF INDONESIAN PULP AND PAPER INDUSTRY

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**Abstract:** Global Value Chain (GVC) has been a global phenomenon since 1980s when export values no longer represented the actual benefit of a country's economic measure. Furthermore, GVC measurement applying input-output table approach has quite rapidly developed. Given the fact that the role of Indonesian pulp and paper industry is increasingly important in the country's economy, this study aimed at measuring the pulp and paper industry GVC in 1995 and 2011 as well as its position and participation in the global GVC using Inter-Country Input-Output (ICIO). The results show that GVC of Indonesia's pulp and paper industry is generally in the form of value-added exports in intermediate absorption by direct importers and indirect final exports and also in the form of foreign value-added return in foreign countries in intermediate exports and also value-added exports in intermediate goods exports to the third countries. GVC Indonesia is also still dominated by domestic value-added compared to foreign value-added and remains in a "downstream" position and has decreased its GVC participation globally. In the future, it is important to strengthen GVC participation by maintaining greater ownership of domestic value-added in Indonesia's pulp and paper industry.

**Keywords:** global value chain, pulp and paper, Intercountry input-output, GVC position and participation

**Abstrak:** Rantai Nilai Global (GVC) telah menjadi fenomena global sejak 1980-an ketika nilai ekspor tidak lagi mewakili manfaat nyata dari ukuran ekonomi suatu negara. Selanjutnya, pengukuran GVC yang menerapkan pendekatan tabel input-output telah cukup berkembang pesat. Mengingat fakta bahwa peran industri pulp dan kertas Indonesia semakin penting dalam perekonomian negara, penelitian ini bertujuan mengukur GVC industri pulp dan kertas pada tahun 1995 dan 2011 serta posisi dan partisipasinya dalam global GVC dengan menggunakan Inter-Country Input-Output (ICIO). Hasilnya menunjukkan bahwa GVC industri pulp dan kertas Indonesia umumnya dalam bentuk nilai tambah ekspor produk antara yang diserap oleh importir langsung, nilai tambah ekspor dalam bentuk ekspor produk final, nilai tambah luar negeri yang kembali ke luar negeri dalam bentuk ekspor produk antara dan juga nilai tambah ekspor dalam bentuk produk antara yang diekspor kembali ke negara-negara ketiga. GVC industri pulp dan kertas Indonesia juga masih didominasi dalam bentuk nilai tambah dalam negeri dibandingkan nilai tambah luar negeri serta tetap berada dalam posisi "downstream" dan mengalami penurunan tingkat partisipasi GVC secara global. Di masa depan, penting penguatan partisipasi GVC dengan mempertahankan kepemilikan nilai tambah domestik yang lebih besar dalam industri pulp dan kertas Indonesia.

**Kata kunci:** rantai nilai global, pulp dan kertas, intercountry input output, posisi dan partisipasi GVC

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## INTRODUCTION

Pulp and paper industry is one of the important industries in the national economy (Widyantoro et al. 2006; Mardiana, 2012). Not only is this industry capable of absorbing quite massive labor in the last 10 years, but it also contributes to the national export (Wulandari, 2007). Based on BPS data (2016), this industry's 2002-2015 labor absorption in average reached 129 thousand workers in a year, and its export contribution during the same period reached 3,937 thousand tonnes in average, which is equal to USD 3,265 million. Compared to national non-oil and gas export, pulp and paper industry export was 3.4% per year in average during the same period. The main pulp and paper industry's export destination countries include Japan, the United States, Malaysia and Vietnam.

High export value does not necessarily represent the national economy's value-added, taking into account that other countries' import content is also contained in the export (Hummels et al. 2001). As the result, some parts of the value-added also belong to Indonesia's trading partners exporting auxiliary raw materials for Indonesian pulp and paper industry. Such value-added possession is illustrated with the case of iPhone production where manufacture took place in China, while hardware was produced in Japan, memory came from South Korea, and processor came from the US, for further retail marketing in the US and the other parts of the world (Dedric et al. 2010). This process, in turn, will form GVC where each country provides raw materials, intermediate to final goods and becomes the final of consumer (Gereffi, 2014). GVC itself has become a phenomenon since 1980s.

Pulp and paper industry GVC is found not only in certain countries, but also in many countries and from many other sectors. Take example of the three-country case where the first country manufactures intermediate and final goods for the second country (Meng, 2011; Koopman et al. 2010); and the second country manufactures for both its domestic needs and export to the third-countries. The manufacturing process in the second country requires domestic intermediate goods, capital and manpower. As for the export to the third-countries, this may take form of intermediate and final goods. That is, because international production fragmentation process has implications that each country will be specialised in certain trade or value-added (Timmer et al. 2014). The same process

involving multiple countries will form a GVC where each country with its own resources participates in one or more manufacturing processes and production sharing between them (Johnson and Noguera, 2012).

Research on pulp and paper industry GVC is still very limited, including in Indonesia. Generally, the research employs survey and statistical measures to illustrate the value-added that each actor in the industrial supply chain gains. Examples of this research include those in the Philippine (Daly et al. 2016), Canada (Lantz, 2003; Shahi and Pulkki, 2013), India (Pati et al. 2006), South Africa (Pulkki, 2001), Sweden (Carlson and Mikael, 2005) and Indonesia (Suka, 2009; Indriantoro et al. 2012). Nevertheless, these researches are currently unable to represent the current situation of international production fragmentation that has gone complex, such as GVC measurement uttered by Hummels et al. (2001), Meng (2011) and Koopman et al. (2010); Timmer et al. (2014) and Serbanel (2015) using a wide range of data already available such as World Input Output Database, Inter-Country Input-Output, Asia International Input-Output Tables, and Global Trade Analysis Project (GTAP).

Given that situation, this study was conducted to assess the GVC of pulp and paper industry in Indonesia and its trading partners, including Indonesian pulp and paper industry overall position and participation level in the GVC. By applying ICIO approach with the model from Koopman et al. (2010, 2014), this study will be able to complement a variety of perspectives on the approach that Kaplinsky and Morris (2003) much described in GVC measurement including many value-added studies in Indonesia and other countries, using the abovementioned survey or statistical data approach. This study limited its scope to sectors/industries relevant to pulp and paper and countries with which Indonesia partners in trade, constructing the data into 16 sectors and 17 countries. In addition, this study also divided the scope into two periods, i.e. 1995 and 2011, to observe the development of this industry since the implementation of Industrial Forest (HTI) policy in 2001. It is suspected that this industry GVC has domestic value-added higher than that of the foreign one, considering that raw materials mostly come from domestic sources. However, it is expected that this study could serve as an input as to how this industry should improve in the future, taking into account other country's development in value-added trade (Johnson and Noguera, 2012), particularly for Indonesian pulp

and paper sector during the two periods. Furthermore, better measurement will help presenting more relevant information to decision makers (Gereffi et al. 2005).

## METHODS

This research logical framework was based on the consideration that pulp and paper export plays a big role for the Indonesia's national economy. While export keeps growing, it does not reflect the actual benefit that the country receives due to the foreign value-added that the activity contains. One of the measures to differ is the value-added that each country gains out of the international production fragmentation (Los et al. 2015). This process, in turn, forms a GVC where each country makes available of raw materials, intermediate to final goods, and becomes the end consumer. This is the reason why information on each country's GVC, including the position and participation of pulp and paper industry in Indonesia and its trading partners, becomes very important. This information is necessary to increase the value-added of domestic pulp and paper industry and to define the current trade policy and industrialisation process.

This research employed Inter-Country Input-Output (ICIO) using the model developed by Koopman et al. (2010; 2014). The basic data for constructing pulp and paper industry's ICIO approach were taken from the Organisation for Economic Co-operation and Development (OECD) where 1995 and 2011 were the baseline (secondary). To aggregate and disaggregate data, Multiregional Input-Output from EORA database was used from the same period, in which there were data aggregation for 17 countries with 16 sectors and disaggregation of pulp and paper from pulp, paper, printing and publishing. The different two years were used to examine to what extent Indonesian pulp and paper industry of GVC developed during the era of HTI policy implementation, along with the re-enactment of log export prohibition policy in 2001. The main data processing used Stata 13.

Conceptually, the model developed by Koopman et al. (2014) divided export into nine 'terms' of value-added as presented in equation:

$$\begin{aligned}
 uE_{s*} = & \left\{ V_s \sum_{r \neq s}^G B_{ss} Y_{sr} + V_s \sum_{r \neq s}^G B_{sr} Y_{rr} + V_s \sum_{r \neq s}^G \sum_{t \neq s, r}^G B_{sr} Y_{rt} \right\} \\
 & + \left\{ V_s \sum_{r \neq s}^G B_{ss} Y_{sr} + V_s \sum_{r \neq s}^G B_{sr} A_{rs} (I - A_{ss})^{-1} Y_{ss} \right\} \\
 & + V_s \sum_{r \neq s}^G B_{sr} A_{rs} (I - A_{ss})^{-1} E_{s*} \\
 & + \left\{ \sum_{t \neq s}^G \sum_{r \neq s}^G V_t B_{ts} Y_{sr} + \sum_{t \neq s}^G \sum_{r \neq s}^G V_t B_{ts} A_{sr} (I - A_{rr})^{-1} Y_{rr} \right\} \\
 & + \sum_{r \neq s}^G B_{sr} A_{rs} (I - A_{rr})^{-1} E_{r*}
 \end{aligned}$$

This model supposed the world with G (17) countries where each manufactured goods of N (16) different trade sectors where  $uE_{s*}$  was gross export,  $Y_{sr}$  was final demand vector  $16 \times 1$  constituting demand in country r for the final goods s manufactured in country s,  $A_{sr}$  was Input-Output (IO) matrix coefficient  $16 \times 16$  constituting intermediate goods used by country r manufactured by country s. In addition,  $B_{sr}$  was Leontief inverse matrix  $16 \times 16$ , of the matrix of total needs providing a number of gross outputs produced by country s necessary to increase one unit in the final demand of r as the destination country.  $Y_s$  was  $16 \times 1$  vector that represented global use of s final goods. Lastly,  $V_s$  was direct coefficient of value-added of vector  $1 \times 6$ .

The nine terms uttered by Koopman et al. (2014) include the first term ( $V_1 = V_s \sum_{r \neq s}^G B_{ss} Y_{sr}$ ) of domestic value-added in direct final goods export; the second term ( $V_2 = V_s \sum_{r \neq s}^G B_{sr} Y_{rr}$ ) of domestic value-added in intermediate exports absorbed by direct importer; the third term ( $V_3 = V_s \sum_{r \neq s}^G \sum_{t \neq s, r}^G B_{sr} Y_{rt}$ ) of domestic value-added in intermediate re-exported to third-countries; the fourth term ( $V_4 = V_s \sum_{r \neq s}^G B_{ss} Y_{sr}$ ) of domestic value-added that returns via final imports; the fifth term ( $V_5 = V_s \sum_{r \neq s}^G B_{sr} A_{rs} (I - A_{ss})^{-1} Y_{ss}$ ) of domestic value-added that returns via intermediate imports; the sixth term ( $V_6 = V_s \sum_{r \neq s}^G B_{sr} A_{rs} (I - A_{ss})^{-1} E_{s*}$ ) of double counted intermediate export produced at home; the seventh term ( $V_7 = \sum_{t \neq s}^G \sum_{r \neq s}^G V_t B_{ts} Y_{sr}$ ) of foreign value-added in final goods export; the eighth term ( $V_8 = \sum_{t \neq s}^G \sum_{r \neq s}^G V_t B_{ts} A_{sr} (I - A_{rr})^{-1} Y_{rr}$ ) of foreign value-added in intermediate goods exports; and the ninth ( $V_9 = V_s \sum_{r \neq s}^G B_{sr} A_{rs} (I - A_{rr})^{-1} E_{r*}$ ) of double counted intermediate exports produced abroad.

The other model used is adapted from Koopman et al. (2010) to observe the linkage between Indonesia GVC and that of its trading partners as formulated in position and participation index by adopting  $VS1_{*sn}$  and  $VS_{sn}$  in Koopman et al. (2014) as presented:

$$GVC_{position_{sn}} = Ln\left(1 + \frac{VS1_{*sn}}{E_{s*n}}\right) - Ln\left(1 + \frac{VS_{sn}}{E_{s*n}}\right)$$

Other than seeing from the ‘upstream’ and ‘downstream’ standpoints through GVC position, it is also necessary to take into account participation of Indonesia and its main trading partners against the overall value-added chain between countries. For this purpose, use of formula described by Koopman et al. (2010) will result in the following change.

$$GVC_{participation_{sn}} = \frac{VS1_{*sn}}{E_{s*n}} + \frac{VS_{sn}}{E_{s*n}}$$

Where  $GVC_{position_{sn}}$  position of country  $s$  in GVC was,  $GVC_{participation_{sn}}$  was participation of country  $s$  in GVC and  $E_{(s*n)}$  was gross export in each country  $s$ . As for  $VS_{sn}$ , this was an element of vector gained from summing VC matrix column (excluding domestic industry) relating to import/foreign content of country  $s$  export with. Formula:

$$\begin{aligned} VS_s &= \sum_{t \neq s} \sum_{r \neq s} V_t B_{ts} Y_{sr} + \sum_{t \neq s} \sum_{r \neq s} V_t B_{ts} A_{sr} (I - A_{rr})^{-1} Y_{rr} \\ &+ \sum_{t \neq s} V_t B_{ts} A_{sr} \sum_{r \neq s} (I - A_{rr})^{-1} E_{r*} = \sum_{r \neq s} V_r B_{rs} E_{s*} \\ &= \sum_{t \neq s} \sum_{r \neq s} V_t B_{ts} Y_{sr} + \sum_{t \neq s} \sum_{r \neq s} V_t B_{ts} A_{sr} \end{aligned}$$

$VS_s$  was an element vector gained by summing  $VS1$  matrix line (excluding domestic industry) relating to domestic intermediate goods export in other countries’ exports in country  $s$ . Formula:

$$\begin{aligned} VS1_s &= V_s \sum_{r \neq s} \sum_{t \neq s, r} B_{sr} Y_{rt} + V_s \sum_{r \neq s} \sum_{t \neq s, r} B_{sr} A_{rt} X_t + \\ &V_s \sum_{r \neq s} B_{sr} Y_{rs} + V_s \sum_{r \neq s} B_{sr} A_{rs} X_s \end{aligned}$$

Equation indicate different directions where countries in ‘downstream’ position tended to have a high share of vertical specialisation in import or, in other words, it had foreign content (VS) in its export, while others in ‘upstream’ position tended to have high share of vertical specialisation from export or, in other words, they had a high share of export through third-countries (Koopman et al. 2014).

Based on the analysis, it is estimated that Indonesian pulp and paper industry’s domestic value-added is still higher than that of the foreign one. This is because the industry still relies on domestic sources of raw materials. Moreover, since the implementation of Industrial Forest (HTI) policy in 2001, the availability of its main raw materials has been pushed. Consequently, the country’s level of participation in GVC has been reduced due to the decreasing foreign value-added.

## RESULTS

In principle, pulp and paper industry has a quite long value chain (Daly et al. 2016). Gained from domestic and foreign sources, this industry inputs take forms of logs, wood chips and non-wood natural fibres, in addition to recyclable products such as used papers, paperboard, chemical product and energy. The inputs are then processed into chip/flake, wood fibre and lumber. The next step of processing is pulp of various forms starting from mechanical pulp, semi-chemical pulp, chemical pulp, sulphite, recovered fibre pulp, and others. Pulp can be processed into long and short fibres. The former can be processed into paper and paperboard, while the latter into rayon, thread and textile, for further processing into garment (final goods). Paper itself can be coated, uncoated and made into newspaper, while paperboards can take forms of container board, boxboard and tissue sheet. Paper can be the final goods such as print paper (newsprint, magazine, office paper), industrial paper (bulk packaging), consumer paper (individual packaging), and medical and hygiene paper (diaper, pad, toilet paper).

The information above is necessary for understanding the physical form of the GVC described by Koopman et al. (2014), taking into account the nine forms of value-added taking form of intermediate and final goods that ultimately form the GVC visible from the originating, destination, third and other countries. Output of data processing indicates that Indonesia’s domestic value-added in 1995 gained through domestic value-added in intermediate exports absorbed by direct importer was 43.52% (V2), which is quite high compared to that of other countries, while its domestic value-added in direct final goods export was 18.3% (V1), which is relatively lower compared to that of China, India and Japan whose domestic value-added in direct final goods export reached above 30% (Table 1). In Indonesia case, such

composition indicates that, although the intermediate goods export value-added was relatively low, the final goodsexport was not fully developed. On the other hand, the domestic value-added in intermediate re-exported to third-countries of 7.42 % (V3) indicates that the industrialisation process in the country's pulp and paper industry was yet to completely make final goods. Even it turns out that the intermediate goods that Indonesia exported was used by other countries for re-export.

On the other hand, domestic value-added that returns via final importsand intermediates imports is still relatively low where the portions are respectively 0.11% (V4) and 0.14% (V5). This means that there is a value-added that Indonesia gains by the time its export goods come back to it taking form of final and intermediate goods. The double counted intermediate export produced at homealso generates a relatively small value, i.e. 0.04% (V6). This is possible in statistic calculation between

Indonesia and its importing countries, especially those who re-export Indonesian intermediate goods.

In terms of Indonesia gross export, there is also foreign value-added in finalgoodsexport and in intermediate goods export, i.e. 20.99% (V8) and 9.37% (V7) respectively, as well as double counted intermediate exports produced abroad of 0.11% (V9). This means that, the total foreign value-added is 30.5%. Compared to the average of all countries of 21%, the role of foreign value-added in Indonesian pulp and paper gross export is quite high although lower than that of Belgium, Malaysia, Singapore, Taiwan and Vietnam. The high foreign value-added can be comprehended from the side of raw material sourced from foreign countries. BPS (1995) data indicates that the value of import raw materials for Indonesian pulp and paper industry is 26.5% of the total raw material values. In general, these materials include wood fibre, used paper, chemical and many others.

Table 1. Global value chain decomposition of export for pulp and paper industry in Indonesia and trade country partners in 1995 (%)

Country	in Billions of US dollars	Value-added exports			Domestic VA return home		Pure double counting	Foreign VA return foreign countries		Pure double counting	Total	Domestic Value Added	Foreign Value Added
		in direct final exports	in int. absorb by direct importers	in int. reexports to third countries	in final exports	in int. Exports	in int. exports produced in home	in final exports	in int. Exports	in int. Exports produced abroad			
		V(1)	V(2)	V(3)	V(4)	V(5)	V(6)	V(7)	V(8)	V(9)			
Indonesia	538	18.30	43.52	7.42	0.11	0.14	0.04	9.37	20.99	0.11	100.00	69.5	90.5
Australia	459	22.16	46.46	7.01	0.17	0.15	0.04	6.95	16.96	0.09	100.00	76.0	24.0
Belgium	2,278	16.56	37.68	5.47	0.25	0.23	0.24	11.33	27.87	0.39	100.00	60.4	39.6
France	5,525	22.47	44.24	5.93	0.71	0.64	0.27	7.22	18.12	0.41	100.00	74.3	25.7
Germany	13,319	25.22	50.52	5.59	1.29	0.84	0.38	4.17	11.60	0.39	100.00	83.8	16.2
Japan	1,554	35.95	48.31	7.50	0.96	0.94	0.15	2.09	3.96	0.13	100.00	93.8	6.2
Korea	797	24.98	42.36	5.76	0.16	0.20	0.10	8.72	17.57	0.15	100.00	73.6	26.4
Netherlands	3,253	19.65	45.44	7.05	0.34	0.36	0.26	7.80	18.83	0.26	100.00	73.1	26.9
United Kingdom	4,902	23.97	46.54	5.77	0.54	0.41	0.19	6.27	16.09	0.24	100.00	77.4	22.6
United States	15,912	28.42	53.73	5.57	1.75	1.18	0.26	2.64	6.24	0.22	100.00	90.9	9.1
China	611	37.20	38.28	4.83	0.10	0.17	0.05	7.71	11.57	0.08	100.00	80.6	19.4
India	188	34.26	38.84	5.83	0.05	0.04	0.01	7.97	12.99	0.02	100.00	79.0	21.0
Malaysia	293	16.15	26.02	6.18	0.27	0.14	0.20	17.33	33.10	0.62	100.00	49.0	51.0
Singapore	653	9.23	28.32	3.68	0.11	0.13	0.27	21.16	36.47	0.64	100.00	41.7	58.3
Taiwan	873	15.24	32.09	4.33	0.10	0.09	0.09	15.68	32.17	0.22	100.00	51.9	48.1
Vietnam	11	29.71	25.26	5.52	0.02	0.03	0.01	19.66	19.74	0.04	100.00	60.9	39.4
Rest of The World	31,346	27.07	48.60	3.82	3.13	3.44	0.91	4.05	7.88	1.11	100.00	87.0	13.0

Compared to year 1995, the development of Indonesian pulp and paper industry value-added in 2011 demonstrated a different pattern although the gross export value increased from USD 538 billion to USD 4,555 billion (Table 2). The change includes the increasingly declining composition of foreign value-added in gross export from 30.5% to 13.10% or, in other words, the domestic value-added increased. The declination in foreign value-added is made possible by the constantly decreasing use of import raw materials. BPS 1995 and 2011 data indicates declining portion of import raw material composition from 26.5% to 13.8%. This is possible as the main raw materials of pulpwood started being provided from industrial forests. Nevertheless, import raw materials are difficult to eliminate because other industries such as chemical, machinery and other industries keep relying on import.

At the same time, change also takes place in domestic value-added where export value-added portion in the form of domestic value-added in intermediate exports absorbed by direct importer increased from 43.52% in 1995 to 60.45% in 2011, while domestic value-added in direct final goods export decreased from 18.30% to 16.55% during the same given period. The increase in the form of intermediate goods is accompanied by increase in the domestic value-added in intermediate re-exported to third-countries from 7.42% to 9.38%. This means that demand for intermediate goods became higher in importing countries, along with increasing exports from importing countries to others although it contains Indonesia's domestic value-added.

Table 2. Global value chain decomposition of export for pulp and paper industry in Indonesia and trade country partners in 2011 (%)

Country	in Billions of US dollars	Value-added exports			Domestic VA return home		Pure double counting	Foreign VA return foreign countries		Pure double counting	Total	Domestic Value Added	Foreign Value Added
		in direct final exports	in int. absorb by direct importers	in int. reexports to third countries	in final exports	in int. Exports	in int. exports produced in home	in final exports	in int. Exports	in int. Exports produced abroad			
Indonesia	4,555	16.55	60.45	9.38	0.20	0.27	0.06	3.34	9.69	0.07	100.00	86.9	13.1
Australia	1,109	18.75	43.95	7.12	0.25	0.17	0.05	6.67	22.88	0.17	100.00	70.3	29.7
Belgium	2,543	16.34	35.12	5.53	0.14	0.14	0.12	11.24	31.11	0.25	100.00	57.4	42.6
France	7,885	18.03	39.52	5.50	0.60	0.47	0.25	10.46	24.63	0.53	100.00	64.4	35.6
Germany	23,773	24.57	46.90	5.13	0.76	0.44	0.39	5.35	16.12	0.34	100.00	78.2	21.8
Japan	2,775	27.84	49.86	9.07	0.72	0.79	0.25	3.57	7.68	0.22	100.00	88.5	11.5
Korea	5,185	22.43	48.97	7.33	0.18	0.26	0.30	6.39	13.94	0.20	100.00	79.5	20.5
Netherlands	2,752	22.09	50.16	8.44	0.16	0.19	0.11	5.48	13.28	0.08	100.00	81.2	18.8
United Kingdom	6,918	20.60	46.65	6.14	0.48	0.37	0.21	6.88	18.38	0.29	100.00	74.5	25.5
United States	39,124	24.13	58.04	6.46	1.93	1.43	0.33	2.28	5.19	0.20	100.00	92.3	7.7
China	10,989	27.24	36.70	4.79	0.52	1.06	0.58	11.01	17.07	1.03	100.00	70.9	29.1
India	1,035	19.57	30.13	4.43	0.14	0.13	0.04	15.60	29.75	0.21	100.00	54.4	45.6
Malaysia	1,919	8.55	26.60	4.14	0.06	0.06	0.11	19.40	40.61	0.45	100.00	39.5	60.5
Singapore	919	5.87	29.71	4.84	0.03	0.04	0.10	19.22	39.98	0.21	100.00	40.6	59.4
Taiwan	1,012	11.45	28.08	4.99	0.08	0.08	0.15	15.03	39.72	0.42	100.00	44.8	55.2
Vietnam	293	16.57	21.83	4.13	0.03	0.02	0.03	24.86	32.41	0.11	100.00	42.6	57.4
Rest of The World	51,764	24.68	45.04	4.31	4.01	4.50	1.22	4.44	9.93	1.86	100.00	83.8	16.2

As for the gross export growth, China and Vietnam have the most rapid one. Theirs are respectively 1,699% and 2,447% with domestic ownership of, also respectively, 79% and 60.55%. Both countries slightly reduced their portions of domestic value-added in intermediate exports absorbed by direct importer (V2) and domestic value-added in intermediate re-exported to third-countries (V3), and drastically reduced domestic value-added in direct final goods export(V1). At the same time, both countries also increased their portions of foreign value-added in intermediate goods exports (V8) and in final goods (V7). This implies that both countries massively involved foreign countries to provide intermediate and final goods. This took place through foreign investment into China and Vietnam and provision of raw material, intermediate and final goods, to their pulp and paper exports. In particular, China unleashed freedom of business for investing, gave guarantee for domestic and foreign ownership, allowed business partnership, strongly enforced the law and supported banking (Xing, 2015).

This is slightly different from the US whose foreign value-added portion remained small (9.10% in 1995 and 7.67% in 2011). This suggests that the country has a strong domestic ability to manufacture all goods to meet its needs for pulp and paper export. However, in general, the pattern of Indonesia trading partners' pulp and paper industry GVC change saw a proportional decrease in V1 and V2 but increase in V7 and V8 (Figure 1). This indicates that there has been a tendency that the trading partners increase the portion of foreign value-added in their gross exports compared to their domestic value-added. On the contrary, Indonesia strengthened its domestic value-added, especially in intermediate goods export to importing countries.

The above explanation indirectly draws the change of a wide range of GVC forms using the approach of Koopman et al. (2014). Surely, each country had choices to make efforts to increase their own gross export. Indonesia itself, with domestic value-added growth bigger than its foreign value-added growth was strongly supported by the availability of HTI to provide raw materials from acacia and eucalyptus wood species. Affordable and cheaper raw materials had positive influence to increase the overall value-added (Wulandari, 2007).

Another GVC calculation is participation and position of GVC of particular sector or industry from the

calculation of input-output table (Koopman et al., 2010; 2014). This analysis is deepened with description of each country roles in forming Indonesian pulp and paper total demand and intermediate input. This allows fuller identification of the linkage between Indonesia and its main trading partners' pulp and paper industries. This method is used to complement Koopman et al. (2010) method when tracing the roles of each country and sector in forming a sector's GVC in particular country.

In 1995, position of Indonesian pulp and paper industry in GCV with its main trading partners was at 'downstream' position, which is -1.28 (negative), as can be seen in Figure 2. This position suggests that Indonesia had a large portion in this industry where intermediate goods from other/importing countries were needed to export final goods. As already known, pulp and paper industry in Indonesia requires intermediate input in the forms of wood chip, used paper, chemical goods and other goods that can be sourced from other countries. This also applies to the same industry in the US, Germany, Australia, UK, Netherland, France, India, China, Korea, Belgium, Vietnam, Malaysia, Taiwan and Singapore. Difference in these countries' 'downstream' position value indicates varying levels of depth where the smaller the value, the higher its vertical specialisation share in import or, in other words, the higher its foreign content in the pulp and paper industry's gross export.

This is different from Japan whose GVC position value is 0.39 or at 'upstream' position, meaning that this country manufactures input to other countries (main supplier) both in providing raw materials and intermediate input materials for the same industry. Japan tends to have high vertical specialisation in export (VS1) through third-countries (Koopman et al. 2014).

On the other hand, participation index in GVC indicates different tendency from position in GVC, as can be seen in Figure 2 and Figure 3. Countries tending to be on 'downstream' position have higher participation index. This indicates that countries with high foreign content in their value-added also have high participation in GVC. This could happen as vertical production integration allows participation of multiple countries where each country has their own share in the production (Johnson and Noguera, 2012).

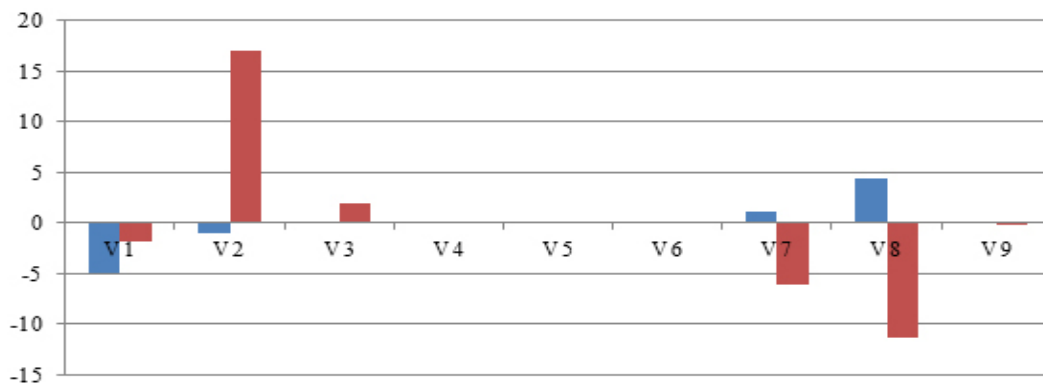


Figure 1. Changes in global value chain decomposition of export for pulp and paper industry in Indonesia and trade country partners 1995 and 2011 (%) ( ■ Indonesia; ■ Partners)

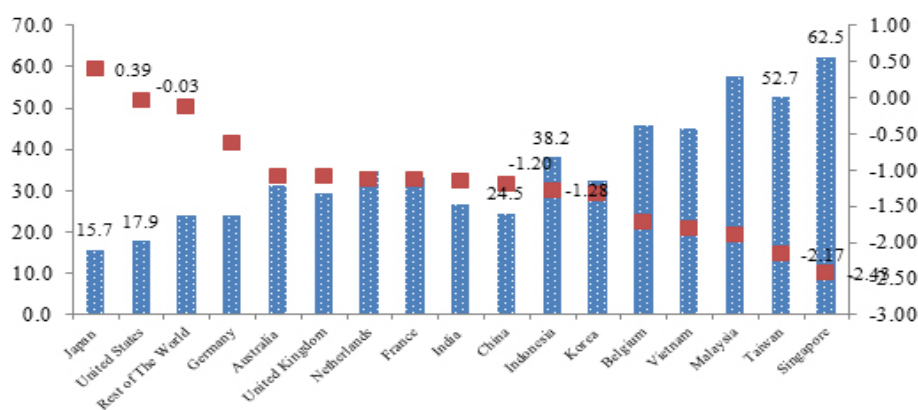


Figure 2. Global value chain position and participation of export for pulp and paper industry in Indonesia and trade country partners 1995 (%) ( ■ Indonesia; ■ Partners)

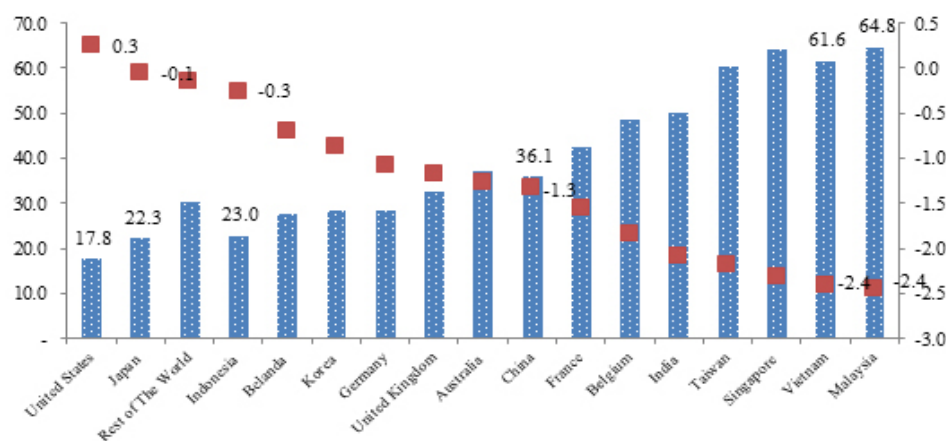


Figure 3. Global value chain position and participation of export for pulp and paper industry in Indonesia and trade country partners 2011 (%) ( ■ Indonesia; ■ Partners)



Analysis indicates that Indonesia's participation index is 38.18 at the scale of 0-100. Compared to its trading partners, such level is moderate. This indicates that only some import inputs become parts of the country's pulp and paper industry export. On the other hand, Taiwan and Singapore have the highest index of pulp and paper industry participation with the respective values of 52.7 and 62.5. The fact that both countries are at downstream position with high participation in GVC indicates that import inputs become the major scheme in their pulp and paper industry exports. Their high participation index also indicates their sector/industry's high connectivity to other countries. According to Marrel (2015), factors leading to high GVC participation are innovation climate, spending for research and development against GDP, human capital and logistic performance.

Compared to 2011, major change took place where GVC position saw an increase from -1.28 to -0.26. This indicates that, while Indonesian pulp and paper industry remained at 'downstream' position; it also means that this industry reduced dependency on inputs from other countries. At the same time, GVC participation index shows a declination from 38.18 to 23.01. Such declination means that Indonesian pulp and paper industry participation in GVC increasingly reduced. In other words, overseas value-added got reduced and replaced by increasing domestic value-added. That is, because in the country the needs for imported raw material that normally had been large could, over the time, be met domestically. The raw material was mainly sourced from timber from industrial forests and natural forest (Suka, 2009).

Changes also took place in Indonesia's main trading partners. Being at the 'upstream' position, the US took Japan's position, meaning that it produces inputs to provide to other countries (main supplier) in the form of raw materials or input materials for pulp and paper industry. The US itself was at the lowest level of GVC participation level or, in other words, it did not depend on other countries in exporting its pulp and paper industry products. Both the US and Japan are countries with quite large domestic resources to allow their pulp and paper industry to keep growing. Even the US pulp and paper industry has the highest gross export value of all countries.

Meanwhile, Malaysia (64.8) and Vietnam (61.6) turned out to be at the most 'downstream' position, taking the place of Singapore and Taiwan in GVC. This indicates that import inputs became the major scheme in both countries' pulp and paper industry export. This is in contrast to China that remained at 'downstream' position with increasing GVC position during the two periods. This means that China, with the highest gross export value, had a strong linkage to other countries in pulp and paper industry export. This explains why, in general, China has a good grip over manufacture industries in terms of its position and participation in GVC (Jiang and Wang, 2016).

The phenomenon of China as the country holding the 'champion' position in global pulp and paper industry gross export relates to the same industry in Indonesia. As to the industrial intermediate and final demand, 1995 was dominated by South Korea, China, Malaysia, Taiwan and the rest of the world, while in 2011 the position changed where the domination was made by China, Japan, South Korea and, of course, the rest of the world. High demand from China came for log, wood chip, pulp, and used paper. Meanwhile, concerning input, countries with the strongest linkage to Indonesian pulp and paper industry in 1995 were the US, Japan, Singapore, Germany and Australia, while in 2011 the position also slightly changed where Korea, Singapore, the US and China dominated the linkage to Indonesian pulp and paper industry. Given this fact, China plays a strong role in Indonesian pulp and paper industry.

Learning from many countries including China, Trinekens (2011) suggests that GVC could be increased by 'upgrading' value-added in production, network and governance form. Production upgrade can involve product innovation and differentiation, as well as innovative process and marketing activity. Network upgrade can be done by setting appropriate markets and taking part in appropriate marketing channel. Governance can be upgraded by selecting appropriate organising forms with both vertical and horizontal value-added partners. There is no doubt that a wide range of options can be applied to Indonesia case to allow rapid growth of this industry's value-added, including its gross export, in Indonesia.

## Managerial Implications

The results of the calculation show that domestic value added in the composition of the GVC export of the pulp and paper industry which increased from 1995 to 2011 has implications for the need to maintain a sustainable supply of raw materials from within the country, including maintaining wood production of Industrial Plantation Forests. On the other hand, the increasingly downstream position of GVC has the consequence that increasing input from other countries must be accompanied by an up-grading of network efforts in the trading system with Indonesia's main trading partner countries. Both have become very important so that the management of the pulp and paper industry is making of value added more increase.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

In 1995 and 2011, Indonesia and its trading partners' pulp and paper industry export GVC were still dominated by domestic rather than foreign value-added. On the other hand, Indonesia's foreign value-added saw a decrease during both periods, while that of its trading partners increased. In general, Indonesian pulp and paper industry GVC took form of domestic value-added in intermediate goods exported to importing countries, foreign value-added in intermediate goods, direct domestic value-added in final goods, and foreign value-added in intermediate goods. The same position was also experienced by Indonesia's main trading partners although foreign value-added in final goods also played a significant role.

In the period between 1995 and 2011, Indonesian pulp and paper industry saw an increase in domestic value-added in intermediate goods exported to importing countries and domestic value-added exported to importing countries for further processing and re-export to third-countries, in addition to a decrease in foreign value-added in intermediate and final goods and domestic value-added in final goods. On the other hand, the main trading partners saw increase in their foreign value-added in intermediate and final goods, while the others saw the other way around.

As for Indonesian pulp and paper industry GVC position against the main trading partners in 1995 and

2011, it remained at the 'downstream' position where intermediate input was needed from other countries and this industry participation in GVC was increasingly weakening. In general, the same industries of Indonesia's main trading partners were at 'downstream' position but their GVC increased.

### Recommendations

To increase Indonesian pulp and paper industry GVC, there should be improvements for the role of domestic value-added of intermediate goods exported to importing countries for further processing and re-export to third-countries and domestic value-added in intermediate and final goods coming back to Indonesia. However, such improvements can include capacity acceleration by means of upgrading process at each phase of pulp and paper industry and involvement of foreign investment in this sector. Lastly, it is also imperative that the value-added that Indonesia gains from each goods and service export be taken into account in making industrial and trade policies.

## REFERENCES

- Statistic Indonesia (BPS). 2016. *Manufacturing Industrial Statistic Indonesia 1992-2015 (Unpublished)*. Jakarta: Statistic Indonesia Agency.
- Statistic Indonesia (BPS). 2016. *Foreign Trade Statistical Export by Harmonized System 1992-2015*. Jakarta: Statistic Indonesia Agency.
- Carlson D, Mikael R. 2005. Supply chain management in forestry-case studies at soda cell ab. *European Journal of Operational Research* 163: 589–616. <https://doi.org/10.1016/j.ejor.2004.02.001>.
- Daly J, Peny B, Gary G. 2016. *The Philippines in the Paper Global Value Chain*. Duke Center on Globalization, Governance & Competitiveness, Duke University. Final Draft for Usaid/Phillippines, May 2016
- Dedrick J, Kraemer KL, Linden G. 2010. Who profits from innovation in global value chains?: A Study of The Ipod and Notebook Pcs'. *Industrial and Corporate Change* 19(1): 81–116. <https://doi.org/10.1093/icc/dtp032>.
- Gereffi G. 2014. A global value chain perspective on industrial policy and development in emerging market. *Duke Journal of Comparative & International Law* 24: 433.

- Gereffi G, John H, Timothy S. 2005. The governance of global value chains. *Review of International Political Economy* 12: 78–104. <https://doi.org/10.1080/09692290500049805>.
- Hummels D, Ishii J, Yi K. 2001. The nature and growth of vertical specialization in world trade. *Journal Of International Economics* 54:75–96. [https://doi.org/10.1016/S0022-1996\(00\)00093-3](https://doi.org/10.1016/S0022-1996(00)00093-3).
- Indriantoro FW, Sa'id EG, Guritno P. 2012. Rantai nilai produksi minyak sawit berkelanjutan. *Jurnal Manajemen & Agribisnis* 9(2): 108–116.
- Johnson R, Noguera G. 2012. Accounting for intermediates: production sharing and trade in value-added. *Journal of International Economics* 86(2): 224–236. <https://doi.org/10.1016/j.jinteco.2011.10.003>.
- Jiang W, Wang T. 2016. Estimate on China's manufacturing position in global value chain. 2016 2nd International Conference On Social Science and Development (Iccsd 2016)
- Kaplinsky R, Morris M. 2003. A handbook for value chain research. <https://www.ids.ac.uk/ids/global/pdfs/vchnov01.pdf>
- Koopman R, Powers W, Wang Z, Wei SJ. 2010. Give credit to where credit is due: tracing value added in global production chains. *NBER Working Paper* 16426.
- Koopman R, Powers W, Wang Z, Wei SJ. 2014. Tracing value added and double counting in gross exports. *American Economic Review* 104(2): 459–494. <https://doi.org/10.1257/aer.104.2.459>.
- Lantz V. 2003. Measuring scale, technology and price effects on value-added production across Canadian forest industry sectors. *Forest Policy and Economics* (2003)
- Los B, Marcel PT, Gaaitzen J, De V. 2015. How global are global value chains? A new approach to measure international fragmentation. *Journal of Regional Science* 55(1): 66–92. <https://doi.org/10.1111/jors.12121>.
- Mardiana. 2012. The impact of pulp and paper industry to local financial government in Riau Province (Case on PT. RAPP). *Journal of Economic and Business View* 3(2).
- Marel EVE. 2015. Positioning on the global value chain map: where do you want to be ?. *Ecipe Occasional Paper* No.01/2015
- Meng B. 2011. *Trade Pattern and Global Value Chain in East Asia: From Trade in Goods to Trade in Tasks*. World Trade Organizations-IDE JETRO.
- Pati RK, Prem V, Pradeep K. 2006. Integrated chain analysis of recycled vis-a-is pulp paper industry: an Indian manufacturer viewpoint. *International Journal Value Chain Management* 1(1): 44–63. <https://doi.org/10.1504/IJVC.2006.009023>.
- Pulkki R. 2001. Role of supply chain management in the wise use of wood resources. *Southern African Forestry Journal*- No. 191. July 2001
- Serbanel CI. 2015. Romania and its position on the global value chain. An introductory analysis. *Journal Procedia Economics and Finance* 27: 136–143. [https://doi.org/10.1016/S2212-5671\(15\)00982-X](https://doi.org/10.1016/S2212-5671(15)00982-X).
- Suka AP. 2009. *Global Value Chain Analysis and Demand Analysis for Indonesia Pulp Export*. A Research Paper. Institute of Social Studies.
- Shahi S, Pulkki R. 2013. Supply chain network optimization of Canadian forest goods industry : a critical review. *American Journal of Industrial and Business Management* 3:631–643. <https://doi.org/10.4236/ajibm.2013.37073>.
- Timmer MP, Erumban AA, Los B, Stehrer R, Gaaitzen J, De Vries. 2014a. Sciling up global value chains. *Journal of Economics Perspectives* 28(2): 99–118. <https://doi.org/10.1257/jep.28.2.99>.
- Trienekens JH. 2011. Agricultural value chains in developing countries a framework for analysis. *International Food and Agribusiness Management Review* 14(2):51–82.
- Widyantoro B, Siregar H, Sanim B, Priyarsono DS. 2006. Ekonomi industri pulp dan kertas Indonesia: analisis simulasi kebijakan dan tekanan internasional. *Jurnal Manajemen & Agribisnis* 3(2): 103–111.
- Wulandari F. 2007. Structure and performance of pulp and paper industry in Indonesia: before and after crisis. *Journal of Development Economics* 8(2): 209–222.
- Xing Y. 2015. Global value chains and china's export to high income countries. *Grips Discussion Paper* No. 15-06.