Wood Construction Reaching New Heights with Mass Timber – Opportunities for South American Producers

Expocorma 2017
Concepcion, Chile
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Agenda

- Indufor
- Evolution of Wooden Construction
- Mass Timber Products
- SWOT
- Home Takeaway Messages
Indufor

- Independent international consulting company based in Finland, New Zealand, Australia and the US with over 35 years of experience in the field of forestry, forest industry and natural resources
- Provide world class advisory services to a wide range of private and public sector clients
- More than 300 clients in over 800 projects in 5 continents.
Indufor – Forest Industry & Bio Solutions – Service Offerings

Biomass sourcing and wood supply plans
- Site suitability for forest plantation and biomass species and varieties
- Potential and realistic supply availability in biomass supply baskets
- Developing supply models and assessing associated cost structures

Business strategies
- Pre-feasibility/feasibility studies
- Business plans
- Market supply, demand and trade assessments – market entry solutions
- End use segment and client identification studies

Due Diligence and M&A
- Purchaser and vendor due diligence
- Valuations
- Mergers and acquisitions

Process improvements
- Technology assessments
- Operational improvement analysis

Industry benchmarking
- Industry segment productivity assessments
- Single plant benchmarking studies
Evolution of Wood Construction
Evolution of Wood Construction – Main Markets

*Europe is the largest housing market but the US has shown the strongest growth in the recent years.*

Source: National Association of Home Builders (NAHB), Japan Wood Market Statistics, Euroconstruct
Evolution of Wood Construction – Market Shares

Wooden construction has the highest market share in North America, Japan and Northern Europe.

Source: Various sources analysed and modified by Indufor
Evolution of Wood Construction – Building Codes

There are numerous national and regional building codes. The IBC allows 6-storey wooden buildings but recent projects have even more storeys.

- Wood is very traditional building material but the use has mainly been limits to residential single family housing
- A push to change the building codes started in the 1990s in Europe
- Change in building codes has enabled the use of wood in multi-storey construction and this largely explains the positive development
- 2015 version of the International Building Code (IBC) allows construction of wood-frame buildings up to 6-storey (26 meter) high. Higher buildings are also permitted, but imply consultations with local building officials
- Many national and regional building codes have been harmonised with the IBC allowing the same height of wooden buildings, including those in Europe, Canadian Ontario and others
- In fact, in 2016 the International Code Council established a "tall wood ad hoc committee" in order to investigate potential of higher wooden buildings in the next revision of the IBC which takes place every three years.
Evolution of Wood Construction – Big Change

Swedish city of Växjö is European forerunner in wooden construction. Other countries are following the trend. Mass timber products are used in all projects.

- The Swedish city of Växjö is considered as a showroom for wood construction in Europe
- Back in 2008, around 25 ha of land was allocated for wood construction making it gradually one of the "greenest cities" in Europe
- Växjö has set an ambitious target of reaching a 50% share of municipal timber construction by 2020 and becoming fossil fuel free by 2030
- In 2014, the first Finnish high-rise wooden building (Puukuokka) was built from CLT in Jyväskylä and had 8-storeys
- As of September 2017, there are 59 complete multi-storey wooden buildings in Finland (over 2-storey high)
- Stora Enso and SRV are currently jointly working on the renown Wood City quarter (two 8-storey high wooden buildings) in Helsinki.
Evolution of Wood Construction – High Rises

In 2008, there was only one 8-storey wooden building, while now there are around 40 complete or on the way. The highest complete is the 53 m Brock Common student resident in Vancouver, Canada, made from timber and concrete, while the highest projected is the Barbican Oakwood Tower in London, the UK.

Source: “A glimpse into the future – Mass timber projects” by Confederation of Timber Industries
Mass Timber Products
Mass Timber Products – Cross Laminated Timber (CLT)

CLT is an alternative to concrete elements in multi-storey construction.

- CLT is an EWP composed of several layers (typically 3-7, in odd numbers) of sawnwood boards put together in a crosswise direction, glued and pressed horizontally and vertically.
- KD sawnwood with 12% moisture content.
- Thickness ranges from 50 to 500 mm and are 18 meter max in length and 3 meter max in width (but typically 0.6 m, 1.2 m, or 3 m wide).
- The panel is a strong but light high-performing product which finds its use in wall, floor, and roof systems.
- Easy to install, therefore allow saving time and costs at the construction site.
- CLT is commonly produced from softwood species (spruce, fir, pine, larch), but opportunities for producing CLT from hardwood species are also being currently explored.
Mass Timber Products – Cross Laminated Timber (CLT)

90% of the global production is located in Europe, and over half in Austria. By 2020 the European CLT production is expected to increase from current 750 000 m$^3$ to 1.25 Mm$^3$. The shares of North-America and Asia. However, interest is picking up fast in North America.

Global CLT production

- Austria 55%
- Germany 16%
- Switzerland 2%
- Czech Republic 1%
- Other EU 16%
- North-America and Asia 10%

Total 2016e - 745 000 m$^3$

Top-10 biggest producers of CLT, 2016

1. Stora Enso St Leonhard and Ybbs (AT)
2. KLH Massivholz (AT)
3. Mayr-Melnhof Holz (AT)
4. Züblin Timber (DE)
5. Hasslacher Norica (AT)
6. Eugen Decker (DE)
7. Lignotrend (DE)
8. X-Lam Dolomiti (IT)
9. Schilliger Holz (CH)
10. W. u. J. Derix (DE)

Source: UNECE, Holzkurier

Source: Various sources analysed and modified by Indufor
Mass Timber Products – Laminated Veneer Lumber (LVL)

*LVL is mainly an alternative for steel beams and wide lumber. LVL wall elements start to compete with CLT panels.*

- Laminated Veneer Lumber (LVL) is a high-strength EWP used primarily for structural applications.
- It is comparable in strength to solid timber, concrete and steel and is manufactured by bonding together rotary peeled or sliced thin wood veneers under heat and pressure.
- LVL was developed in the 1970s and is today used for permanent structural applications including beams, lintels, purlins, truss chords and formwork.
- LVL can be used wherever sawnwood is used however; one of the main advantages is that it can be manufactured to almost any length, restricted only by transportation to site.
- In 2017, Stora Enso started LVL mill in Finland with focus on LVL wall elements.
Mass Timber Products – Laminated Veneer Lumber (LVL)

The global output is estimated at ca. 4 Mm³. North America dominates the production with about half of the global output. China has increased its relative share of the total although its production growth has been modest. A great majority of the European production is consumed within Europe. North America forecast to face supply shortage in the near future.

Source: APA, FAO, Indufor
Mass Timber Products – Mass Plywood Panel (MPP)

Competitor to CLT but only 1 current producer.

- Been developed by Freres Lumber (OR, USA)
- MPP is a direct competitor to CLT in construction of multi-storey buildings with the main difference being that MPP is laid up from veneers while CLT from lumber
- Expected to have similar structural characteristics as CLT while requiring 20-30% less wood
- Other advantages include:
  - Suitability of trees of smaller diameter as a raw material
  - Openings for doors and windows are made in the mill, therefore allow to save cost related to waste utilisation and labour force
  - Less transportation costs – lighter than CLT
- Potential applications: crane mats, floor and wall panels, concrete forming, solid structural columns, scaffold planking, etc.
SWOT
## SWOT

### STRENGTHS
- Low carbon footprint (CLT, LVL & MPP)
- Low labor requirement (CLT, LVL & MPP)
- Shorter construction time
- Good strength properties / earthquake resistance too
- Use for lower grade lumber (CLT)
- Reasonably good insulation properties

### WEAKNESSES
- Sound insulation in wood construction
- Lack of awareness – changing
- Design know how

### OPPORTUNITIES
- Export potential to the US and Europe – access to structural markets with a higher value products
- Domestic introduction – Chile and Brazil – largely untapped markets on wooden high rises
- Higher values for knotty products?

### THREATS
- Competition between mass products (CLT vs. MPP)
- Risk of remaining as a niche product
- Dependence on export markets if no local market
- Plantation wood’s strength properties not sufficient
Home Takeaway Messages
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- High rise wooden construction is real and on strong upward trajectory both in Europe and North America
- Analyze opportunity
  - which product (CLT – LVL – MPP)
  - which markets (domestic – North America – Europe)
- Develop local market acceptance
  - Building code development
  - Pilot projects
  - Wide market acceptance
- Mass timber products require different type of selling – project sales, not bulk sales, working with architects and designers, selling human capital – not just a product.