CURRENT STATUS AND FUTURE IMPLICATIONS OF FINNISH WOOD-BASED-PANEL INDUSTRIES

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MOTIVATION

Wood processing industries have long been the strength of Finnish economy. Among them wood-based panel industry (WBP) has concentrated on birch plywood since early 1900's and on softwood plywood and laminated veneer lumber (LVL) since 1990's, being currently market leaders in Europe. Instead, the position and size of chipboard (particleboard) and fibreboard industries has declined since 1980's owing to the lack of price competitiveness in export markets, limited domestic markets and strong import and stagnating investments and RTDI activity. Their raw material basis is nowadays solely in by-products of saw and plywood mills, such as saw dust, planer shavings, grinding dust, residual wood chips and bark, instead of more expensive small-diameter thinning woods and less used hardwoods during 1960's to 1980's (BS 2017). Recently, oversupply of the side streams of saw and plywood mills and other woodworking industries has lowered considerably the raw material price of WBP mills and calls for new markets and uses for these by-products. In parallel, continuous growth and more versatility in the European WBP markets, advanced technology development among machine and chemical manufacturers, specific product segments including engineered panel products and green building with lifecycle approach may provide potential for renaissance of Finnish WBP industry.

The main purpose of this paper is to review the current status and evaluate the future potential of Finnish wood based panel industries. The analysis includes historical prospects, current scope and structure, raw material and product trends, mill operations, fabrication lines and adhesives systems. One part of the work is to evaluate the challenges faced and opportunities found for the development of Finnish WBP industries.

EXPERIMENTAL

The research was carried out through literature and internet survey and data collection from Finnish Forest Industries, Wood Products Finland etc. and personal communication with wood based panel industries, machine manufacturers, adhesive producers and related RTDI experts. The work was focused to flake-based and fibre-based panel industries with short implications to veneer-based panel industries only.

RESULTS & DISCUSSION

2.1. Current status of panel industry

As Pihlava softboard mill was closed in 2013, now only one chipboard mill (Koskisen Oy panel industry at Järvelä) and one fibreboard mill (Finnish Fibreboard Ltd at Heinola) are active wood-based panel mills in Finland. They are mostly producing panels for domestic purposes. Table 1 demonstrates the details. Koskisen Oy chipboard mill is producing P1, P2, P4, P6 (dry condition) and P5 (humid condition) types of chipboard. On the other hand, Finnish Fibreboard Ltd. mainly produces six types of hardboard for different application. The company is one of the largest manufacturers of harboard in Europe. Figure 1 shows the export of different wood based panels including plywood from Finland during last ten years. In 2007 it was 1.5 million m^3 with the value of 800 million Euros, while getting down in 2016 to 1.0 million m^3 and 546 million Euros. (FFI 2018). Table 2 demonstrates the export and import of different wood based panels to and from Finland during last years. As seen in the table the production of chipboards and fibreboards is not enough to fulfill the domestic market demands, so this gap is being filled by import, the volumes increasing every year.

It is notable that there is currently no production of many globally important types of wood-based panels in Finland. Of the flake-type products, these include Oriented strand board (OSB) and its precessors flakeboards and waferboards and also Laminated Strand Lumber (LSL). Dry-process fibreboards (especially MDF, but also HF or LDF) or Parallel strand lumber (PSL) which is a veneer-based product are not manufactured either. Their domestic market needs are satisfied through import, the origin being most often in Russia, Eastern Europe or Western Europe (Berthold et al. 2017).

Table 1: Active wood-based panel mills in Finland.

Panel type	**Particleboard**	**Fibreboard**
Company/ Location	Koskisen Oy Panel Industry Järvelä, Finland	Suomen Kuitulevy Oy (Finnish Fibreboard Ltd) Heinola, Finland
No. of mill	1	1
Production lines	1	2 production line
Raw materials	By-products Spruce - 80 % Birch - 15 % Pine - 5 % Saw dust Mini chips Cutter chips	Sawdust and wood chips
Resin system	UF, MUF	UF, MUF, pMDI
Installed capacity annually	100,000 m^3	65,000 m^3
Pressing system		Platen pressing
Classes of panel produced	P1, P2, P4, P6 (dry condition), P5 (humid)	
Certifications	FSC, PEFC, CPR E1 (formaldehyde emission class)	CE, FSC, PEFC, M1 (emission classification of building materials)

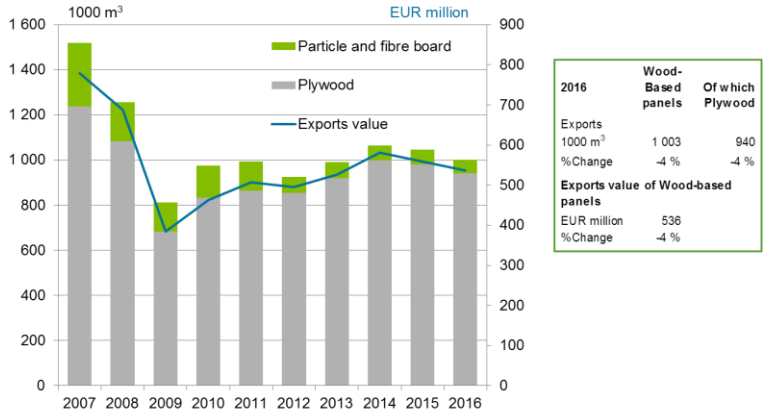

Figure 1: Finnish exports of Wood-based panels. (Source: National board of customs)

Table 3: Wood-based panel production and import estimates in Finland (FAO 2016)

Year	Particleboard		MDF		Hardboard		Other hardboard (softboard)	
	Production (m^3)	Import (m^3)	Production (m^3)	Import (m^3)	Production (m^3)	Import (m^3)	Production (m^3)	Import (m^3)
2011	170000	75924	0	124565	45000	35956	55000	34276
2012	100000	95311	0	125055	45000	30503	55000	22356
2013	96000	87857	0	106024	45000	31479	55000	21471
2014	93000	77630	0	113320	47000	26730	0	33440
2015	92000	79833	0	98974	15000	30255	0	27588
2016	92000	79201	0	121041	15000	27810	0	23996

2.2. Future implications

European Union and the countries involved are targeted to moving towards the fossil free society to reduce the CO_2 and greenhouse gases. In recent years, the development of thermal insulators using renewable raw materials of natural origin brings the interest for researchers and industries. The fossil fuel or crude oil based thermal insulators i.e. expanded polystyrene, extruded polystyrene, polyurethane are not sustainable and environment friendly due to the drastic depletion of fossil fuels (Kumar et al. 2016). As discussed earlier, the demands of wood fibre based materials such as softboard is increasing every year and most of the softboard is imported to Finland. So, a fibreboard mill with emphasis on fibreboard insulator may be a viable option for Finnish WBP industry to fulfill the domestic demands in building sector. Next target for the industry should be focusing on replacing fossil fuel based adhesive such as UF, PF, MUF etc. systems, because of formaldehyde emissions and strict regulations, which has hindered the development of WBP industries markets. So, renewable resources such as tannin, lignin etc. based adhesives should be the most important targets for WBP industries.

CONCLUSIONS

The manufacture of wood products has long traditions. The choice of products is extensive, from sawn timber to engineered products, interior design products and furniture from top-class designers. Finland is a pioneer of the forest based bio economy, and produces a wide range of sustainable solutions for wood and wood products. On the other hand WBP industry is not moving forward in the similar direction like other wood products industries. There are only two WBP mills active in Finland, one is particleboard mill and second is fibreboard mill. Both are using the old traditional production lines without upgrading them with the latest state of art technology. During this decade the price of raw materials has come down in Finland despite the increased demand for energy sector. Plenty of sustainable side stream and roundwood raw materials are still available for the future.

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