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## A Status and Development Direction of Lumbering Industry in Korea

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The government defines eco-friendly lumbering industry as its essential challenge for fostering of forest business and raising of its competitiveness and aims at 17% of wood self-supply ratio in 2017 from 10% of it in 2005, as well as promotes stable supply system of wood, improvement of timber production and distribution system, industrial application of wood resources, supply expansion of lumbering industry, creditability of domestic materials, and development of processing technologies. However, the financial difficulty has been deteriorated because of economic slump and export limitation of countries with wood resources and therefore total output of lumbering industry was reduced by 7% to 2500 billion KRW in 2008 than that in 2007 and the number of general lumbering companies was also reduced by 10% from 674 in 2007 to 609 in 2008. Although researches on lumbering companies and wood industry include research on development measures of wood industry and analysis of environmental factors affecting wood supply, recently these researches are not active so much and there is few study on management cases for lumbering companies by regions. Thus in this study investigation in order to seek problems on management and future developmental direction was conducted against lumbering enterprises located in Gapyeong-gun and Pocheon-si that have larger areas of artificial forest with Korean white pine and larch compared with other regions in Gyeonggi Province. As a result, it was found that there were some factors making management of lumbering enterprises more difficult, including increase of items substituting wood, outworn lumbering facility, decrease of demand for lumbering product from economic slump as well as raise of wood price and labor costs. Therefore, it was identified that for enhancement of public beneficial function of forest through fostering of lumbering enterprises and expansion of domestic material consumption, and production of large diameter log with good quality, it was needed to prepare various support plans such as tax reduction and exemption and financial support for lumbering enterprise.

### INTRODUCTION

The government defines fostering of eco-friendly wood industry as an essential challenge in the 5th Forest Basic Planning (2008~2017) for rearing of resource cycling forest business and raise of competitiveness and aims at 17% of self-supply ratio for wood in 2007. For theses, it sets up also detailed promotion plans such as stable supply system of wood, improvement of timber production and distribution system, industrial application of wood resources, supply expansion of lumbering industry, creditability of domestic materials, and development of processing technologies. In 2010, the government expanded and achieved self-supply ratio of domestic materials for stable supply administration of wood to 13% (3,600,000 m<sup>3</sup>) and secured 10.7 billion won of budget and 16 billion won of loan for strengthening the competitiveness of wood industry and activating wood culture. However, as the financial difficulty has been deteriorated because of economic slump and export limitation of countries with wood resources since 2008, total output of wood industry was reduced by 7% to 2500 billion KRW in 2008 than that in 2007 (Forest

Service, 2010). In addition, the number of general lumbering companies was also reduced by around 10% from 674 in 2007 to 609 in 2008 and average number of their workers, their average wages, and monthly average stream day were decreased together. And for intention to enlarge their facility if they have a margin in capital, 62% answered to maintain their status quo and the companies that answered not to want the support of government formed 25%. From theses, it was considered that there were many companies that had a pessimistic view on the future prospect of lumbering industry. Besides, the researches on lumbering companies and wood industry have been largely divided into development measures of wood industry (Son, 2002; Sohn, 1991; Lee, 1997; Park, 1996) and analysis of environmental factors affecting wood supply (Lee, 1980; Kim *et al.*, 2006; Jo, 1992; Shin, 2003), but recently these researches are not active so much and there is actually few study on management cases for lumbering companies by regions. Therefore, the purpose of this study is to identify problems on management and seek future developmental direction against lumbering enterprises processing and marketing wood in Gapyeong-gun and Pocheon-si, where there are larger areas of artificial forest with Korean white pine and larch compared with other regions in Gyeonggi Province.

### MATERIALS AND METHODS

Although it was investigated that there were 62 lum-

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bering companies in Gyeonggi Province as of 2008, when considering that the number of nationwide lumbering companies was reduced by around 10% from 674 in 2007 to 609 in 2008, it is assumed that considerable lumber mills in Gyeonggi-do closed or altered their type of business in 2010, 2 years passed from that time. As the subject of this study, Gapyeong-gun and Pocheon-si that have greater afforestation ratio of artificial forest with Korean white pine and larch than those of other regions in Gyeonggi Province were selected. It had attempted to perform the survey via questionnaire against 7 lumbering mills in Gapyeong-gun and 9 lumbering mills in Pocheon-si, but the survey was completed on the whole of subjects in Gapyeong-gun, whereas was not completed on the whole in Pocheon-si because of cessation, alteration, and refusal to the questionnaire. The questionnaire was conducted via direct interview for 2 months from the beginning of October, 2010 to the beginning of December, 2010. The contents to be investigated included general conditions such as management period, age of its representative, capacity of lumbering

facility, and monthly average stream day, wood purchasing amount, purchasing price, selling price, conditions and difficulties in management. Data from the investigation were compared and analyzed by regions.

## RESULTS AND DISCUSSIONS

### Status of lumbering industry in Korea

#### General conditions of lumbering companies

As of 2008, the number of general lumbering companies was 609, the average number of employees was 7.3, the average wage was 1.56 million won, and the monthly average stream day was 21.3 days. However, it was suggested that the number of lumbering companies was reduced by around 10% than that of 2007 and the average number of employees and average wage decreased also.

For wood materials handled for lumbering by regions as of 2008, it was found that among 609 companies, 14% handled only domestic materials, 20% handled domestic and imported materials together, and 51% handled only

**Table 1.** Status of general lumbering companies in Korea

Classification	2007	2008
No. of companies	674	609
Average No. of employees	9.3	7.3
Average wage	1.65 million won	1.56 million won
Monthly average stream day	21.6 days	21.3 days

Source: Korea Forest Service. 2009 Research on the Actual Condition of Wood Application in 2008

**Table 2.** Status of wood material to be handled for general lumbering by regions (as of 2008)

(Unit: %, company)

Classification	No. of companies	Domestic materials	Imported materials	Domestic & imported materials	No answer
Total	609 (100)	14.1	51.1	20.0	14.8
Seoul	2	-	-	-	100.0
Busan	70 (11)	1.0	78.6	1.4	18.6
Daegu	15	20.0	46.7	26.7	6.7
Incheon	90 (15)	-	70.0	1.1	28.9
Gwangju	8	-	75.0	25.0	-
Daejeon	8	-	37.5	37.5	25.0
Ulsan	6	-	66.7	-	33.3
Gyeonggi	62 (10)	8.1	46.8	30.6	14.5
Gangwon	44	36.4	15.9	38.6	9.1
Chungbuk	30	60.0	10.0	26.7	3.3
Chungnam	30	33.3	13.3	33.3	20.0
Jeonbuk	65 (11)	21.5	46.2	20.0	12.3
Jeonnam	56	12.5	57.1	25.0	5.4
Gyeongbuk	52	9.6	50.0	32.7	7.7
Gyeongnam	66 (11)	3.0	63.6	19.7	13.6
Jeju	5	100.0	-	-	-

Source: Korea Forest Service. 2009 Research on the Actual Condition of Wood Application in 2008

Note: The value in ( ) is the component ratio.

imported materials. Besides for location of lumbering mills by regions, it was found that 160 companies corresponding to 26% of total 609 companies were located in Incheon and Busan having a harbor (Forest Service, 2009) (Table 1).

In addition for the capacity of lumbering facilities, it was found that less than 50 kW and 50~100 kW accounted for 27% and 26% respectively. For total output it was found that less than 1,000 m<sup>3</sup> and 2,000~5,000 m<sup>3</sup> accounted for the greatest ratio as 30% and 24% respectively. Besides, for supply amount of material lumber it was found that domestic materials and imported materials accounted for 13% and 87% and it was suggested that the amount of imported materials overwhelmed that of domestic materials (Forest Service, 2009) (Table 2).

In case of Japan, it was found that the number of plants and the amount of receipt were 9,850 and 21,857,000 m<sup>3</sup> respectively in 2003, but they were

reduced to 7,838 and 19,448,000 m<sup>3</sup> in 2007 and it was suggested that they were reduced by 2,012 and 2,409,000 m<sup>3</sup> respectively. It was found also that while the number of plants using only domestic materials had been reduced gradually every year, their receipt amount had been increased gradually (Table 3). However, in case of plants using over 50% of domestic materials or over 50% of foreign materials, their number and receipt amount were reduced largely and in case of plants using only foreign materials, the number and receipt amount had been actually reduced also every year (Forest Agency Japan, 2008).

When viewing multiple responses of 208 companies on measures to obtain domestic lumber materials, it was found that purchasing through wood merchandisers and fellers, direct felling through contract with mountain owners, purchasing via other lumbering companies, purchasing via local government, and direct felling by contract with the country were 84%, 20%, 9%, 4.3%, and

**Table 3.** Number of lumbering plants and receipt amount of lumber by types of lumber received in Japan

(Unit: Plant, 1,000m<sup>3</sup>)

Year	Total		Domestic materials		Domestic and foreign materials				Foreign materials	
					>50%		>50%			
	No. of plants	Amount of receipt	No. of plants	Amount of receipt	No. of plants	Amount of receipt	No. of plants	Amount of receipt	No. of plants	Amount of receipt
2003	9,850	21,857	4,995	8,813	1,843	2,391	1,804	2,576	1,208	8,077
2004	9,387	21,705	4,913	9,211	1,779	2,270	1,591	2,307	1,104	7,917
2005	8,955	20,540	4,978	9,704	1,560	1,879	1,457	1,960	960	6,997
2006	8,433	20,342	4,897	9,684	1,448	1,997	1,222	1,976	866	6,685
2007	7,838	19,448	4,723	10,275	1,295	1,698	1,093	1,653	727	5,822

Source: Japan Forest Agency. 2008 Wood Demand and Supply Report

**Table 4.** Capacity and output of lumbering facility

Total capacity of facility (%)	Total (100)	<50kW (27)	50~100kW (26)	100~200kW (23)	200~300kW (10)	≥ 300 (14)
Total output (%)	Total (100)	<1,000 m <sup>3</sup> (30)	1,000~2,000 m <sup>3</sup> (19)	2,000~5,000 m <sup>3</sup> (24)	5,000~10,000 m <sup>3</sup> (11)	≥ 10,000 (16)
Sales scale (%)	Total (100)	<0.2 billion (23)	0.2~0.5 billion (24)	0.5~1 billion (15)	1~3 billion (25)	≥ 3 billion won (13)
Supply of material lumber (%)	Total (100)	Domestic materials (13)	Imported materials (87)	-	-	-

Source: Korea Forest Service. 2009. Research on the Actual Condition of Wood Application in 2008.

Note: It is based on data as of 2008. The number of companies are 609.

**Table 5.** Supply amount of domestic wood materials for lumbering

(Unit: m<sup>3</sup>)

Needle-leaf tress	519,032 (100)	Larch	Pine	Rigida	White pine	Cedar	Others
		387,962 (75)	84,303 (16)	17,898 (3)	17,574 (3)	7,657 (2)	3,638 (1)
Broad- leaf trees	40,631 (100)	Oak	White Birch	Birch	Ash	Others	-
		38,104 (94)	826 (2)	629 (2)	576 (1)	496 (1)	-

Source: Korea Forest Service. 2009 Research on the Actual Condition of Wood Application in 2008

Note: The value in ( ) is the component ratio.

3% respectively (Forest Service, 2009) (Table 4).

In supply records of domestic wood materials, it was found that overall supply amount was 702,000 m<sup>3</sup>, comprising 45,000 m<sup>3</sup> of mine post, 838,000 m<sup>3</sup> of pulp materials, and 1,819,000 m<sup>3</sup> of general materials. The price per m<sup>3</sup> of domestic wood materials were 193,847 won for pine, 109,125 won for larch, 91,667 won for ordinary non-conifers, 117,583 won for birch, 101,000 won for white birch, 121,000 won for ash, 119,000 won for giant dogwood, 85,000 won for linden, 70,717 won for pit prop wood, and 60,146 won for pulp wood<sup>2)</sup>. In addition, it was found also that overall supply amount of domestic wood materials for lumbering was 559,663 m<sup>3</sup> and comprised 93% of needle-leaf trees and 7% of broad-leaf trees, showing that needle-leaf trees took the majority. By tree species, it was found for needle-leaf trees that they consisted of 75% of larch and 16% of pine. For broad-leaf trees, it was shown that oaks accounted for the majority, including other tree species such as white birch, birch, and ash (Forest Service, 2009) (Table 5).

First, it was found also that overall supply amount of

imported wood materials for lumbering was 3,592,406 m<sup>3</sup> and comprised 96% of needle-leaf trees and 4% of broad-leaf trees, showing that needle-leaf trees took the majority. By tree species, it was found for needle-leaf trees that they included 56% of Radiata pine, 16% of Douglas fir, and 12% of spruces. For broad-leaf trees, it was shown that they consisted of 45% of Dillenia and 24% of MLH (MIX). When viewing multiple responses of 433 companies on measures to obtain imported lumber materials, it was found that purchasing through importing companies, purchasing via intermediate wholesalers, and direct purchasing from foreign countries were 71%, 15% and 10% respectively (Forest Service, 2009) (Table 6).

As of 2008, it was shown that total product output of 609 companies was 3,013,545 m<sup>3</sup> and their sales volume was 2,967,130 m<sup>3</sup>, corresponding to 98% of total output. It was found also that among this, the output of domestic wood materials was 450,744 m<sup>3</sup>, 15% of total output, and the output of imported wood materials was 2,562,801, 85% of that. Besides, for manufactured goods of the

**Table 6.** Supply amount of imported wood materials for lumbering

(Unit: m<sup>3</sup>)

Needle-leaf trees	3,441,660 (100)	Radiata Pine	Douglas Fir	Spruces	Red Pine	Others
		1,926,412 (56)	978,111 (28)	413,924 (12)	88,573 (3)	34,640 (1)
Broad-leaf trees	150,746 (100)	Dillenia	MLH (MIX)	Meranti	Taun/Burckella	Others
		68,468 (45)	36,182 (24)	13,411 (9)	13,214 (9)	19,470 (13)

Source: Korea Forest Service. 2009 Research on the Actual Condition of Wood Application in 2008.

Note: 1) Among the needle-leaf trees, Radiata Pine was introduced from New Zealand, Spruces from Russia, and red pine from Russia and Germany. Dillenia, MLH (MIX), and Taun in broad-leaf trees were introduced from Solomon.

2) The value in ( ) is the component ratio (%).

**Table 7.** Output and sales volume of general lumbering industry by manufactured goods

(Unit: m<sup>3</sup>)

Classification	No. of companies	By manufactured goods		Domestic materials		Imported materials	
		Output	Sales	Output	Sales	Output	Sales
Name of overall goods	609	3,013,545 (100)	2,967,130	450,744 (100)	437,394	2,562,801 (100)	2,529,736
Construction members	406	735,681 (24)	723,911	187,237 (42)	178,447	548,444 (21)	545,464
Temporary construction equipments	313	1,016,959 (34)	1,006,701	103,346 (23)	101,619	913,613 (36)	905,082
Palette	259	266,938 (9)	263,082	51,869 (12)	51,306	215,069 (8)	211,775
Packing material/export container	204	222,996 (7)	221,853	7,999 (2)	7,999	214,997 (8)	213,854
Construction interior materials	173	243,491 (8)	235,966	38,253 (8)	38,007	205,237 (8)	197,959
Furniture	165	106,192 (4)	102,532	4,414	4,172	101,778 (4)	98,360
Park establishments	148	98,176	97,361	6,467	6,133	91,709 (4)	91,228
Wood floor plate	146	36,063	35,745	7,903	7,858	28,161 (1)	27,887
Deck	143	60,339	57,075	6,845	5,615	53,494 (2)	51,460
For bridging	136	56,522	53,530	7,105	7,105	49,417 (2)	46,424
For sea farming	104	17,822 (1)	17,765	2,670	2,670	15,152	15,095
Others	374	152,367 (5)	151,609	26,637 (6)	26,462	125,731 (5)	125,148

Source: Korea Forest Service. 2009 Research on the Actual Condition of Wood Application in 2008.

Note: 1) This number of companies was from multiple responses.

2) Others include for manufacturing music instruments, ammunition box, farm implements, and wood posts.

3) The value in ( ) is the component ratio (%).

above 609 companies it was shown that 406 companies produced construction members, 313 companies produced temporary construction equipments, 259 companies produced palette, 204 companies produced packing materials/export containers (Forest Service, 2009) (Table 7).

Overall byproduct from lumbering wood materials was 751,203 ton, including 64% of side splits and 32% of sawdust. The uses of sawdust included 58% of bedding material for livestock barn, 33% of uncertified, 8% of manufacturing compost, and 1% of mushroom cultivation (Forest Service, 2009) (Table 8).

In addition, for intention to enlarge their facility if they have a margin in capital, 62% answered to maintain their status quo. For government support, they answered 53% of financial support, 9% of distribution system improvement, and 6% of wood supply system improvement, but the companies that answered not to want the support of government formed 25%. From these, it was considered that it was because many companies had a pessimistic view on the future prospect of

lumbering industry. However, the government defines fostering of eco-friendly wood industry as an essential challenge in the 5th Forest Basic Planning (2008~2017) for rearing of resource cycling forest business and raise of competitiveness. It aims at 14% and 17% of self-supply ratio of wood material in 2012 and 2017 from 10% of that in 2005. For these, it sets up also detailed promotion plans such as stable supply system of wood materials, improvement of wood production and distribution system, industrial application of wood resources, supply expansion of lumbering industry, creditability of domestic materials, development of processing technologies, and enhancement of quality control by standardization and green product quality certification. In association with support for wood industry, it established various measures such as support and rearing of wood industry by business types, system improvement for activating wood construction, expansion of cooperation with related departments for securing quays exclusive for wood materials and piling field for wood, facility modernization of wood industry, expansion of capital support

**Table 8.** Output and sales volume of by products

(Unit: ton)

Classification	Total	Side splits	Sawdust	Others
Output	751,203 (100)	481,926 (64)	242,655 (32)	26,622 (4)
Sales	713,439 (100)	452,623 (63)	234,194 (33)	26,622 (4)

Source: Korea Forest Service. 2009 Research on the Actual Condition of Wood Application in 2008.

Note: 1) Others include charcoal/forage/chip.

2) The value in ( ) is the component ratio(%).

**Table 9.** General condition of target lumbering mills

Classification	Lumbering mill	Period of management (year)	Age of the representative (years old)	Capacity of lumbering mills (kW)	Area of lumbering mills (m <sup>2</sup> )	Monthly average of stream day (days)
	Average	14	-	45	4,798	20
	Average	11	-	39	4,761	22
Gapyeong-gun	1	17	50's	38	11,880	20
	2	16	73	45	3,300	25
	3	14	50's	-	3,300	25
	4	12	62	53	3,300	20
	5	10	60's	23	2,310	20
	6	7	50's	38	4,950	21
	7	1	63	38	4,290	22
		17	-	51	4,835	19
Pocheon-si	1	30	61	68	2,046	20
	2	28	64	40	3,300	17
	3	24	62	45	2,640	20
	4	21	67	23	1,650	25
	5	15	50's	38	-	15
	6	14	63	23	9,900	8
	7	12	50's	83	8,250	25
	8	5	50	60	6,600	16
	9	1	61	75	4,290	25

to purchase raw materials and equipments, and putting a priority to domestic materials in national supply items such as school facilities and sound absorbing walls made of wood ( Forest Service, 2007).

In 2010 plan for fostering wood industry, the government expanded and achieved self-supply ratio of domestic materials for stable supply administration of wood to 13% (3,600,000 m<sup>3</sup>) and secured 10.7 billion won of budget and 16 billion won of loan for strengthening the competitiveness of wood industry and activating wood culture. However, as the financial difficulty has been deteriorated because of economic slump and export limitation of countries with wood resources since 2008, total output of wood industry was reduced by 7% to 2500 billion KRW in 2008 than that in 2007 (Forest Service, 2010).

### Case study of lumbering companies

#### General status of lumbering companies

Regarding to general conditions of 7 lumbering mills in Gapyeong-gun and 9 lumbering mills in Pocheon-si as subjects, it was found that their management period varied 1~30 years, averaged to 14 years, which was 11 years for Gapyeong-gun and 17 years for Pocheon-si. For capacity of lumbering facility, it was shown that Gapyeong-gun was 39 kW and Pocheon-si was 51 kW. Average areas of the lumbering mills were 4,761 m<sup>2</sup> and 4,835 m<sup>2</sup> respectively in Gapyeong-gun and Pocheon-si and their monthly average stream days were 20 and 21 days in Gapyeong-gun and Pocheon-si respectively.

#### Status of wood purchase and sales of lumbering companies by tree species.

#### Status of wood purchase of lumbering companies by tree species

First, for purchase amount of wood material al by regions it was found that total amount of Gapyeong-gun was 16,022 m<sup>3</sup> and average amount of lumbering com-

**Table 10.** Status of wood purchase of target lumbering companies by tree species

Classification	Lumbering mill	Total	Domestic materials (m <sup>3</sup> )				Imported materials (m <sup>3</sup> )			
			Subtotal	Larch	White pine	Broad-leaf trees	Subtotal	Douglas Fir	Douglas pine	Others
	Total	22,398 (100)	16,406 (73)	8,807	7,124	475	5,992 (27)	3,383	1,209	1,400
	Average	1,493	1,094	587	475	32	399	225	81	93
Gapyeong-gun	Subtotal	16,022 (100)	14,838 (93)	8,294	6,544	-	1,184 (7)	642	542	-
	Average	2,289	2,120	1,185	935	-	169	92	77	-
	1	5,733	5,667	2,667	3,000	-	66	33	33	-
	2	2,706	2,588	1,294	1,294	-	118	59	59	-
	3	2,667	2,667	2,000	667	-	-	-	-	-
	4	2,167	2,000	1,500	500	-	167	67	100	-
	5	1,499	1,333	333	1,000	-	166	83	83	-
	6	750	250	167	83	-	500	233	267	-
	7	500	333	333	-	167	167	-	-	
Pocheon-si	Subtotal	6,376 (100)	1,568 (25)	513	580	475	4,808 (75)	2,741	667	1,400
	Average	797	196	64	73	59	601	344	83	175
	1	2,334	-	-	-	-	2,334	2,334	-	-
	2	1,167	1,000	500	500	-	167	167	-	-
	3	1,000	-	-	-	-	1,000	-	-	1,000
	4	667	-	-	-	-	667	-	667	-
	5	501	501	13	13	475	-	-	-	-
	6	307	67	-	67	-	240	240	-	-
	7	200	-	-	-	-	200	-	-	200
	8	200	-	-	-	-	200	-	-	200
	9	-	-	-	-	-	-	-	-	

Note: 1) Others of Pocheon-si 3 include Douglas pine, spruces, red pine, douglas pine, and tropical timer.

2) Others of Pocheon 7 referred to oak, maple, and walnut and was trusted lumbering pattern wood.

3) Others of Pocheon 8 referred to maple, walnut, elm, and douglas pine and was trusted lumbering pattern wood.

4) Pocheon 9 uses only imported materials, but sent no response to purchase amount of wood material.

5) Pocheon 9 was exclude from the average.

6) The value in ( ) is the component ratio (%).

pany was 1,493 m<sup>3</sup>. In case of Pocheon-si, it was shown that its total amount was 6,376 m<sup>3</sup> and its average amount of lumbering company was 797 m<sup>3</sup>, about half of the amount of Gapyeong-gun. For local purchasing of lumbering companies by tree species, it was shown that in Gapyeong-gun, the domestic wood materials accounted for 73%, more than that of imported materials and the major tree species of domestic materials included larch and white pine and those of imported materials included Douglas Fir and Douglas pine. On the contrary in case of Pocheon-si, it was found that the imported materials took 75%, of which major tree species included Douglas Fir and Douglas pine. For domestic materials, it was shown that there was regular distribution among larch, white pine and broad leaf-trees.

*Purchase and sales price of lumbering companies by tree species*

For purchase and sales price of wood materials by regions, it was found that in case of Gapyeong-gun, average purchase price of larch was 447 won per jae and its sales price was 850 won. The purchase and sales price of white pine were similar level to those of larch as 436 won per jae and 900 won. Differently, the broad-leaf trees had some higher purchase and sales price as 550 won and 1,150 won compared with the larch and white pine.

In case of Pocheon-si, it was shown that its purchase and sales price for domestic materials were similar to those of Gapyeong-gun.

Next, for purchase and sales price of imported wood

materials it was found that in case of Gapyeong-gun, average purchase price of imported douglas fir was 1,015 won per jae and its sales price was 1,860 won. It was shown that the purchase and sales price of douglas pine were 550 won and 1,150 won, suggesting the douglas pine had higher sales price than its purchase price compared with douglas fir. In case of Pocheon-si, it was found also that the douglas pine had higher sales price than its purchase price compared with douglas fir. For references, although when lumbering 10 m<sup>3</sup> of wood material, average 2 ton of byproducts were generated, they also were sold in 13~140,000 won for heating or cooking. Besides, in case of Pocheon-si it was found that pattern wood lumbering companies earned 100~150 won per jae as lumbering charge by servicing pattern wood lumbering for other companies (Table 11).

*Management conditions and difficulties of lumbering companies*

First, it was found that the lumbering companies in Gapyeong-gun depended on domestic wood materials for more than 70% of their purchase wood and the wood materials were supplied from other regions as well as Gapyeong-gun. The domestic and imported materials were processed mainly as construction members, but there were some companies answering that white pine and larch were improper to wooden house and it was difficult to supply them regardless of seasons.

In case of lumbering companies in Pocheon-si, they depended on domestic wood materials for more than 70% of their purchase wood and the wood materials

**Table 11.** Purchase and sales price of lumbering companies by tree species

(Unit: Won/Jae)

Classification	Lumbering mill	Larch		White pine		Broad- leaf trees		Douglas Fir		Douglas pine	
		Purchase price	Sales Price	Purchase price	Sales Price	Purchase price	Sales Price	Purchase price	Sales Price	Purchase price	Sales Price
Gapyeong-gun	Average	447	850	436	900	550	1,150	975	1,605	933	2,105
	Average	444	900	422	1,000	-	-	1,015	1,860	1,066	2,210
	1	420	600	420	600	-	-	780	1,800	880	2,400
	2	430	900	430	900	-	-	700	1,600	800	1,600
	3	600	-	-	-	-	-	-	1,500	-	-
	4	430	1,250	430	1,250	-	-	1,800	2,600	1,800	2,600
	5	450	1,000	450	1,000	-	-	780	1,800	800	2,250
	6	370	800	390	1,400	-	-	-	-	1,050	2,200
Pocheon-si	Average	450	800	450	800	550	1,150	900	1,350	800	2,000
	1	450	800	450	800	-	-	900	1,350	-	-
	2	-	-	-	-	-	-	-	-	850	-
	3	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	750	2,000
	8	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	550	1,150	-	-	-	-	



were supplied from other regions such as Gangwon Province as well as Gapyeong-gun. The domestic and imported materials were processed mainly as construction members, but 7 companies among them produced construction members for traditional Korean-style house, furniture material, temple construction members, pattern wood, and materials for crafted products at the same time.

In addition, most companies in the targeted regions answered that while the price of imported wood materials has been increased gradually, the domestic wood materials showed no large alteration in wood purchase price and domestic goods are cheaper than the imported goods. Some companies answered that they had an intention to increase further processing amount of domestic materials such as white pine and larch, but there were some difficulties because of demand reduction and insufficiency of wood materials from poor financial condition and economic slump. Additionally, they answered also that the domestic wood material focusing on medium and small pole had difficulties in manufacturing various lumbering products such as construction members for traditional Korean-style house.

Besides, they answered that difficulties on management included difficulty in funding from increase of purchase price of wood materials and uncollected amount, precise conditions for loan, weak financial support and loan by the government, difficulty in securing skilled manpower caused by labor intensity to be needed and poor working conditions, and raise of labor cost and pointed out that increase of wood substitutes, aging of lumbering facilities, and decrease of demand for wooden goods from economic slump played a role to promote closure or business alteration of lumbering.

## CONCLUSION

1. In 2008, the number general lumbering companies in Korea was 609, reduced by around 10% that that of 2007, their monthly average stream day was 21.3 days, and among them, the companies handling only imported materials accounted for 51%.
2. For supply amount of material lumber it was found that domestic materials and imported materials accounted for 13% and 87%, suggesting that the amount of imported materials overwhelmed that of domestic materials. In addition, it was found also that overall supply amount of domestic wood materials for lumbering was 559,663 m<sup>3</sup> but needle-leaf trees took 93% of them. It was shown also that overall supply amount of imported wood materials for lumbering was 3,592,406 m<sup>3</sup> showing that needle-leaf trees took the almost majority as 96%.
3. In order to foster wood industry, the government expanded its self-supply ratio of domestic materials for stable supply administration of wood to 17% (3,600,000 m<sup>3</sup>) in 2017 and secured 10.7 billion won of budget and 16 billion won of loan for strengthening the competitiveness of wood industry and activating wood culture. However, because of economic slump and export limitation of countries with wood resources since 2008, total output of wood industry was reduced by 7% to 2500 billion KRW in 2008 than that in 2007.
4. For 7 lumbering mills in Gapyeong-gun and 9 lumbering mills in Pocheon-si as subjects, their management period were 11 years for Gapyeong-gun and 17 years for Pocheon-si and their monthly average stream days were 20 and 21 days in Gapyeong-gun and Pocheon-si respectively. For average purchase amount of wood materials of lumbering facility, it was shown that Gapyeong-gun was 1,493 m<sup>3</sup> and Pocheon-si was 797 m<sup>3</sup>.
5. For purchasing of lumbering companies by tree species, it was shown that in Gapyeong-gun, the domestic wood materials accounted for 73% and the major tree species of domestic materials included larch and white pine and those of imported materials included Douglas Fir and Douglas pine. On the contrary in case of Pocheon-si, it was found that the imported materials took 75%, of which major tree species included Douglas Fir and Douglas pine. For domestic materials, it was shown that there was regular distribution among larch, white pine and broad leaf-trees.
6. The purchase and sales price of imported wood material were 2 time higher than those of domestic materials. However, the purchase and sales price of douglas pine were higher than those of douglas fir.
7. In case of Gapyeong-gun, the domestic and imported materials were processed mainly as construction members, but 7 companies among them in Pocheon-si produced construction members for traditional Korean-style house, furniture material, temple construction members, pattern wood, and materials for crafted products at the same time.
8. It was pointed out that as well as raise of purchase price of wood material and increase of labor cost, increase of wood substitutes, aging of lumbering facilities, and decrease of demand for wooden goods from economic slump played a role to promote closure or business alteration of lumbering.

Therefore, it is considered that following measures should be sought for enhancement of public beneficial function of forest through fostering of lumbering enterprises and expansion of domestic material consumption, and production of large diameter log with good quality,

1. It seemed that for production of various lumbering products as well as pertained forestation, it will be necessary to secure domestic tree resources including various tree species such as white pine, larch, and broad-leaf trees. In addition, it seemed that measures to grow up large diameter pole should be considered actively to meet various demands and uses.
2. It was considered that it is necessary for the government and local governments to develop various uses of wood materials and offer active supports such as loan and support to utilize its own produced domestic materials at maximum. Particularly, various benefits and support policies such as tax exemption and capi-

tal support must be sought.

3. Finally, decrease and scale reduction of local small lumbering companies will be led to decrease of domestic material consumption, so it is likely to carry a failure in a plan for stable production and supply of wood materials. This may cause a lot of problems including increase of unconcern of mountain owners on forest management, expansion of foreign currency outflow from increase of import, and weakening of stable supply system for domestic materials, as well as deterioration of public beneficial functions of forest. Therefore, it was identified that development of local lumbering companies must be necessary for activation of Korean forest management.

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