

Wood Procurement Chain Affects Raw Material Quality

Wood procurement means the logistics of wood material flow from forest to the end user. On the current wood market timber, pulpwood and energy wood are traded. All phases and factors in the wood procurement chain affect the extractives content of the woody biomaterial, as well as the composition of the extractives fraction. These factors include e.g.: harvesting methods and time, storage time and system, and handling and transportation modes.

WOOD PROCUREMENT CHAIN

Wood procurement in shortly means the logistics of wood material flow from forest to the end user. The procurement chain usually constitutes of two actors: the seller of the wood and the buyer of the wood. On the current wood market timber, pulpwood and energy wood (logging residues, small sized trees, stumps etc.) are traded. However, the trade of timber and pulpwood (roundwood) is together economically superior and dictates the way procurement logistics are designed and managed.

Cut-to-length logging method

In the Nordic countries the cut-to-length (CTL) logging method is used, in which the tree is cut, delimbed and bucked into different assortments at the stump. The merchantable stem wood volume at a specific stand is due to the agreed minimum top diameter and min-max lengths of assortments set in the contract. Thus, residual volumes of tree tops, branches, stumps that can be used for energy/refining is dependent of how contracts roundwood are set.

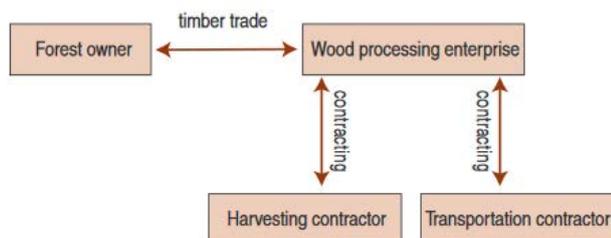


Figure 1. Typical contractual relations in Nordics.

Source: <http://www.metla.fi/julkaisut/workingpapers/2012/mwp249.pdf>

Standing and delivery sale contracts

The most common logging contract used is the “standing sale contract”, where the wood buyer buys the standing trees and arrange logging and transportation operations from forest to industry (Figure 1). Usually the buyer does not own machines, but buy harvesting and transportation services from contractors. Another form of timber sale is the “delivery sale contract”, where the seller arranges the logging and transportation from forest to the roadside.

Logging operations and wood transport

Forest machine contractors main service is logging of roundwood and they use harvesters and forwarders. The other group of contractors working for same customers are the timber truckers, who transport the roundwood from roadside to the industry.

The annual volume of harvested energy wood is increasing and currently is a important work share of logging contractors. Also other services, such as soil preparation, seeding and planting are provided by contractors.

Logging operations can be divided into first thinnings, late thinnings (second and possibly third thinnings) and final fellings (regeneration felling).

The first thinning generally provide low revenues but is, together with the pre-commercial thinning, the treatment in which the potential future values of standing trees throughout the stands rotation are “created” and thus, from a silvicultural point of view the most important thinning (right timing and intensity).

Later thinnings aims is to guarantee enough grow space for remaining trees for maximum diameter growth and hence maximum timber yield in the final felling and provide relative high revenues compared to first thinnings as larger proportion of timber is harvested.

The single grip harvesters came into forestry in the end of the 1980's and started to gain market shares rapidly from manual felling (Figure 2). Nowadays practically all commercial logging is carried out by harvesters and forwarders. As an example: the number of used machines 2017 in Finland were roughly 2000 harvesters, 2000 forwarders and 1500 timber trucks, with considerable variation between months (ref to LUKE statistics).

WOOD PROCUREMENT HAS AN EFFECT TO FEEDSTOCK QUALITY

It has to be pointed out that not only storage, but also other phases/factors in the wood procurement chain affect the extractives content of the woody biomaterial, as well as the composition of the extractives fraction (Ekman 2000, Rupar & Sanati 2005).

These factors include e.g.: harvesting methods, harvesting time, storage time, storage system and handling and transportation modes. The duration of each of the phases in procurement chain, as well as environmental conditions, is important in respect to changes in extractives content and composition.

During train or truck transport material will be left vulnerable to environmental conditions if an open carriage is used. When transportation in water is used, the situation is totally different as water protects wood from damage caused by fungi or insects. Additionally, the chemical reactions in water are different, and some extraction might also occur.

Average delivery times from the logging site to the sawmill or pulp mill in Finland are approximately 2–3 weeks for timber, 4 weeks for spruce pulpwood and 8–13 weeks for pine and birch pulp wood (Lukkari et al. 2004). Road transportation takes only hours or days, whereas transportation in ships or barges takes approximately one week.

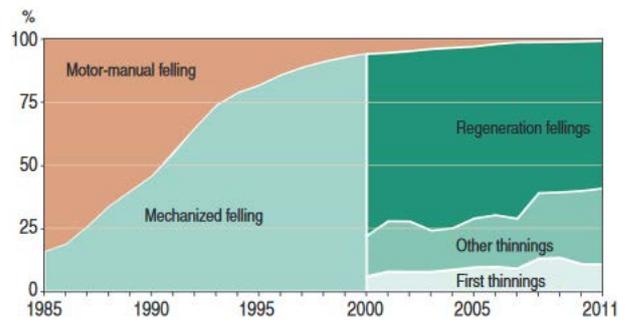


Figure 2. Development of felling methods in commercial roundwood production by the forest industries and Metsähallitus in 1985–2011. Source: <http://www.metla.fi/julkaisut/workingpapers/2012/mwp249.pdf>

In order to minimize losses of valuable chemical compounds in wood, effective management of procurement chains are of great importance.

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