

TAMPERE POLYTECHNIC  
Paper technology  
International pulp and paper technology

Engineering thesis

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THE PROCUREMENT OF WOOD RAW MATERIALS BY FINNISH PAPER  
INDUSTRY – AN OUTLOOK

Supervised and commissioned by  
Tampere 2007

Pertti Viilo (MSc)

Paper Technology  
Havola, Kai:

The procurement of wood raw material by Finnish paper industry – An outlook

Engineering thesis  
Supervisor  
Commissioner  
Time

23 pages  
M.Sc. Technology Pertti Viilo  
M.Sc. Technology Pertti Viilo  
May 2007

## ABSTRACT

The Finnish pulp industry has recently been under a great concern due to the Russian Federation's recent announcement of considerable raises in the customs fees of exported wood raw material. Industry in Finland has been relying on a constant flow of wood for all the branches of its production and the share of imported raw material reached the highest level so far in the year 2006. In this thesis the most important facts regarding this development were collected and a vision of things to come in near future was created.

The data used is collected from numerous resources handling the trade and use of wood raw material in Finland.

In conclusion the Finnish paper and pulp industry faces major challenge regarding availability of raw material if the Russian Federation forces the strict raises in the customs fees of exported goods. The origin of import is due to change and Finnish forest owners are to be encouraged in selling more wood.

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ABSTRACT

USED ABBREVIATIONS

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## USED ABBREVIATIONS

BH	Bleached chemical hardwood pulp
BS	Bleached chemical softwood pulp
CBM	Corrugated board medium
GDP	Gross domestic product
Mech	Mechanical pulp
Mm <sup>3</sup>	Million cubic meters
MPa	Mega pascal
NSSC	Semi-chemical pulp (neutral sulfite semi-chemical pulp)
t	Ton
UB	Unbleached chemical pulp

## 1. CONSUMPTION OF PULPWOOD IN FINNISH PAPER INDUSTRY

### 1.1. General

The consumption of wood in Finnish paper industry has, despite minor fluctuations, steadily increased since the beginning of industry in Finland. The development of production of wood pulp since 1955 can be seen in Figure 1. The aberration of production in 2005 is result of some seven weeks of industrial action in the Finnish paper industry. Tabulated totals for three quarters of production for 2006 add up to 9 743 000 cubic meters so return to growth is expected.

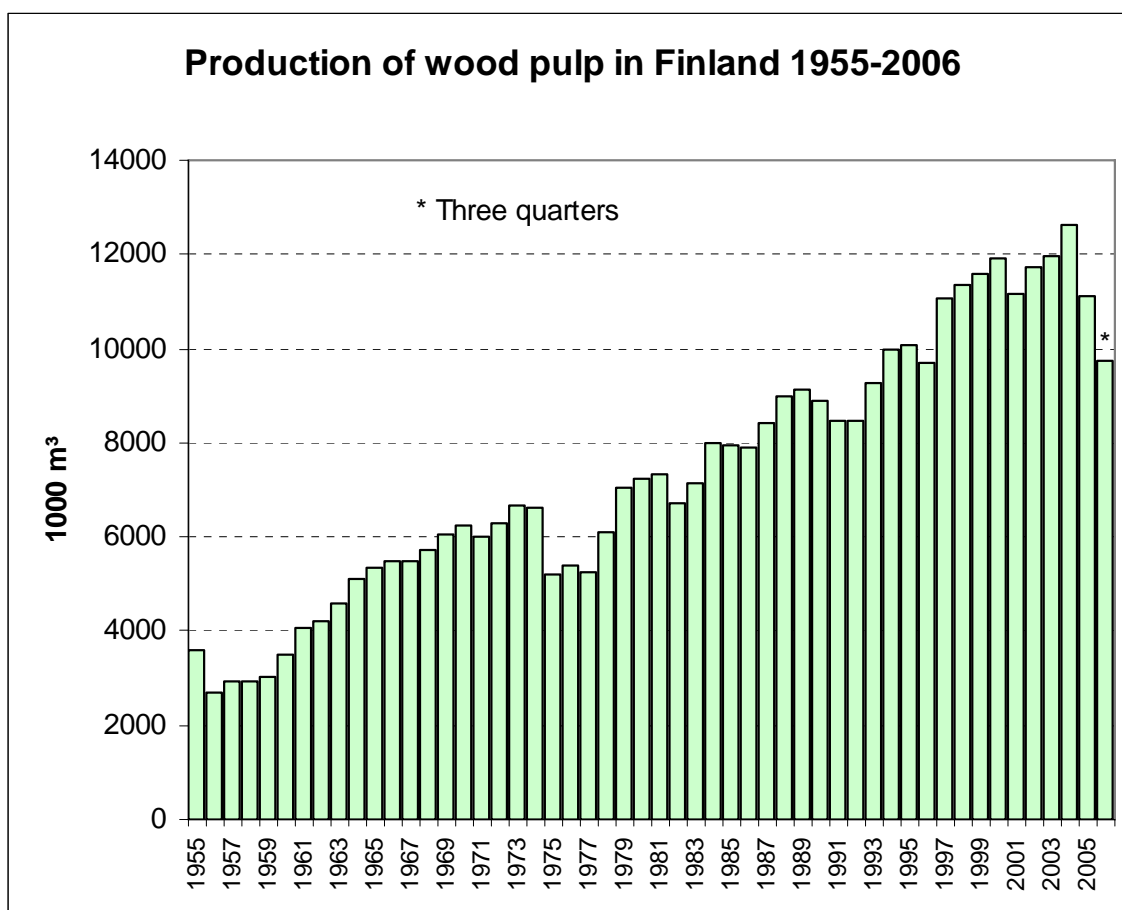


Figure 1. The total production of wood pulp in Finland 1955–2006.

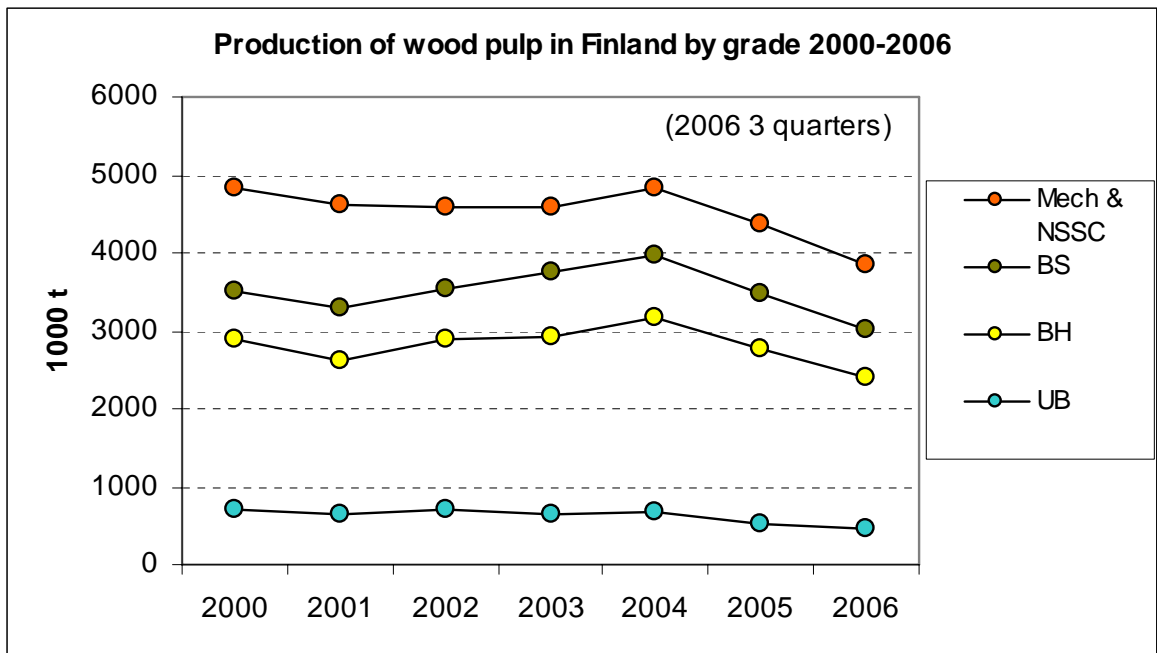


Figure 2. Pulp production by grade in Finland 2000-2006 /8/

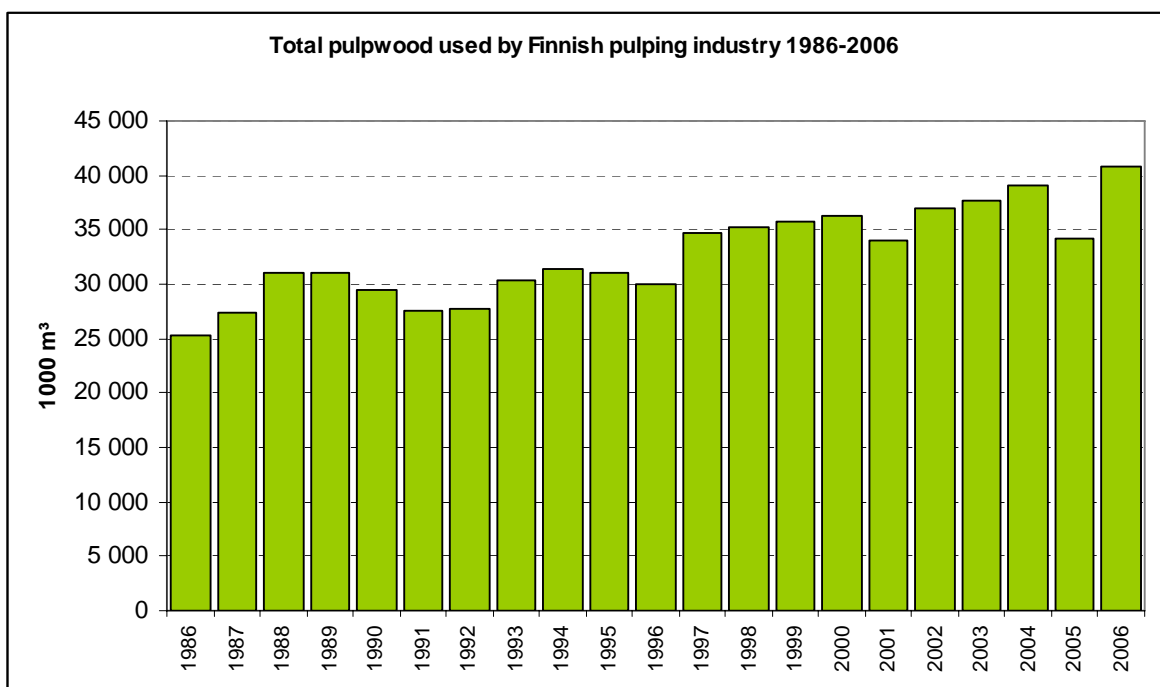


Figure 3. Total amount of pulpwood used by Finnish pulping industry /16/

This development naturally results in higher demand for high-quality raw material for pulping process. The amounts of both production and usage of raw material can be seen in Figures 2 and 3. The amount of raw material in Finland has been on rise since the beginning of 1970's which totals in growth of 46 %. The problem lies in forest owners' changing willingness to sell especially pulpwood. This is further discussed in chapter four.

## 1.2. Species of pulpwood used in Finland

The main species of wood used for pulping in Finland are pine (*Pinus sylvestris*), spruce (*Picea abies*) and birch (*Betula pubescens*, *Betula pendula*). Minor amount of aspen (*Populus tremula*) is also used. The chemical ingredients of most used wood species are presented in Table 1.

Table 1. The percentual texture of the main species of pulpwood.

	Pine	Spruce	Birch
Cellulose	43	41	38
Hemicellulose	20	24	32
Lignine	28	28	20
Extractive agents	5	3	3
Acetylene	1	1	4
Others	3	3	3

/13/

Not to be ignored are the sawmill chips and sawdust from sawmills. As there are major corporations like Stora Enso and UPM that own production facilities for both timber and pulp products, they naturally use the left-overs from timber production as raw material for pulp. The amount of this material is presented in Figure 4. When the recent share of imported wood raw material used in Finland has been ca 25%, can one roughly estimate that 2.5 Mm<sup>3</sup> of imported sawmill chips and sawdust has been produced in the sawmills and later used for pulping. In addition to these chips are also imported (Figure 5).

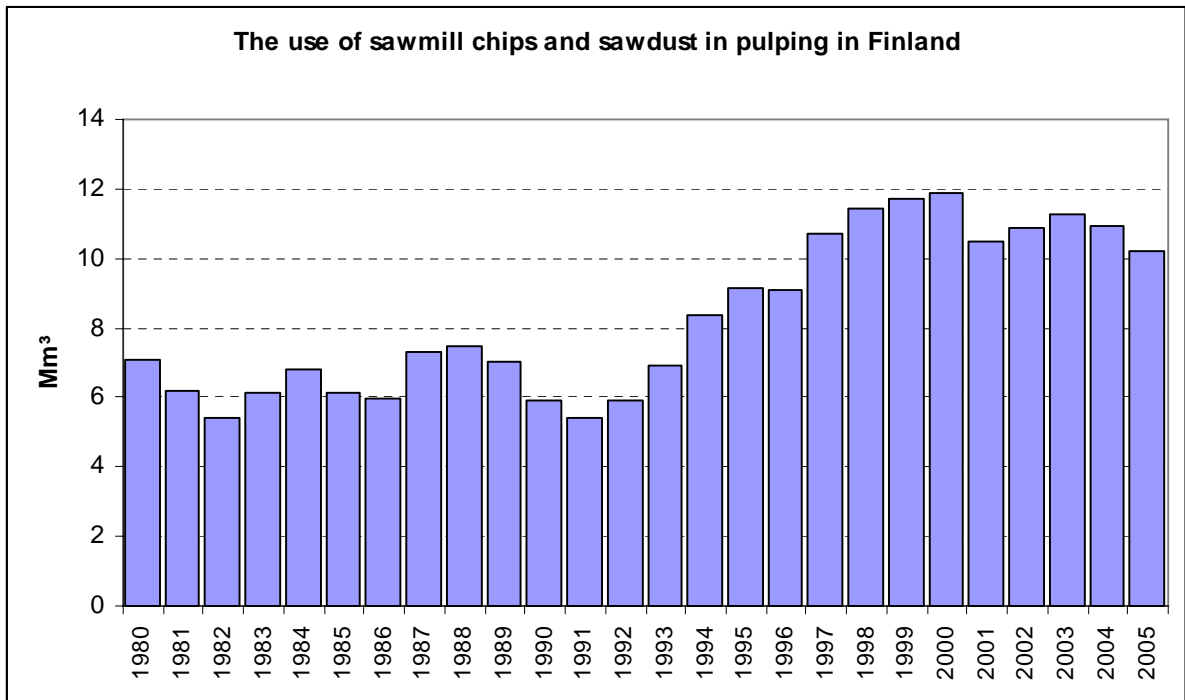


Figure 4. The amount of sawmill residues used in pulping in Finland 1980-2005 /16/

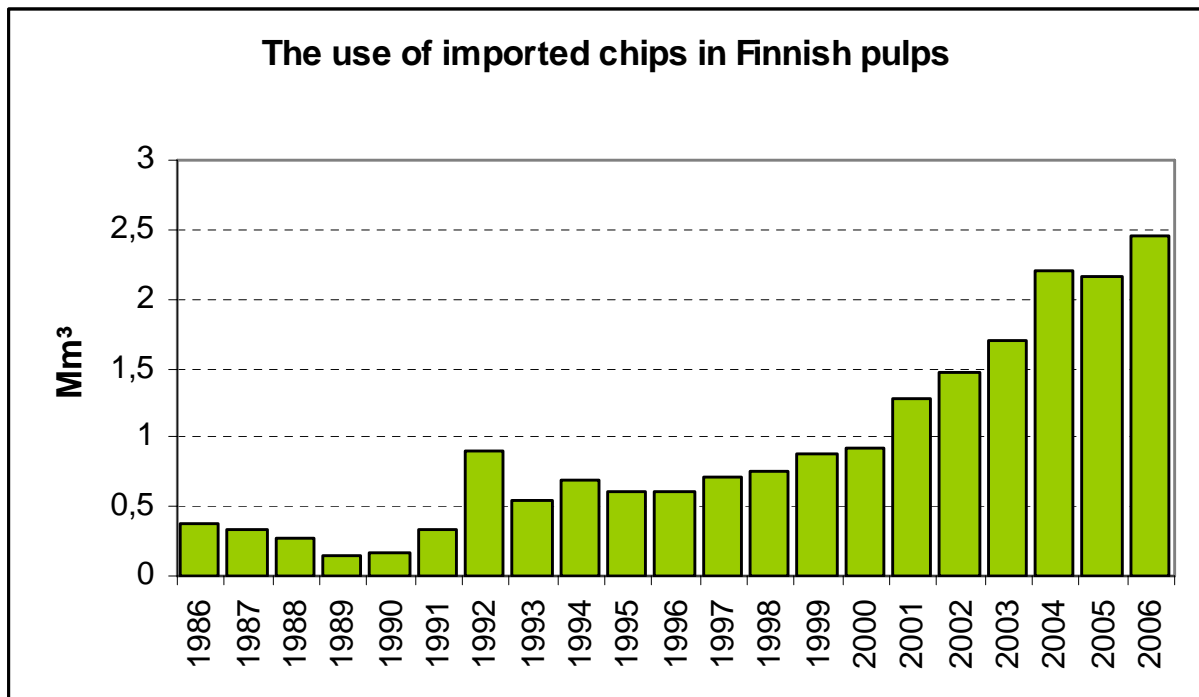


Figure 5. The use of imported wood chips in Finnish pulping industry /16/



### 1.3. Production of paper and paperboard in Finland

The Finnish paper industry produces over 14 Mt of paper and paperboard (Figure 6) along with 13 Mt pulp (of which 8 Mt chemical pulp) annually. This production is made in 28 paper mills, 14 board mills, 19 chemical pulp mills and 24 mechanical / semi-chemical pulp mills. These amounts add up to 3% of Finland's GDP, 12% of industrial production in Finland and more than 15% of all the exports from Finland (2006). Thus, the paper industry plays a major role in the economics of Finland. /1, 2, 3/

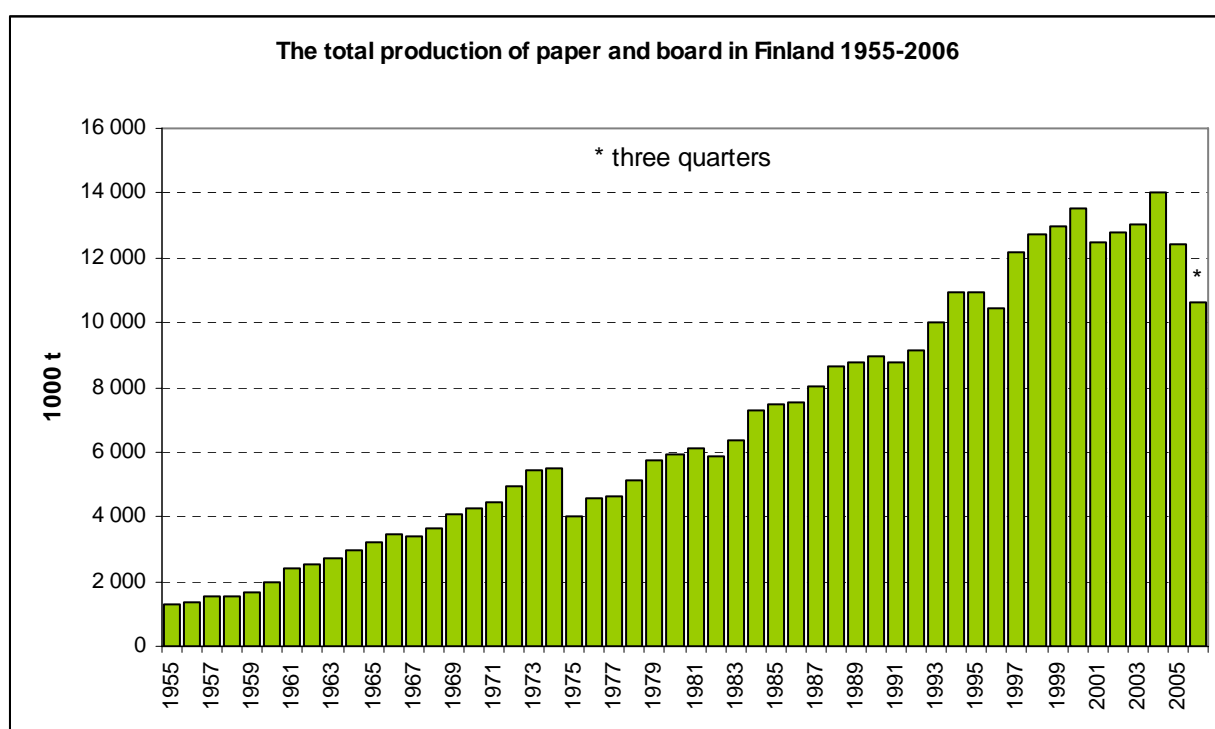


Figure 6. Production of paper and board in Finland

## 2. THE PULPS PRODUCED FOR PAPER INDUSTRY IN FINLAND

### 2.1. *Mechanical pulp*

The process of manufacturing mechanical pulp is done with grinding or refining. The process is quite different from chemical or semi-chemical pulping. In grinding the raw material is taken to process as logs, in refining the used form is chipped wood. In grinding the logs are pressed against a rotating grinding stone while in refining the chips are led between two rotating discs or one rotating and one stationary disc. Mechanical pulping gives extremely high yield of 95 – 98% but demands much larger amounts of energy compared to other pulping methods. The wood raw material used for production of mechanical pulp is, almost exclusively, spruce. /5, 7, 11/

### 2.2. *Semi-chemical pulp (NSSC)*

NSSC is usually manufactured in CBM-mill's own premises. In Finland the main wood material used in manufacturing NSSC is birch. Coniferous materials are not suitable for NSSC production due to their high lignine content. The production is kind of mix of the manufacturing processes of chemical and mechanical pulp. The actual fibrillation is done in disc refiners after a gentle treatment with chemicals and cooking. Temperature for cooking is 165 - 190°C and cooking time varies from 10 to 60 minutes. /1/

Small amounts of long-fibrous, coniferous sulphate pulp are added to improve tear strength. Stiffness properties of NSSC pulp are excellent due to the gentle nature of the manufacturing process; the process conserves a major part of wood's hemicellulose. The yield of NSSC process is quite high, 75 – 85%. /5, 11/

### 2.3. *Chemical pulp*

Chemical pulping is done by cooking the chips in a chemical solution, either acidic (sulphite) or alkali (sulphate and soda). In the high temperature of 140-190°C and pressure of 0.6-1.0 MPa the chemical dissolve the lignine thus freeing the fibers without damaging them through mechanical stress. As the fibers are not damaged, they give better strength properties to the end product. Chemical pulps are also much easier to bleach, and after the bleaching the paper products made from it are not prone to ultraviolet discoloration. Yield is considerably lower than that of mechanical or semi-chemical pulps, ca. 40 to 55%. This is a consequence of the loss of almost all the lignine and much of the hemicellulose in the process. Nowadays pulp produced in Finland is sulphate (kraft). /4, 10, 13/

### 3. WOOD RAW MATERIAL RESOURCES IN FINLAND

One of the major challenges the Finnish pulping industry faces is the changing structure of the forest owners in Finland. Figures 7 and 8 show this change. As the forest area is passed on to younger generation and the population movement to growth centers still increases, the socio-economical structure of forest owners changes. The share of agricultural entrepreneurs decreases and shares of both pensioners and educated urban forest owners increase as can be seen in figure 7. These new major owner groups do not necessarily share the agricultural entrepreneurs' view of forest as a financial asset and therefore idea of cutting down inherited forests may seem a bit far fetched if there is no true economic urge to do so. As Finland today lives a period of economic boom, the share of capital income has increased and the income percentage of sold wood material of especially urban forest owners has decreased. A problem created here is the condition of the wood material when left to grow for too long. Rotten wood is created and the wood material is being spoiled considering its industrial use. Naturally the current levels of prices of log- and pulpwood will increase the sales and thereby lighten the industry craving for raw material.

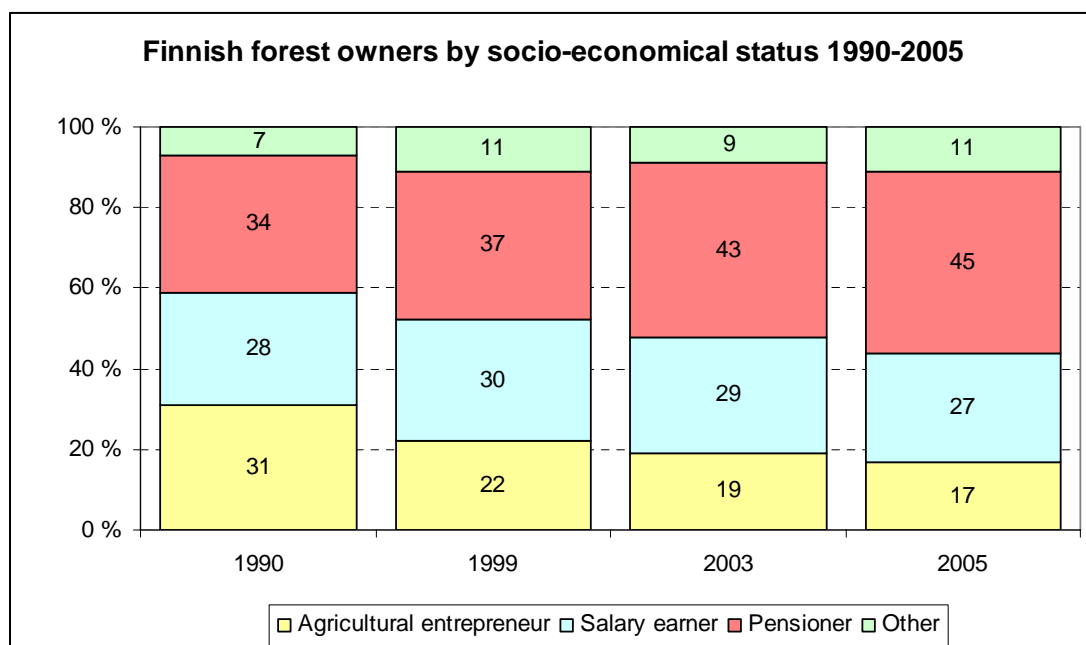


Figure 7. The socio-economical structure of Finnish forest owners /9/

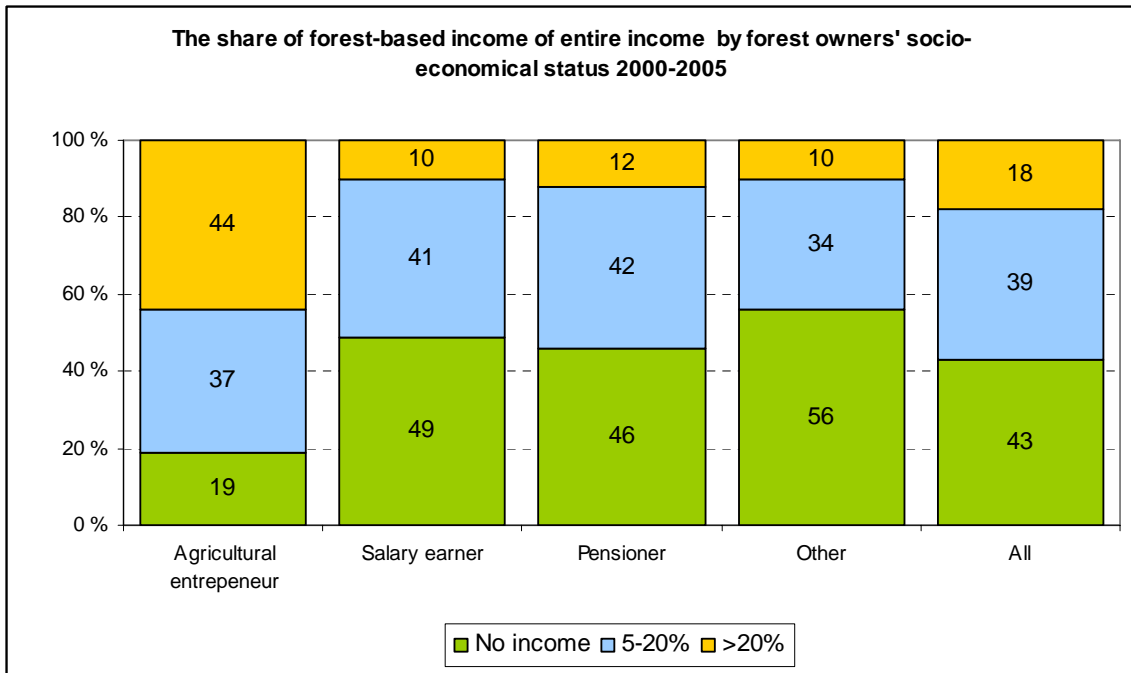


Figure 8. Shares of income of forest owners compared to total income. /9/

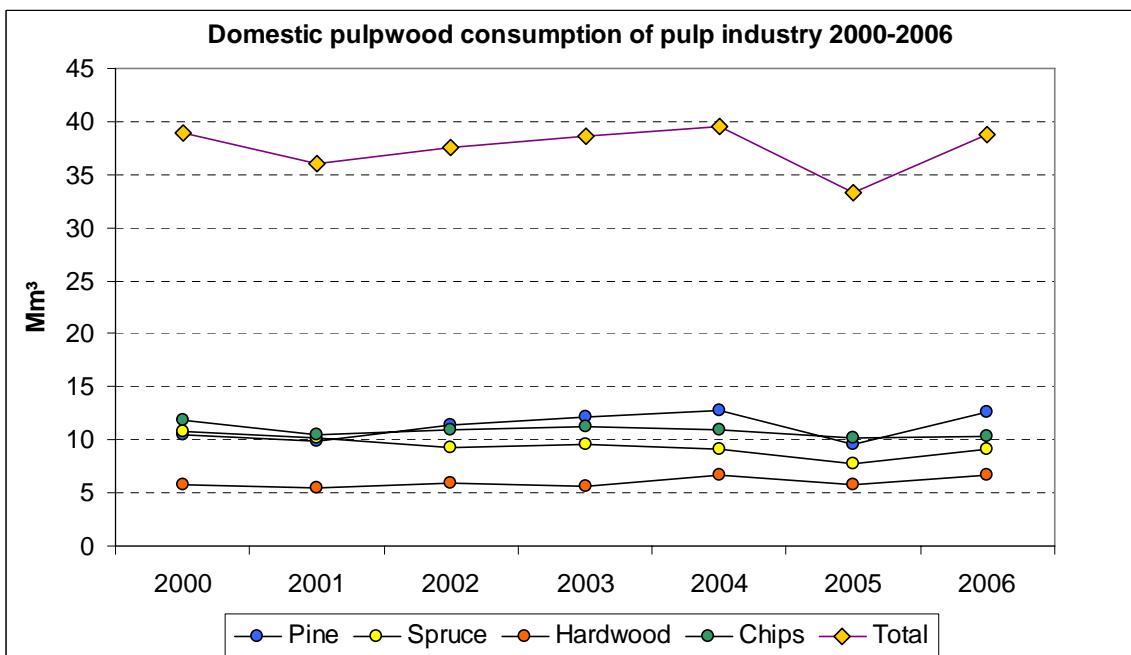


Figure 9. Domestic pulpwood use by species in Finland /16/

The annual growth rate of Finnish forests is ca 100 Mm<sup>3</sup> and the total of annual fellings is roughly half of that. This leads to the obvious fact that the domestic wood raw material reserve is growing. The development of this reserve can be seen in Figure 10 and the consumption in Figure 9. Recent fellings rate in Finland could, and according to Finnish forest industry should be increased to at least 66 Mm<sup>3</sup> by the year 2014. /9, 17/

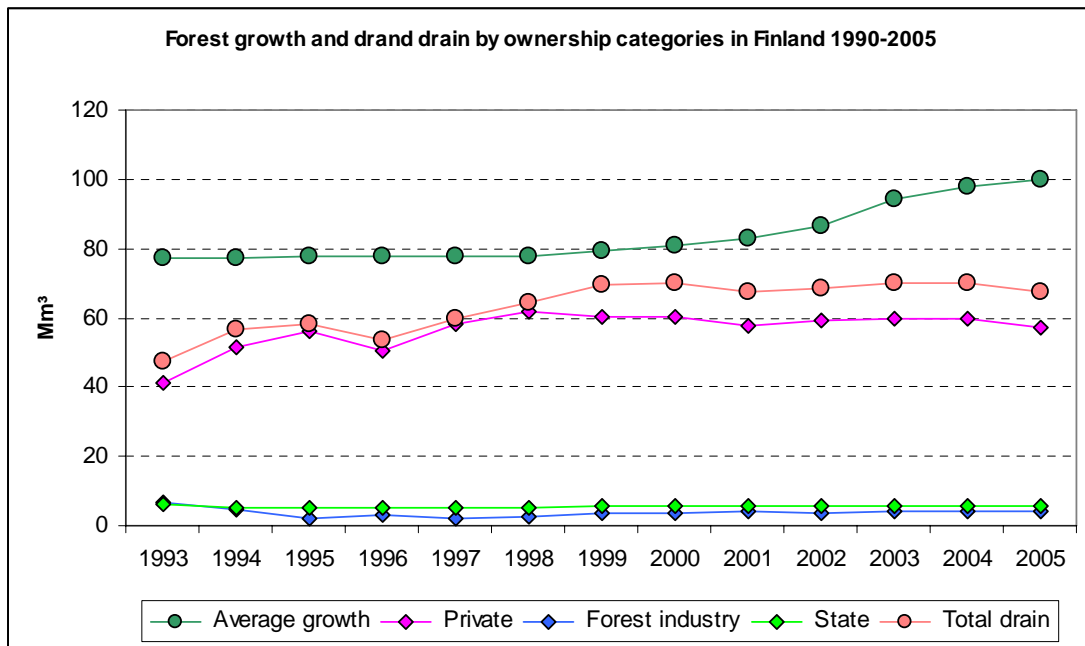


Figure 10. Total growth and drain of forest resources in Finland.

## 4. PRICES OF WOOD RAW MATERIALS FOR PULPS

### 4.1. Domestic prices of wood

The prices discussed here are domestic delivery prices. Reason for this is their comparability to the border prices of imported wood raw material from the Russian Federation. The price of wood raw material covered 14% of paper and pulp production's cost structure in 2004. The prices and commercial removals can be seen in Figures 11 and 12. Raises in this amount could prove unbearable at the present market situation. /4/

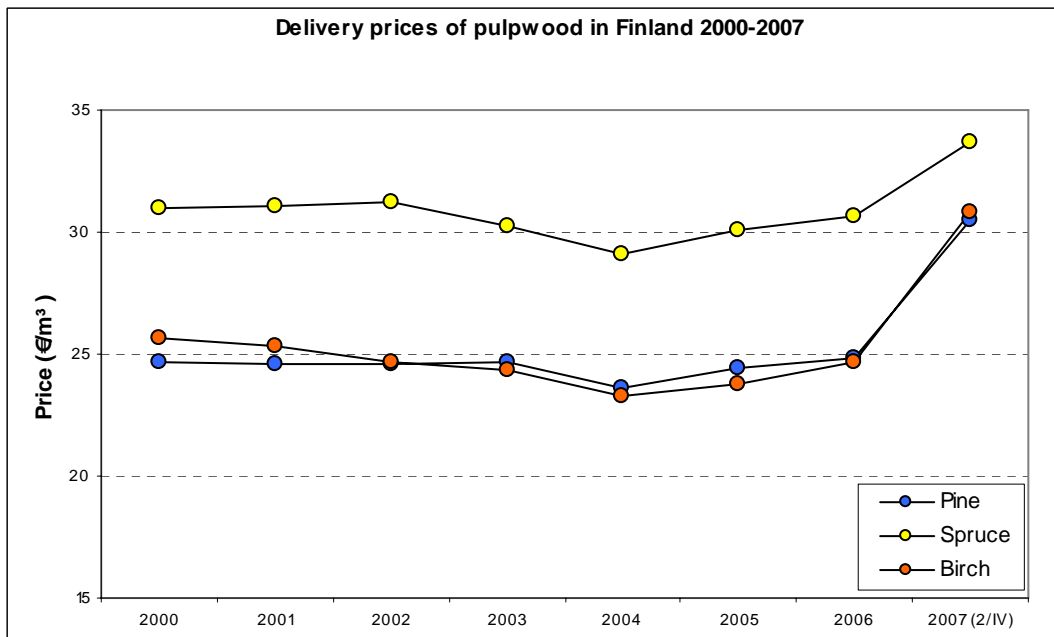


Figure 11. Delivery prices of domestic pulpwood.

/16/

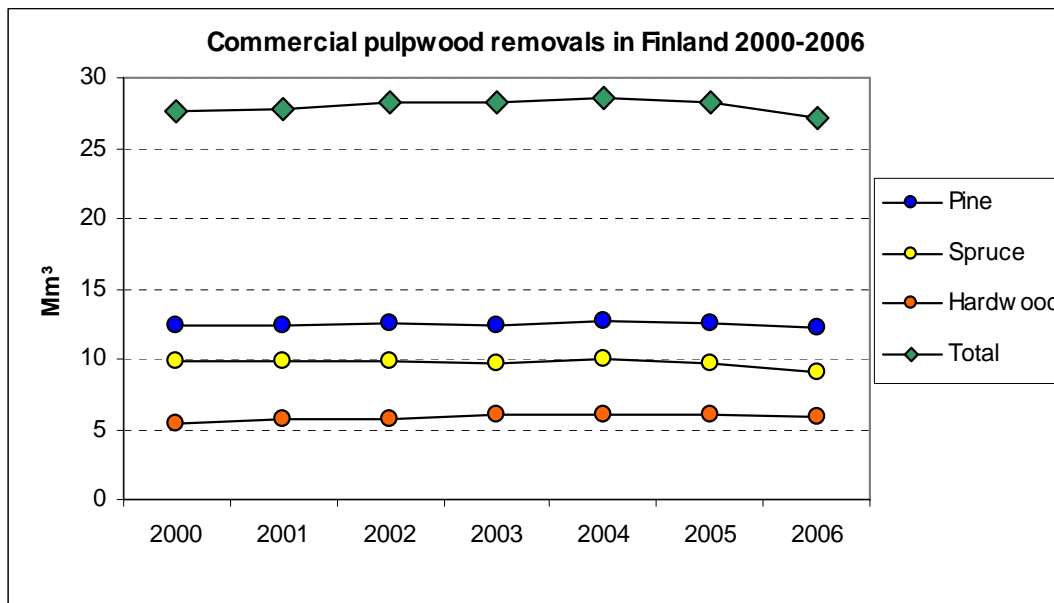


Figure 12. Domestic pulpwood removals.

/16/

#### ***4.2. Imported wood raw material***

As precise enough statistics from the Russian Federation are not available the delivery price of imported wood raw material are only obtained from two years (1996 and 2007). Quite surprisingly the border prices of pulpwood have never been lower than the domestic prices. At the moment, the prices at the border for pulpwood are similar to those in Finland. The trend of import before recent announcement of the Russian government had been on constant rise since the fall of The Soviet Union but this situation may well be changing. The most recent information (18.4.2007) has already shown a 40% decrease in imports from the Russian Federation compared to last year's equivalent period. This amount (900 000m<sup>3</sup>) of imported wood from the Russian Federation is also 14% below the average amount of previous decade. The border-prices of pulpwood in January 2007 were: Spruce 38, pine 34 and birch 30 (€/m<sup>3</sup>). The corresponding prices in 1996 were for birch pulpwood 29.4 and for softwood pulpwoods (pine and spruce) 27.7 (€/m<sup>3</sup>). As one can see, the prices for pulpwood are actually higher at the border than the delivery prices in Finland. Respectively prices of logwood are still competitive and, as mentioned before, the sawmills do produce raw material for pulp mills.

/15, 18, 19/

## 5. IMPORT OF WOOD RAW MATERIALS FOR PULPS FROM RUSSIA

### 5.1. General

Wast forest resources in The Russian Federation are almost solely owned by the state. These resources comprise of estimated  $74000Mm^3$  of wood that has been characterized in table 2. This adds up to more than half of the world's softwood resources and 23% of the whole world's wood supply. The area from which the wood is imported to Finland is the north-west region that also has considerable wood resources of  $22900Mm^3$  with estimated annual growth expectancy of  $377 Mm^3/year$ . /17/

Table 2. The distribution of wood species in the Russian Federation /6/

Species	Percentage
Larch	37,3
Spruces	12,8
Pines	21,8
Birch, aspen	16
Finewood	2,5
Other	9.6

### 5.2. Import to Finland

The import of wood raw material from Russian Federation has been on significant rise since the beginning of 1990's, when Soviet Union perished. Figure 12 shows the development of import of roundwood from The Russian Federation since 1989 and one can see that the amount of import has more than tripled since 1990. By 2005 the percentage of wood raw material imported from The Russian Federation has reached  $17 Mm^3$  which represents 79% of Finland's imported wood raw material. Rest of the imported wood raw material is originated in the Baltic states and Sweden with small amount of Eucalyptus from South-America.



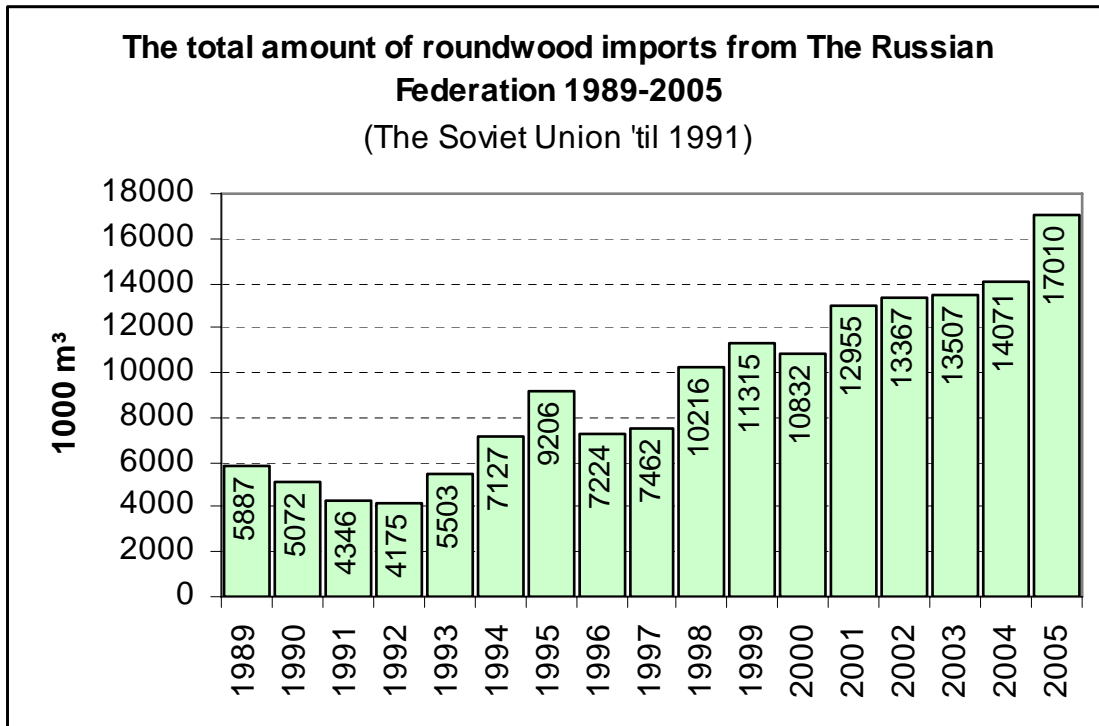


Figure 13. Total import of wood raw material from the Russian Federation /8/

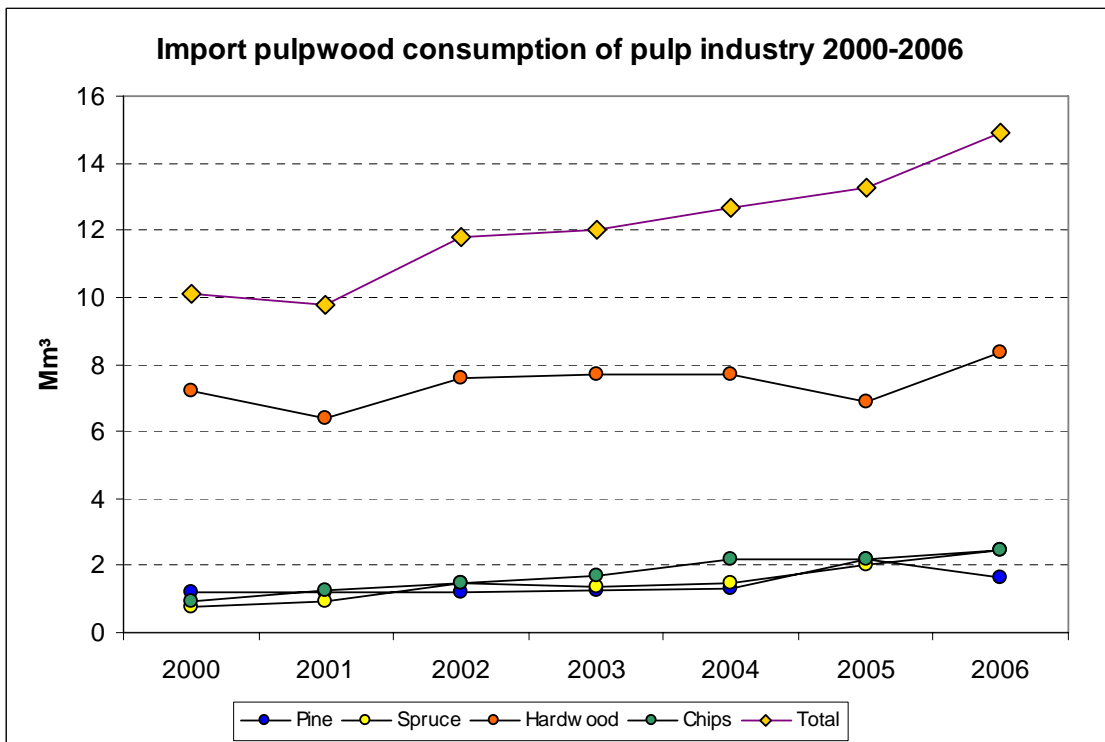


Figure 14. Use of imported pulpwood by species in Finland /14/

The amount of imported hardwood in figure 14 is considerable, consisting mainly of birch pulpwood. As the Finnish forest policy has concentrated its efforts to mainly softwood production, this will cause the greatest concerns in the future if the import of softwood from the Russian Federation is further complicated in 2011.

### **5.3. Customs renewal of export of wood raw material**

The renewal of customs of exported wood raw material from The Russian Federation is based on the low added value of the products when exporting them un-processed. The urge to get foreign investments has been declared the reason for both introduction of mixed fees of sorting exported hardwood and substantial raise in customs fees of all the wood raw material exported from the Russian Federation.

The events concerning the export from the Russian Federation so far: /17/

- |               |                                                                                                                                                                                                                                                                                                                                                              |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| March 2003    | Rumours of raises in fees of exported wood from Russia reach Finland.                                                                                                                                                                                                                                                                                        |
| Spring 2006   | The president of the Russian Federation, Mr Vladimir Putin announces the forthcoming raises in the customs fees in his definition of policy speech telling of the Russian Federation's goal to decrease the export of raw wood and process the wood in domestic production facilities                                                                        |
| June 2006     | The customs fees for softwood raise from 2.5€ to 4€/m <sup>3</sup> . The import of birch is complicated with various sorting demands causing a lot of extra effort and expenses. EU Commission negotiating the Russian Federation's application to join the World Trade Organisation announces its support to Finland in the quarrel about the customs fees. |
| October 2006  | The government of the Russian Federation begins to prepare its program to raise the fees of exported wood raw material for years 2007-2010.                                                                                                                                                                                                                  |
| February 2007 | The ordinance is prepared and states the following raises in the customs fees of softwood: 1.7.2007 the fee raises from 4€ to 10€/m <sup>3</sup> , 1.4.2008 from 10€ to 15€/m <sup>3</sup> and 1.1.2009 from 15€ to 50€ m <sup>3</sup> . Hardwood customs are set separately in 2011.                                                                        |
| March 2007    | EU Commissioner of Trade and the Russian Export Trade Minister meet to discuss the export customs fees but reach no solution.                                                                                                                                                                                                                                |

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The Prime Ministers of the Russian Federation and Finland meet to discuss the problem but once again no solution is reached.,

The public policy of the Russian Federation is to make export of wood raw material unprofitable by year 2009. The goal is to be achieved by substantial raises of customs fees, renewal of domestic forest industry and prevention of illegal loggings. These actions are believed to create a stable industrial environment and bring both domestic and foreign investors to Russian markets. The expectations among Russian specialists are high; the sum of investments according to them is 20 000 M€ by the year 2010 to be invested in the Russian forest industry. The goal is to make forest industry another major line of industry comparable to oil business. /15/

The results of steep increases in the customs fees will at the near future affect Finnish sawmills' production costs more than pulping industry. This due to instant raises in prices of logwood and later announced raises in the prices of especially birch pulpwood.

One not so much publicly discussed problem with imports from the Russian Federation is corruption of the state officials. There are no statistics regarding wood material imports in this view, but something can be judged by the Russian Federation's position (121/142) on Transparency International's CPI (Corruption Perceptions Index) in 2006. /20/

#### ***5.4. The Russian Federation's possible participation in the WTO***

Negotiations about the Russian Federation's accession to the World Trade Organisation have been done for a long time and they seem to last still. The European Union wishes these negotiations to end briefly and successfully, as the customs regulations between member states are ruled by the WTO and these regulations would ease the traffic of goods between the Russian Federation and Finland. The membership of the Russian Federation in the WTO does seem a bit uncertain at the moment as there are numerous, difficult customs-related questions to handle before the membership can come true. However a bilateral contract between the Russian Federation and EU has been signed in 2004. To secure the import of wood raw material to Finland this treaty should be finished in a way that regards the customs fees changes, but for now the Russian Federation has strictly informed Finland that the new, higher wood customs will not be removed. /19, 20/

## **6. FUTURE ASPECTS OF PULPING IN FINLAND**

### ***6.1. Earlier predictions of the import from The Russian Federation***

The predictions presented by Finnish officials (ministry of agriculture and forestry, ministry of trade and industry, Finnish Customs etc) have been based on the assumption that the import of wood raw material from the Russian Federation to Finland would sustain its recent level or even increase. These predictions were made as late as last year. The situation now suggests that last year's record breaking levels of import shall remain the highest for now as this year already shows major decrease in imports. The import may even fade away if the customs renewal is carried out at the levels that were announced this spring. /17, 20, 21/

### ***6.2. The potential of domestic forests***

The volume of wood raw material of Finland's own forests increases annually by 97 Mm<sup>3</sup>. Of this 70 Mm<sup>3</sup> could be harvested. The difference between the growth of volume and total drain of the wood raw material can be seen in figure 9. At the present the quantitative proportions of Finnish forests have been stable for decades. Of the whole volume pine dominates the scene with 46% followed by spruce (36%) and deciduous trees (18%). if measured by area, the dominance of pine is still greater (65%) with the respective shares of spruce (26%) and deciduous trees (8%). This difference is due to large areas of young pine seeding stands. /20/

## 7. CONCLUSIONS

The pulping industry in Finland does face new considerable challenges as the import of wood raw material from the Russian Federation increases costs quite remarkably. The problem is, however, much more severe among sawmills. When considering pulping, and the natural companion, paper and board industry, the problems accumulate as the supply of end products has been on the rise for quite a while. This is due to greatly grown capacity around the World, especially Asia. This growth will keep the prices of paper and board on a level that does cause concern to paper, board and pulp industry whenever expenses are to grow in production.

The Finnish pulping industry, along with other forest industry, has had too bright expectations concerning the import of wood raw material from the Russian Federation. As the economical trend there changes the need for higher added value continues to disturb, perhaps even halt, the export of un-refined material. The amount of import is due to rise from other countries such as Sweden, Belarus, Estonia, Lithuania and Latvia.

The recent development can, in the worst case scenario, lead to shutting down some of the most unprofitable production lines in the pulping industry, even whole mills are threatened. This can only be prevented by ensuring stable flow of wood raw material to the industry at an affordable price.

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