Collaboration along the wood value chain
Introduction

The content of this brochure has been developed within the regional development project „Hardwoods Are Good – supporting entrepreneurs of the forestry hardwood chain in the South Baltic Region“ - in strong cooperation with the research project „WoodApps - Improvement in collaboration along the wood value chain“. The target groups of this brochure are the main actors within the wood value chain.

The project Hardwoods Are Good has been funded by the South Baltic Programme of the European Union through the European Regional Development Fund (ERDF). The project focuses on the improvement of the forestry based hardwood chain and aims to set up a permanent network for hardwood related topics. Partners and associated organizations from five countries have taken part in the project activities.

Collaboration along the wood value chain

The wood value chain (WVC) can be described as a network of actors that through different processes and activities produce and deliver raw material and products to customers. In addition, there is also a flow of information and services. Many actors are involved in the value chain between the forest and the final customer and depending on which actor’s perspective the chain is observed, there are several examples of how the value chain could be described. Hardwood and softwood roundwood is usually handled within the same wood value chain from forest to the industry.

Within the WoodApps project an interview survey, involving 11 companies from four different countries (Germany, Ireland, Slovenia and Sweden) has been conducted. Based on the outputs from this survey a short overview of the WVC regarding actors, business areas, services, raw-materials and products is given below.

Actors along the value chain and their main business areas

The main actors involved in the value chain from the forest until the wood reaches industry are suppliers and buyers of wood and different kinds of service providers. Suppliers can be represented by forest owners (private persons, forest companies or public bodies e.g. state, municipalities or the church) selling wood and forest owners associations or other wood procurement companies. The Buyers of wood from the forest have been identified as wood procurement companies, timber merchants and wood processing industries like sawmills, veneer producers and pulpmills. In most cases, harvesting operations and off-road transportation are performed by forest-based service providers or contractors (hired by supplier or buyer), but also by logging teams employed by the supplier or buyer. Transportation of logs from road-side to industry is usually performed by a haulage contractor. Wood measurement and grading can be done by the supplier or buyer, a combination of both, or by an independent organisation. Finally the products are sold and delivered to further processing industries, timber or builders merchants and different kind of end-users.

The business areas represented among the actors in the WVC are:

- Supply of roundwood, fuelwood and harvesting residuals
- Forest services e.g. forest management, silviculture and harvesting
- Transportation of roundwood from forest to industry, products form mill to users
- Wood processing in sawmills, veneer plants and pulpmills
- Production of components and finished products for end-users
Services along the value chain

The services required and offered along the value chain can be categorized as main services i.e. the core services within the WVC, value added services which can be assigned to one or more main services and finally additional services, i.e. sub-categories of services that are out the scope of the core process steps for the value chain. In general the final categorisation of services depends on the individual company’s business idea. Examples of main and value added services offered by the responding actors are:

- forestry services
- silviculture (e.g. planting, cleaning and seed collection)
- harvesting operations (e.g. motor-manual or machine harvesting)
- off-road transportation
- storing of wood
- wood measurement and grading
- wood processing
- trading of wood products
- forestry infrastructure services (e.g. road construction and fencing)
- administrative services (e.g. billing and accounting)
- providing of information
- electronic ordering systems for wood products

Additional services generally differ from the services mentioned above, examples of additional services are:

- marketing
- mediation of staff and services
- education
- supervision and excursions
- R&D
- creation and maintenance of websites and customized IT- and logistics solutions for customers, business partners and forest owners.

Hardwood raw-materials and products

The companies included in the survey represented actors along the entire WVC and a large number of different kinds of raw material are handled by these companies. For example roundwood of nearly 20 different hardwood species are harvested, sold, bought or processed within the participating companies.

What is considered as a raw material for one company can be a result of a production process within another depending on the company’s main business area (e.g. supplier of roundwood or producer of sawn wood products). The main categories of raw material from the forest identified were sawlogs, veneer logs, logs for pallets and packaging, pulpwood, industrial roundwood and energy wood.

Wood products can include a variety of processed wood; from sawn timber, semi-finished products and components for furniture, window and door manufacturers, finger joints and veneer sheets to final products like wooden floors and interior design products.

Different kinds of by-products from the forest and processing industry are used within the industry or bought by other actors like cellulose industries, panel board companies and energy plants. Examples mentioned in the survey are residues from harvesting, bark, shavings, sawdust and wood chips.

In addition to the type of raw material (logs, sawn wood or veneer etc.) important factors determining the choice of raw material and where it is bought from have been identified as price, quality, species, good contacts, transport distance, certificates (e.g. FSC) and supplier reliability.

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Hardwood measurement and grading

The shift between a national to an international business model makes it more and more difficult for SMEs in the hardwood sector to compete in the international roundwood market. Entrepreneurs having the opportunity to trade wood across countries have to face the next major problem: timber grading rules. Not only every country but in some cases even each region and company has its own specifications and guidelines regarding the classification of roundwood. Within the project Hardwoods Are Good the different national standards and technical terms have been analysed and the similarities and varieties have been pointed out. Some of the main standards identified are as follows:

**EU EN 1316-1**: With reference to the European Standards for hardwood round timber classification (EN 1315-1 and EN 1316-1/2/3), which were defined in 1997 by the CEN, the European Union suspended the directive EEC/68/89 in 2008 As part of deregulation processes. EN 1315-1 focuses on the dimensional classification and EN 1316-1/2/3 on the qualitative classification of hardwood round timber (Part 1: Oak and beech; Part 2: Poplar; Part 3: Ash and maple and sycamore)

**Germany RVR - Rahmenvereinbarung Rohholzhandel**: Since the Forst-HKS lost its formal basis the German Forestry Council and the German Timber Industry Council initiated the RVR Rahmenvereinbarung Rohholzhandel (Agreement on Round Wood Trading). The major target of the RVR is the creation of a dimensional and qualitative classification of round wood as a basis for a nearly transparent movement/trade of round wood within Germany. Due to the large number of actors along the value chain it is quite hard to reach a final agreement that covers all relevant topics and take all standpoints into account.

**Lithuania LST EN 1316**: Within Lithuania, the European Standards EN 1316 have been transferred into the national Standard LST EN 1316-1:2002, LST EN 1316-2:1999 and LST EN 1316-3:2001. As there is no European Standard for the classification of birch and alder, the Lithuanian Standards Board (LST TK 17 „Woods“) have developed a national standard for quality classification (LST 1609:2001, LST 1609:2001/1K:2007).

**Poland PN-92 / D-95008**: General Measurement instructions for round wood and growth characteristics are documented in the Polish standard PN-D-95000:2002. Other relevant standards for broadleaves species are contained in N-92/D-95008 (big size, veneer and plywood) and with limited relevance PN-92/D-95018 (medium size).

**Russia GOST 22299-76**: Broadleaved saw logs for the export are sorted based on the Russian State Standards (GOST). GOST 22299-76 defines the technical requirements (dimensional and qualitative) and other standards which specify the affected species (GOST 9462-88), the measuring methods (GOST 2140-81) as well as branding, assortment and storage practices (GOST 2292-88 and GOST 9014.0-75).

**Sweden VMR**: Measurement of softwood roundwood within Sweden is based on the rules published by the Swedish Timber Measurement Council (VMR). Whereas most hardwood sawmills classify their roundwood according to company specific grading rules. Examples of quality classes for hardwood logs are A, B and C. It should however be noted that the criteria for A-, B- and C-logs vary between different sawmills. It is also common to add extra classifications for high class timber, to vary the specifications for some characteristics depending on the utilisation.

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Examples regarding „Common grading language”

Although European standards are published in each country there is no legislation in place to enforce the use of these standards and as mentioned above several national and local classification systems also exist. To avoid mistakes and facilitate effective communication of wood quality across language borders the terms used to describe different characteristics of roundwood must be correctly defined. A compilation of international terminology used to classify hardwood logs has therefore been developed within the project.

The starting point for this task was an analysis of terminology used within the European standard EN 1316. The main grading related terms were listed in an XLS-file and after that, other important characteristics used in national standards or local grading rules were identified, categorised and added to the list. Each term is defined according to the EN 844-series of standards which include various glossaries of terms for forest products and their characteristics used in the European standards. For some of the characteristics a picture was also added.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Source of specific term or definition (country): SE / Definition according to: VMR, TNC 96</th>
</tr>
</thead>
<tbody>
<tr>
<td>dead knot</td>
<td>Trockenast</td>
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<tr>
<td></td>
<td>Abgestorbener Ast, dessen Phloem nicht mehr verwachsen ist.</td>
</tr>
</tbody>
</table>

The combination of terms, written definitions and pictures should facilitate and support the communication of wood quality across language borders. A total of 110 terms were listed and of those, 70 were derived from the European standards. This means that about 1/3 of the terms used to describe quality parameters of hardwood roundwood in the participating countries are not included in the European standard.

Smart support tools for an improved communication

Woodpicker

As mentioned earlier, many different specifications and guidelines regarding the classification of roundwood exist. For example if we take a look on oak in Sweden - there are a variety of quality specifications depending on the production requirements of the sawmill.

To solve this problem a system that enables the definition of various individual classifications is required. The Woodpicker system focuses on such a clear communication between national and international partners via visual assessment for common classifications. Woodpicker allows users to communicate across borders independent of language and standards.

The Woodpicker system can be used to communicate quality characteristics between timber trading partners but also as crosscutting instruction tool to instruct forestry service provider.

WoodPicker Test: log in and register at [http://scripts.tracentrum.se/wwwroot/Woodopicker/pdmbuild](http://scripts.tracentrum.se/wwwroot/Woodopicker/pdmbuild), and you can test the tool for a week.

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WGC - Wood Grading Conversion

Entrepreneurs having the opportunity to trade hardwood like beech, oak and birch across countries have to face the fact of varying timber grading rules. Within the WGC common quality parameters of national norms have been analysed, conflated and transferred into a prototypical IT tool. The WGC allows for a conversion and comparison of different national wood grading standards.

However, only a limited number of parameters have been considered within the computer-aided conversion system. The parameter selection is based on the availability and clear definition of quality characteristics in the national standards of DE, SE, LT, PL and RU. In real business environments many more parameters are taken into account. Even some parameters are described in a textual format only and are not incorporated easily into the model since they have no numeric value, e.g. abatement on log length.

WoodApps - Improvement in collaboration along the wood value chain through knowledge-based methods and mobile applications

WoodApps is a research project funded by the WoodWisdom-Net Research Programme and the ERA-NET Bioenergy. The project aim is to develop a pilot „Information and Communication Service Platform“ to link process partners within international value chains from the forest to the industry - Wood Value Chain.

Using standardized descriptions and classifications of business profiles, services, raw-materials and products as well as computer-aided methods, the platform will foster an improved partner communication and the exchange of contrastable information. To optimize the supply of relevant data gained outside, cutting-edge services, realized as mobile phone applications, will be connected to the platform.

Project coordinator is Martin Mueller from HCN - High Competence Network in Germany. Further partners are Scheller Systemtechnik GmbH (DE), Slovenian Forestry Institute (SI), Swedish University of Agricultural Sciences (SE), Linnæus University (SE) and TSSG Waterford Institute of Technology (IRE).

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WGC test: [http://wgc.hcn-grupa.de](http://wgc.hcn-grupa.de)
AFoRS – Digital measurement of stacked timber logs via camera phone or tablet

The AFoRS system enables you to easily gather parametric data from timber stacks in the forest using a reliable and fully automated process. Furthermore the system provides access to the resulting data for customers and service providers.

In the forest the AFoRS.measuring-kit is used to easily measure parameters from the log stacks. The kit includes a mobile application running on a pre-calibrated AFoRS.phones, an image processing service as well as access to the AFoRS.service-platform.

Measuring-kit

The robust AFoRS.measuring-kit is designed for outdoor use and includes all the necessary measurement materials (cellphone or tablet, marker and marker pins). The calibrated cellphone or tablet and the markers are optimally tailored to each other. This technology transforms the cellphone/tablet into an accurate measurement instrument. The requirements for the photogrammetric calculation are a combination of multiple (dependant on stack size) frontal pictures of the wood stacks, which have to be marked with the AFoRS.markers.

System-phone

In addition to the basic timber stack data, like timber stack number, stack pictures and stack depth, the AFoRS.mobile application for Android allows the user to easily add additional information. This additional information includes the tree species, the assortment, the quality etc.. User details, positioning/localisation data and date/time information are taken from the smartphone operating system interface and integrated into the process. The localization of the stacks is achieved using GPS and/or network-positioning information at the time of the image acquisition. The automatically obtained position can be manually adjusted at a later stage using a mobile map.

Data-transfer

The AdHoc data transfer via EIP® SSCI (EIP® Safe Session Communication Interface) permits a direct and secure upload (via GPRS, UMTS, WiFi, a.s.o.) of the acquired data onto the AFoRS.service-platform. The issue of unreliable network connections in remote areas such as the forest is dealt with by utilising packet based data-transfer methods. This allows the transfer of data for a particular measurement operation to continue seamlessly when coverage allows without having to completely restart. Measured stacks and the corresponding calculation results will be available just-in-time on the service platform on the web or mobile device.

Image-processing

Specially developed image-processing algorithms calculate the timber stack parameters from the different frontal images of the stack. The pictures are pre-processed, checked and by using advanced methods the surface of the timber is detected. The overall results, the total cubic meters of the stacks, the solid cubic meters of timber, the distribution of strength classes and the number of logs is then provided to the user.

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