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GLOBAL QUALITY AND STANDARDS PROGRAMME

UKRAINE

Strengthening the quality and standards compliance services for wood and processed wood

VALUE CHAIN STUDY

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Disclaimer

Table of content

List of figures

List of tables

Abbreviations

AA	Association Agreement
BFH	Bern University of Applied Sciences
BIMP	International Bureau of Weights and Measures
BSOS	Business Support Organizations
CAB	Conformity Assessment Body
CAGR	Compound annual growth
CB	Certification Body
CBI	Centre for the promotion of imports from developing countries, Netherlands
CE	Conformité Européenne (European Conformity)
CIS	Commonwealth of Independent States
CMC	Calibration and Measurement Capability
COC	Chain of Custody
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CUTIS	Canada-Ukraine Trade Investment Support project
DCFTA	Deep and Comprehensive Free Trade Area

EBRD	European Bank for Reconstruction and Development
EFTA	European Free Trade Agreement
EN	European Standards
EU	European Union
FORZA	Agency for sustainable development of the Carpathian region
FSC	Forest Stewardship Council
FTA	Free Trade Agreement
GDP	Gross Domestic Product
GEF	The Global Environment Facility
GIZ	Deutsche Gesellschaft für internationale Zusammenarbeit (GIZ) GmbH
GMP	Good manufacturing practice
GOU	Government of Ukraine
GSQP	Global Standard Quality Programme
GVC	Global Value Chains
HA	Hectares
HQ	Headquarters
IAF	International Accreditation Forum
IB	Inspection Body
IEC	International Electrotechnical Commission
ILAC	International Laboratory Accreditation Cooperation
ISO	International Organization for Standardization
ITC	International Trade Centre
ITFC	Ukraine Investment & Trade Facilitation Centre
ITP	Intellectual Property
KPI	Key Performance Indicator
MDETA	Ministry for Development of Economy, Trade and Agriculture of Ukraine
NAAU	National Accreditation Agency of Ukraine
NGO	Non-Governmental Organization
NPA	National Project Assistant
NQI	National Quality Infrastructure

NQIS	National Quality Infrastructure System
NQP	National Quality Policy
NQS	National Quality System
NSB	National Standards Body
NSC	National Steering Committee
NTA	National Technical Advisor
NTB	Non-Tariff Barriers
ODG/EVA	UNIDO's Evaluation Group
OECD	Organization for Economic Cooperation and Development
OIML	International Organization of Legal Metrology
PEFC	The Programme for the Endorsement of Forest Certification
PM	Project Manager
PMC	Project Management Committee
PMM	Project Management Meeting
PMU	Project Management Unit
PT	Proficiency testing
QI	Quality Infrastructure
QMS	Quality Management System
RBM	Result-based Management
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals
RECP	Resource Efficient and Cleaner Production
ROM	Results Oriented Monitoring
SB	Supervisory Body
SDG	(UN) Sustainable Development Goals
SECO	State Secretariat for Economic Affairs (Switzerland)
SE	State Enterprise
SI	International System of Units
SIPPO	Swiss Import Promotion Programme
SMES	Small and Medium-Sized Enterprise(s)
SMTQ	Standard, Metrology, Testing and Quality

SPS	Sanitary and Phyto-Sanitary Measures
SQAM	Standards, Quality Assurance, Accreditation and Metrology
STDR	Export Strategy of Ukraine
SUP	Union of Ukrainian Entrepreneurs
TBT	Technical Barriers to Trade
TC	Technical Committee
TCB	Trade Capacity Building
UAFM	Ukrainian Association of Furniture Manufacturers
UAQ	Ukraine Association of Quality
UAS	Ukraine Standardization Agency
UMTS	Ukrmetrteststandart
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
UNFU	National Forestry and Wood Technology University of Ukraine
USAID	United States Agency for International Development
VC	Value Chain
VCA	Value Chain Analysis
WTO	World Trade Organization

SUMMARY

This value chain analysis (VCA) was done to provide a basis for decision for the further implementation of the UNIDO project "Realizing export potential of the wood and processed wood value chain in Ukraine by strengthening related quality infrastructure (UNIDO ID 180245)". As this title indicates, the main objective of this project is to strengthen quality and standards compliance services for Ukrainian wood and processed wood SMEs' and to promote the use of those services among the value chain participants to ultimately facilitate market access. Hence, the main objective of the VCA was to identify high value-added priority wood products that are most suitable to be supported in this framework.

In order to reach this objective, UNIDO uses the services of the Bern University of Applied Sciences of Switzerland (BFH), together with the Ukrainian non-governmental Organization (NGO) Agency for sustainable development of the Carpathian region (FORZA).

The present document based on 3 workshops in Kyiv with the project stakeholders representing the main Ukrainian Quality Infrastructure (QI) institutions and 61 interviews and discussions with QI institutions, sector associations, technical committees, education and research institutions, various service providers and other actors such as import and export promotion agencies, consultants and buyers in the European Union (EU). In addition, an extensive desk research was done including data collection, analysis and crosschecking with the results from the interviews and discussions.

The section on the global wood sector brings together a vast amount of data on production, trade and consumption of the most important wood products. Moreover, major trends of the wood sector are described such as the consumer driven shift to more sustainable products from renewable resources (such as wood) or the increasing demand for wooden products among other reasons driven by the worldwide boom in the wood construction sector. In addition, the relevant norms and standards of key import markets of wood products were listed, because the export potential of the priority wood products is a decisive factor for the creation of value in Ukraine.

Accordingly, the subsequent overview of the Ukrainian wood sector highlights especially high value-added products (e.g. furniture) where on the one hand standard compliance of the companies is a decisive factor for export and on the other hand a strengthened Ukrainian QI system would be very beneficial for the sector (high value for money). This section also analyses the potential and challenges of the Ukrainian wood sector in a relatively complex business environment. The Ukrainian wood sector relies on vast forest resources and is well diversified, i.e. there is a wide range of products all along the value-added chain. In general, the high value-added products belong to the medium quality segment. Due to the devaluation of the Ukrainian national currency, the companies have comparably low labor costs and are therefore very competitive. Moreover, they are geographically close to the European market and benefit from a free trade agreement with the EU. The challenges in the companies are rather medium quality processing facilities, limited quality management, strategic orientation and planning combined with and skilled labor shortages especially on middle management level and substantial language gaps for export communication (English, German). All these factors are accompanied by an overall political situation that is relatively unstable and to a large extend conditioned by the armed conflict in Eastern Ukraine that implies among others high rates of credit of commercial banks and limited investments and number of innovations of companies.

A matrix that included 48 criteria and sub-criteria was used to identify the priority wood products of the Ukrainian industry with the largest potential for future success. These criteria were grouped into the following four groups:

1. Market potential of the products (demand side)
2. Potential of the companies producing the products (supply side)
3. Relevance of Quality Infrastructure for exploiting the market potential
4. Other framework conditions

This analysis resulted in 2 high value-added priority wood products that are considered to be most suitable to be supported in the framework of the abovementioned QI project: children furniture and wooden windows. The main reasons for these products were the big market potential for both domestic and export market combined with comparably high quality of the producing companies and strong motivation of the sector associations to actively support the QI development. In addition, for both products, standard compliance is not only another advantage for increasing sales, but a compulsory element for export. In general, testing facilities, as an example for children furniture, can also be used for other furniture categories. So, fulfilling high quality standards for children furniture will also be beneficial for other furniture segments and allow test laboratories to serve a broader set of clients. Finally, both products are considered by the main import and export promotion agencies.

In the end, the study concludes with a set of leverage points (LP) and recommendations (Rec). These include:

LP: Lack of trust of EU importers in the reliability of Ukrainian test certificates.

Rec: Trust establishment through cooperation of an internationally recognized testing body with chosen Ukrainian testing bodies.

LP: Lack of cooperation (and trust) between business sector (associations

and companies) and Ukrainian QI institutions.

Rec: Increasing cooperation through building mirror committees to the related CEN Technical Committees and provision of QI and international experts.

LP: Limited availability of EU standards in the Ukrainian language.

Rec: Supporting the translation of the most relevant European Standards (EN) for the priority products in Ukrainian language to penetrate the industry sectors.

LP: Limited competencies of testing body staff for conducting tests according to EU

requirements and standards.

Rec: Offer of training courses for testing body staff for the priority products.

LP: Inappropriate testing infrastructure of testing bodies.

Rec: Infrastructure development of Ukrainian testing bodies for the priority wood products

LP: Limited awareness of the companies for quality and standard compliance.

Rec: Offer of training courses to companies on product development, quality and safety.

LP: Limited close partnerships with foreign QI institutions.

Rec: Establishment of close partnerships with foreign QI institutions including offer of training courses.

The proposed recommendations are inter-linked. It is necessary to have a political framework, the necessary conformity assessment infrastructure as well as application-oriented information and training in order to reach a functioning wood value chain which will facilitate the export of the defined key wood products to the European market.

1

CONTEXT AND OBJECTIVES

Porter [3] describes value chains in terms of a system view of organizations with inputs, transformation processes and outputs. Similarly, value chains can be described on the aggregate level of an industry with a local, regional, national, international or global viewpoint [4]. UNIDO conducted its assessment of the value chain of the Ukrainian wood products sector under consideration of the global and regional wood products markets, hence this study of the Ukrainian wood sector encompasses the following five work packages:

1. An analysis of the global wood products market and opportunities.
2. An assessment of the wood products sector in Ukraine.
3. Prioritization of wood products for further in–depth study.
4. A detailed mapping of the value chain of the selected products and a performance analysis of the industries of the selected products including geographical focus.
5. Leverage identification and recommendations.

Intertwined with the five work packages above that describe the current state of the wood products sector in Ukraine, the team also focused on describing the potential of the Ukrainian wood products value chain. Using economic analysis, the potential of the value chain in terms of economic contribution and economic growth to the country was assessed, as well the potential for job growth in the nation and the region. An assessment of potential domestic as well as international demand has been created as well, based on existing economic forecasts.

UNIDO also investigated the Ukrainian wood products value chain for its social sustainability such as gender equality, social capital, land and water rights, working conditions and social protections, living conditions, and social inclusiveness, among other things. The current and the potential environmental sustainability of the Ukrainian wood products value chain is another focus of UNIDOs' work. Emphasis has been given on water and land use, soil degradation, eutrophication, resource depletion, use of chemicals/pesticides, biodiversity, human health, and ecosystem quality, among other things. The study also looked into the carbon footprint of the Ukrainian wood products value chain, including its coherency with government priorities and the interests and demands from the private sector. Furthermore, the analysis highlighted constraints to the development of the Ukrainian wood products value chain, as well as its conformance to the new European Consensus on Development and adherence to the European Union's principles of engagement with the private sector.

To ensure close cooperation with Ukrainian industry, national, regional, and local governments, associations, and society at large, BFH has partnered with the FORZA as Ukrainian partner. Together, UNIDO, BFH and FORZA ensure that international standards are met and that future decisions pertaining to the export potential of the wood and processed wood value chain in Ukraine and its related quality infrastructure are based on sound data and arguments.

Note: The present report was finalized during the COVID19 pandemic. Hence, its economic or social impacts could not be foreseen and are therefore not taken into account for the conclusions of the report.

2

METHODOLOGY

In order to reach the objectives of the 5 work packages mentioned above (analysis of the global wood products market and opportunities, assessment of the wood products sector in Ukraine, prioritization of wood products for further in–depth study, detailed mapping of the value chain of the selected products and a performance analysis of the industries of the selected products including geographical focus, and leverage identification and recommendations), a participative approach was applied involving the project stakeholders of the Ukrainian quality infrastructure system (QI), representatives of the Ukrainian wood sector (e.g., companies, associations) and representatives from European importers throughout the process of development. This was done through an extensive series of meetings and expert interviews including workshops with the project stakeholders and wood sector representatives.

The interviews were based on standardized interview guidelines and included general information and key data of the interview partners, specific information to identify their strengths, weaknesses, opportunities, and threats (SWOT), and relevant QI related issues including developments and bottlenecks of the Ukrainian QI system. In addition to this direct assessment (primary data), a large dataset consisting of statistics and reports (secondary data) was analyzed and crosschecked with the results from the meetings and interviews to obtain valid conclusions. Chapter 5 provides further details on the following steps for identifying the priority products including the selection criteria.

The limited time frame of 3 months to conduct the study resulted in the project schedule shown in Figure 1. In addition, an action plan (Figure 2) was developed illustrating the steps to reach the objectives of the 5 work packages including selection of priority wood products, identification of leverage points and recommendations for reaching the abovementioned objectives of the UNIDO GQSP project "Realizing export potential of the wood and processed wood value chain in Ukraine by strengthening related quality infrastructure [1], [2]".

FIGURE 1: CHRONOLOGICAL STRUCTURE OF THE 5 WORK PACKAGES INCLUDING 2 STAKEHOLDER WORKSHOPS AND FINAL REPORT.

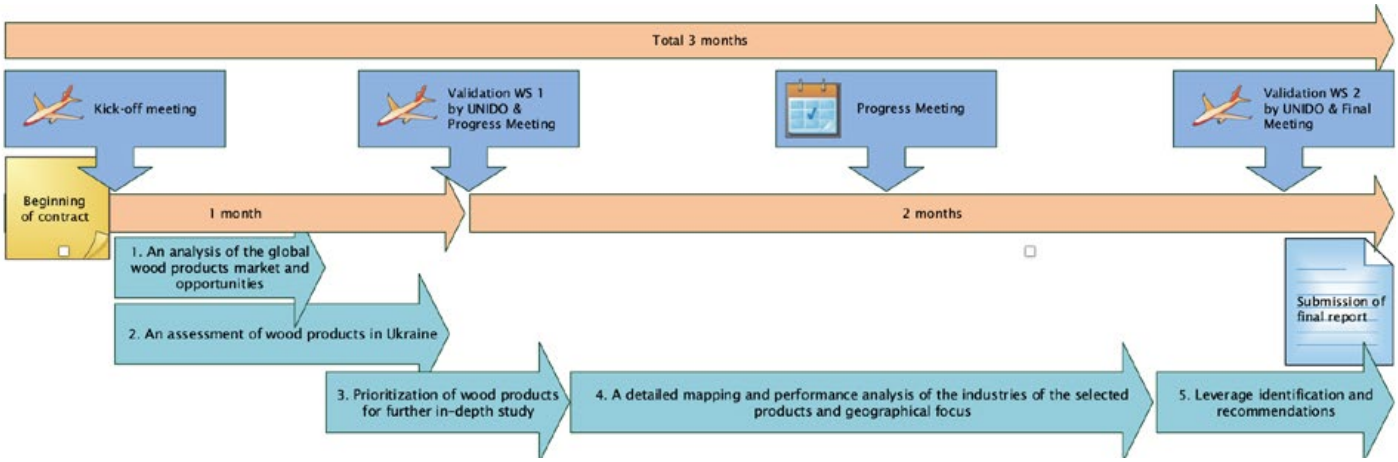
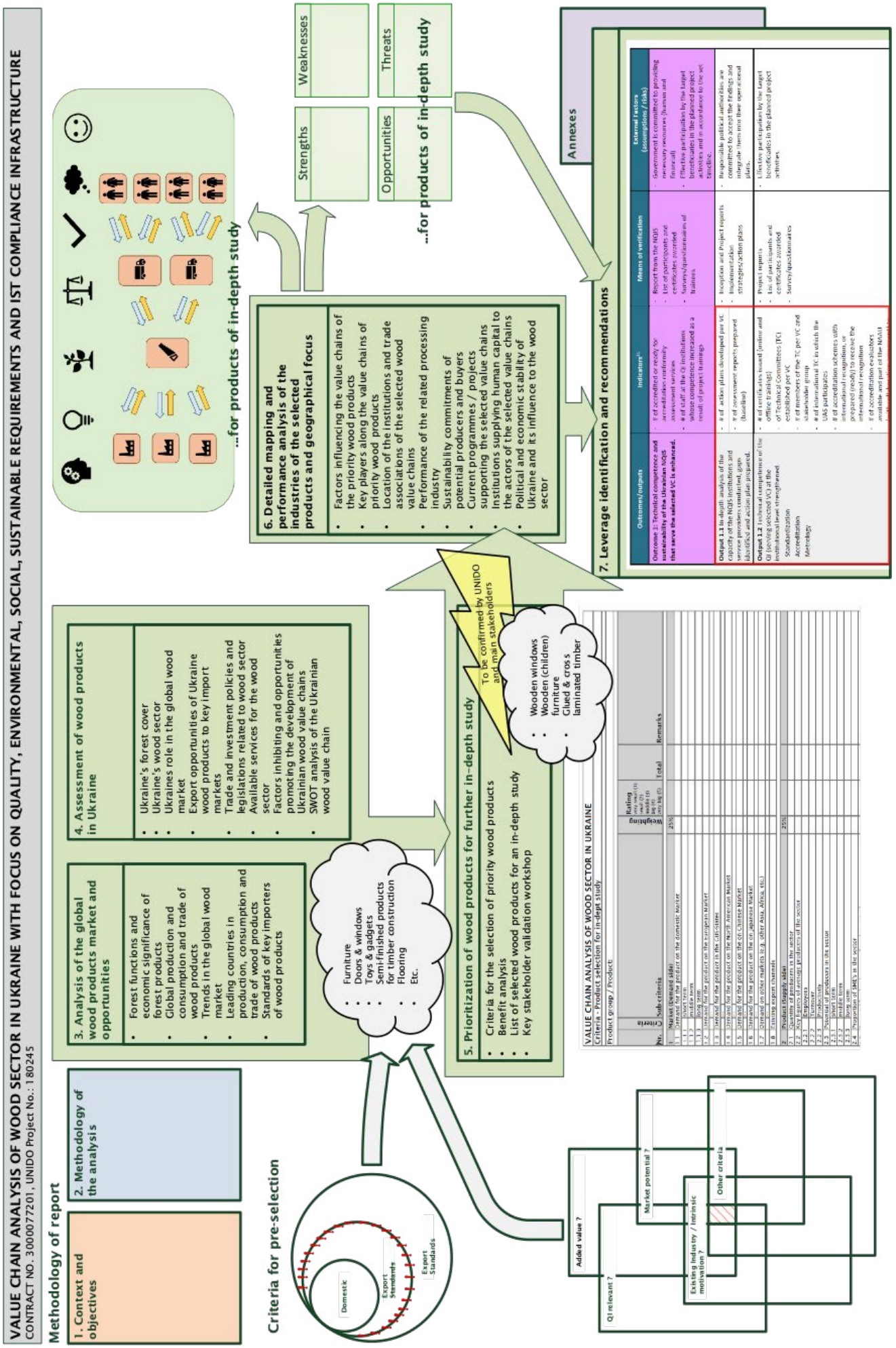


FIGURE 2: ACTION PLAN OF THE VALUE CHAIN ANALYSIS.



3

ANALYSIS OF THE GLOBAL WOOD MARKET

3.1 Forest functions and economic significance of forest products

The world's total forest area is about 4 billion hectares, which corresponds to 31% of the global land area (Figure 3). More than half of the global forests belong to the five states Russia, Brazil, Canada, the USA and China. Figure 4 shows the trends in forest area for Africa, Asia, Europe, North and Central America, Oceania, and South America from 1990 to 2010. Between 2000 and 2010, the global net forest area decreased by approximately 52 million hectares [5], about 900 times the size of Ukraine [1] or about 5,500 times the forested area of Ukraine [[1],[7]. Generally, the forest area in the northern hemisphere is stable or is actually increasing, whilst in the southern hemisphere the forest area is decreasing (+. The largest net loss of forest is registered in South America and Africa. Yet, the decreasing forest area has to serve more people as today's world population of 7.6 billion [8] is expected to increase to 9.8 billion in the year 2050 [9] with the largest increases forecasted in Asia and Africa.

FIGURE 3: FOREST COVER IN PERCENTAGE OF TOTAL LAND AREA [6].

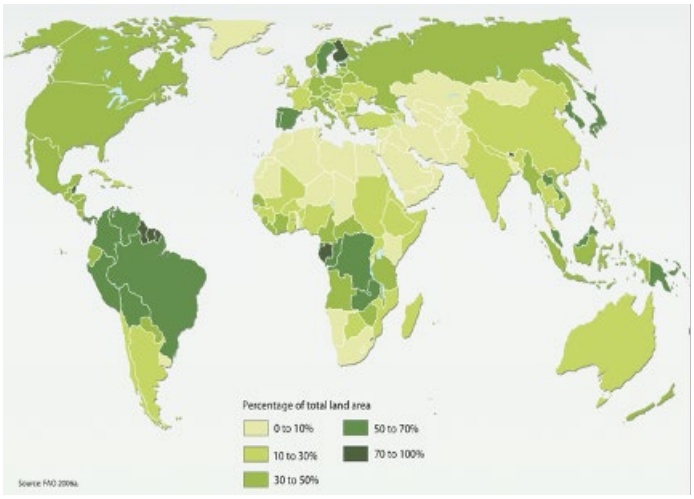


FIGURE 4: TRENDS IN FOREST AREA, 1990-2010 (MILLION HA) [5].

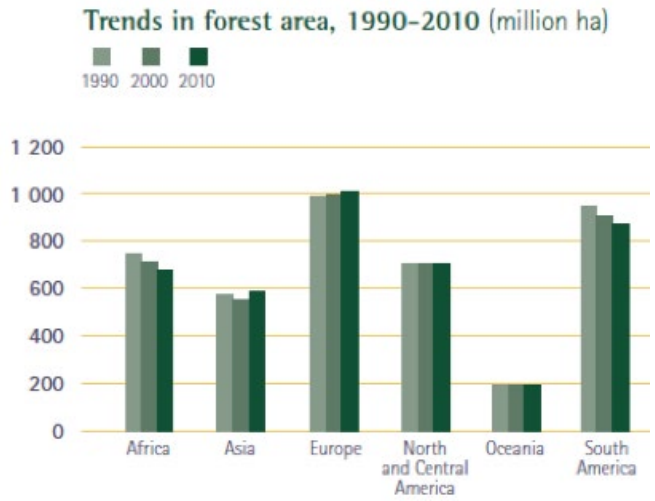
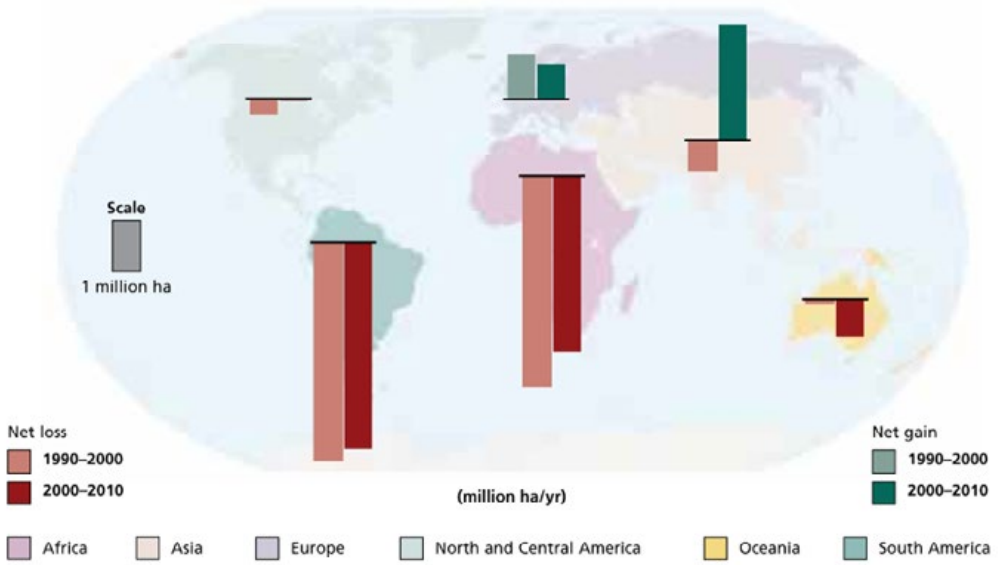


FIGURE 5: PROPORTIONAL ANNUAL CHANGE IN FOREST AREA BY REGION, 1990-2010 [5].



The lives of about 25% of the world population depend directly or indirectly on the forests [11]. Forests offer products and services to fulfil the economic, ecologic and social needs of the people. Unfortunately, practices used to fulfil these needs are not sustainable, thereby inflicting lasting damage to forests. Thus, the increasing demand for food, infrastructure, energy, freshwater, and other products and services provided by forests is in conflict with efforts to reduce deforestation, decrease the greenhouse gas emission, preserve biodiversity, and conserve soil and water. Hence, numerous countries struggle to balance the needs of their society and the preservation of their forests.

Economically, the annual contribution of the forest, wood processing, and pulp and paper industry sectors to the global Gross Value Added[1] (GVA) is about 470 billion US Dollars, corresponding to about 1% of global GVA. While the effective cash contribution of the sector increased slightly between 1990 and 2006, the economical contribution to the Global Gross Domestic Product[2] (GDP) decreased during this period due to stronger growth in other sectors. Table 1 shows the contributions of the various world regions to GVA in 1990 and 2006.

In 2006, the global forest, wood processing, and pulp and paper sector contributed US$468 billion to the global GVA. There is a general agreement that using wood sustainably is advantageous over other forest uses. Wood products use is mostly independent of seasonal fluctuations and demand for the raw material can be quite reliably predicted. The felling of trees is the beginning of a long, diverse value chain in which the resulting wood or wood fibre serves as raw material for countless products and uses, thereby not only offering the utility of given products or services, but also storing carbon until the end of life of a given product. At the same time, if the wood is sourced from a sustainably harvested forest, the new growth starts storing carbon again (about 80% of the terrestrial above-ground carbon is stored in forests ecosystems [14]).

The forestry section of the Food and Agricultural Organization of the United Nations (FAO) gathers and processes data on forests and forest products globally. FAO data includes official member country data, hence introducing errors into their statistics due to the, in some places, considerable volumes of wood and wood products which are harvested and traded unregistered / illegally. However, FAO data is by far the most exhaustive and most pertinent source of information for forest and forest products all over the globe.

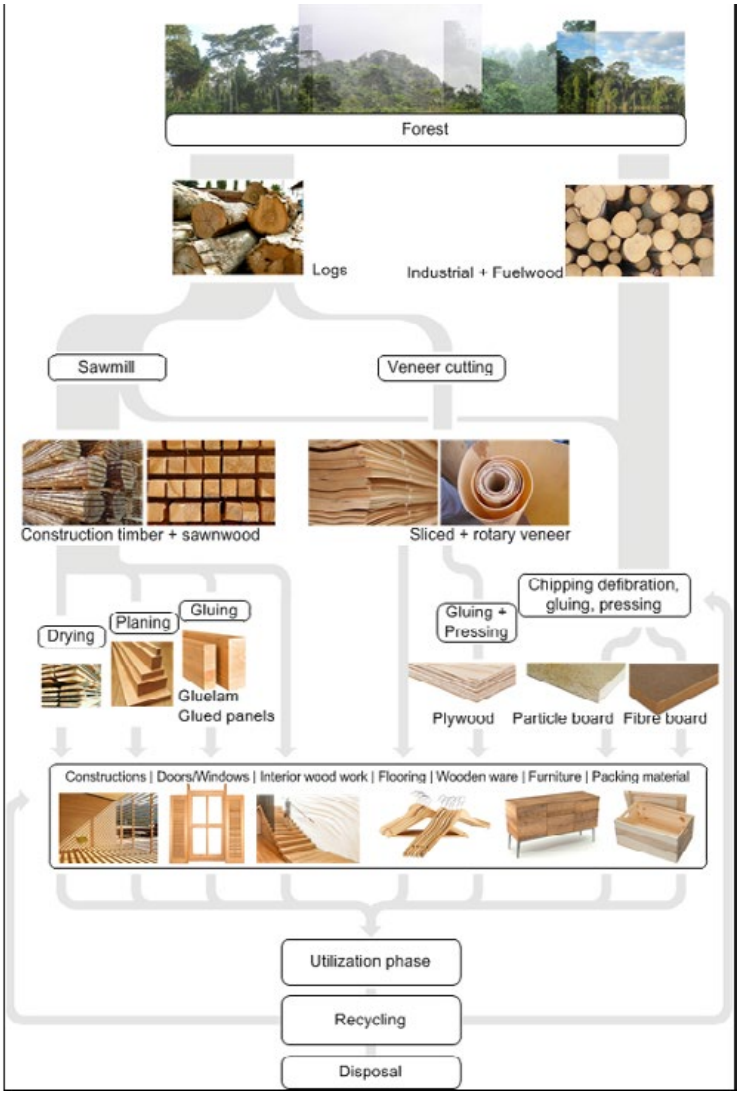
Forests are the origin of wood, among other things. Wood has been and continues to be a critically important material for human civilization, as it is a raw material that is being used for uncountable purposes [12]. The most important forest products can arguably be grouped into the following broad classes: energy wood, industrial round wood, sawn wood, engineered wood, wood pulp and other fibre pulp, recovered paper, paper and paperboard. Due to the enormous portfolio of products made from wood, it is challenging to obtain sound production data. Arguably, the best and most comprehensive database is maintained at the International Trade Centre (ITC), which is based on UN COMTRADE, the world's largest database of trade statistics, maintained by the United Nations Statistics Division (UNSD). Emphasis in this study is given to industrial round wood, sawn wood, engineered wood products categories and all its resulting value-added products, as listed below and as depicted in Figure 6.

[1] Gross value added (GVA) is a measure of the value of goods and services produced in an area, industry or sector of an economy.
[2] Gross domestic product (GDP) is the market value of all officially recognized final goods and services produced within an economy in a given period of time

TABLE 1: GVA OF THE FOREST, WOOD PROCESSING, AND PULP AND PAPER INDUSTRY SECTORS BY REGION FOR 1990 AND 2006 [10].

Region	Roundwood production (US$ billion)		Wood processing (US$ billion)		Pulp and paper (US$ billion)		Total (US$ billion)		Contribution to GDP (%)	
	1990	2006	1990	2006	1990	2006	1990	2006	1990	2006
Africa	6	9	2	2	3	3	11	14	1.7	1.3
Asia and the Pacific	29	33	21	30	40	56	90	119	1.4	1.0
Europe	27	25	57	57	74	60	159	142	1.4	1.0
Latin America and the Caribbean	13	21	6	7	11	12	30	40	2.0	1.9
North America	21	27	35	53	73	67	129	147	1.4	1.0
Western and Central Asia	2	2	1	1	2	2	5	5	0.5	0.3
World	**98**	**118**	**123**	**150**	**202**	**201**	**424**	**468**	**1.4**	**1.0**

FIGURE 6: VALUE CHAIN OF FOREST PRODUCTS FROM HARVESTING TO THE END PRODUCTS [13].



- Round wood
- Sawn wood
- Wood based panels
- Housing and construction wood / Engineered wood
- Value-added wood products, such as:
  - Doors and Windows
  - Interior Work / Flooring
  - Wood components / Furniture
  - Packing Materials

Figure 6 shows the value chain of forest products, which can be grouped into four blocks - forestry, processing, products, and re-utilization:[3]

1. **Raw material / Forestry:** raw materials such as seeds, chemicals, equipment, and water used in the forestry sector.
2. **Processing (primary, secondary, and tertiary) wood industry:** Wood flows from the forests to sawmills, wood-based panel mills, and engineered wood mills (primary producers). Timber and intermediate wood products (components) move to wooden goods manufacturers (secondary producers) that, in turn, obtain inputs from the machinery, hardware, plastics, adhesives, textiles, and paint industries, among others.
3. **End product:** The processed wooden goods industry also draws on design and branding skills from the service sector (tertiary producers). Depending on which market is served, the goods pass through various intermediary buying stages until it reaches the final customer. The buying function is managed by several organizational types including wholesalers, retailers, and independent buyers.
4. **Re-utilized production:** Includes recycling, reusing, and repurposing of the utilized products and their disposal. Dependent on the character of the product and technical opportunities, the re-utilized product can be of numerous different shapes and purposes.

[3] This report uses materials and concepts found in UNIDO 2019 [1] freely to avoid duplication of efforts.

3.2 Global production, consumption, and trade of wood products

Round wood and wood products in general are globally traded products. Overall, the wood processing industry, and, in particular, the value-added wood products industries such as furniture, flooring, or building construction, are a considerable and, mostly, a profitable business worldwide. The wood processing industry has traditionally been a resource- and labour-intensive industry sector including both local craft-based firms and large industrial volume producers. Products from the wood and processed wood sector can be exported at any of the production/ processing stages of the VC.

The global wood and wood products trade is growing, albeit the recent trade disputes may influence this trend over time. Figure 7 and Figure 8 show the biggest exporters (potential competitors) and importers (potential clients) of wood and wood products globally.

However, Figure 7 and Figure 8 do not show the type of product exported or imported, respectively. Yet, from a national economic viewpoint, the value-added content added in a given national economy determines the benefits gained. Therefore, a closer review of major categories of wood and wood products traded globally is given below.

TABLE 2: GLOBAL EXPERTS OF WOOD AND WOOD PRODUCTS 2012 - 2016 (IN EURO THOUSAND) [1], [19].

	Exported value in 2012	Exported value in 2013	Exported value in 2014	Exported value in 2015	Exported value in 2016
World	92,559,366	99,280,611	104,337,478	112,225,818	115,511,163

FIGURE 7: MAP OF NET EXPORTING NATIONS OF WOOD AND WOOD PRODUCTS GLOBALLY 2016 [1], [19].

FIGURE 8: MAP OF NET IMPORTING NATIONS OF WOOD AND WOOD PRODUCTS GLOBALLY 2016 [1], [19].

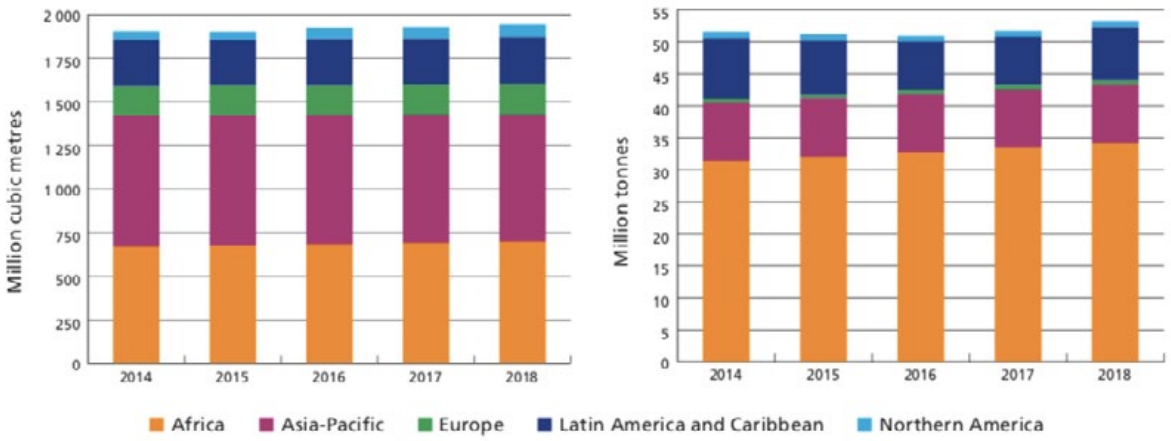
3.2.1 Global production, consumption and trade of round wood

The availability, production and trade of round wood are important indicators of activity of the international wood sector. However, although the sale of round wood creates only limited value added, most developing countries still export large volumes of round wood. Reasons may include unfavourable framework conditions for investments, limited access to capital, limited market access, lack of qualified labour, corruption, high taxes, to name a few. Interestingly, countries like China preserve their own forest resources and import large volumes of round wood for further processing and subsequent export or domestic consumption.

FAO defines two subgroups of round wood [15]. These are industrial round wood (sawn logs, veneer logs, wood for chips and particles, and pulpwood) and fuel wood. According to the FAO database, in 2018, the production of round wood has reached 3.97 billion m^3 (a 27% increase from 1980) of which 2.03 billion m^3 (51%) are industrial round wood and 1.94 billion m^3 are fuel wood (49%) [16]. Large volumes of fuel wood are being used in Asia, Africa, and Central and South America, where fuelwood is an important energy source. Definitely, a potential for conflict exists between the two major uses of the round wood resource - industrial and fuel. However, the value difference between these two uses tends to give preference to industrial uses.

Wood fuel production accounts for 90% of round wood harvest in Africa, 58% in the Asia-Pacific region, 51% in Latin America and in the Caribbean, 21% in Europe, and 12% in Northern America [17]. Except for North America, where the share of fuel wood increased from 8% to 12% of total round wood harvest, these shares remained fairly consistent over

FIGURE 9: GLOBAL FUEL WOOD (LEFT) AND WOOD CHARCOAL PRODUCTION (RIGHT) BY WORLD REGION 2014 – 2018 [17].



the past 5 years. In North America, considerable interest in using biomass for power generation in North America and for export mostly to Europe exist. Figure 9 shows the global fuel wood and wood charcoal production by world region for 2014 to 2018.

In 2018, industrial roundwood removals grew at a healthy 8.9% compared to 2014, with Europe (including the Russian Federation) harvesting 650 million m3 (32%), North America and the Asia Pacific region 519 million m3 each (25% each), Latin America and Caribbean 261 million m3 (13%) and Africa 79 million m3, respectively [17]. Roughly 7% of total industrial roundwood production (138 million m3) was traded, with Asia-Pacific being the largest net importer, mainly from North America and Europe [17]. Export activity of industrial roundwood is relatively small in general, with only 20-25 countries exporting more than 1 million m^3 per year. New Zealand became the largest exporter of industrial round wood in 2018, followed by the Russian Federation, United States of America, Czechia, and Canada. Figure 10 shows global industrial roundwood removal (right) and net trade by region (left) from 2014 – 2018. The large demand of the Asia-Pacific region for industrial roundwood is clearly visible on the net trade flow graph on the right side.

Figure 11 shows the five largest industrial round wood producers globally, who are, in descending order, the United States of America, the Russian Federation, China, Brazil and Canada. These five producers produced over 1 billion m^3 (53%) of total industrial round wood [17]. Figure 12 shows the five largest consumers of industrial roundwood (which are also the largest producers, showing the minor role that round wood exports play in global markets), with the United States consuming 356 m^3, China 240 million m^3, the Russian Federation 200 million m^3, Brazil, and Canada 150 million m^3, respectively ([17].

FIGURE 10: GLOBAL INDUSTRIAL ROUNDWOOD REMOVAL (LEFT) AND NET TRADE (RIGHT) BY REGION 2014 – 2018 [17].

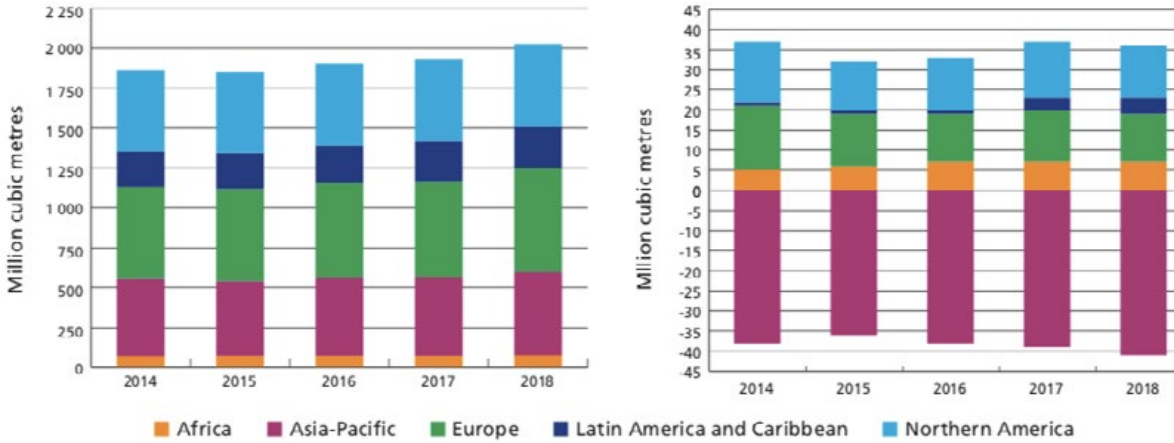


FIGURE 11: THE FIVE LEADING NATIONS WITH LARGEST INDUSTRIAL ROUND WOOD REMOVAL GLOBALLY, 2014 - 1018 [17].

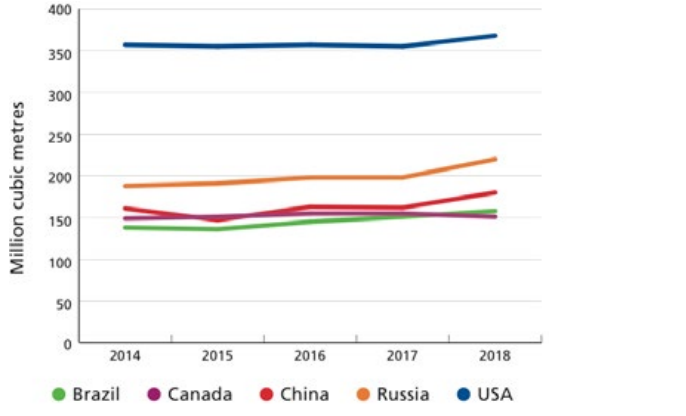
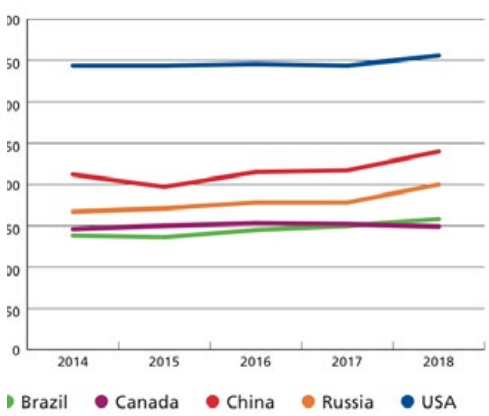


FIGURE 12: THE FIVE LEADING INDUSTRIAL ROUND WOOD CONSUMING NATIONS GLOBALLY, 2014 - 2018 [17].



Unlike other forest products, where global trade is sizeable, round wood exports are relatively insignificant, also since in many localities round wood exports are banned. Round wood exports on a volume basis are largest from New Zealand, the Russian Federation, the United States, Czechia, and Canada for a combined total of 68 million m³ [17]. In 2018, Czechia had to remedy a bark beetle infestation leading to a short-term oversupply of logs but would normally export less industrial round wood. Figure 13 shows the volume (million m³) exported by the five leading round wood exporting nations 2014 - 2018. Figure 14 shows the volume (million m³) imported by the five leading round wood importing nations 2014 - 2018. The dominant role of China stands out as it is by far the largest importer of industrial round wood (reaching 60 million m³ in 2018), thus, China is importing roughly 25% of its total consumption [17]. With a sizeable distance, other sizeable importers of industrial round wood include Austria, Germany, Sweden and Finland (Figure 14).

FIGURE 13: THE FIVE LEADING ROUND WOOD EXPORTING NATIONS GLOBALLY, 2014 - 2018 [17]

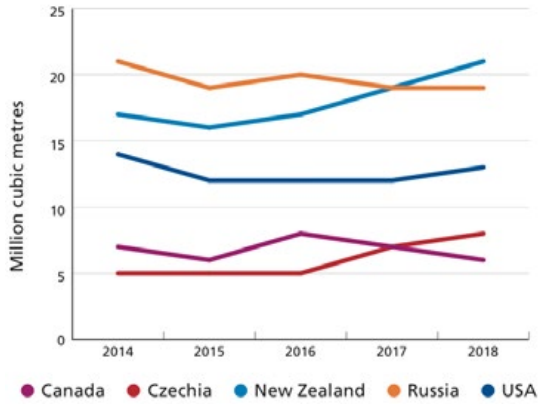
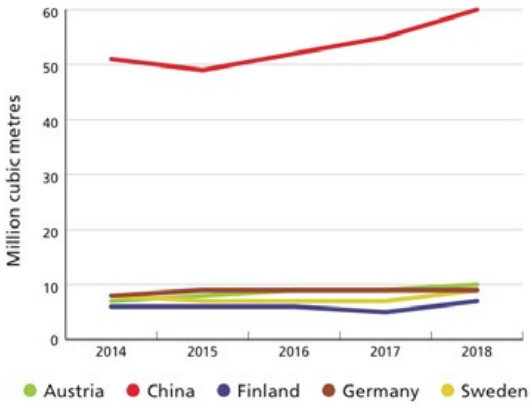


FIGURE 14: THE FIVE LEADING ROUND WOOD IMPORTING NATIONS GLOBALLY, 2014 - 2018 [17].



3.2.2 Global production, consumption and trade of sawn wood

After harvesting, sawing logs into lumber (sawn wood) is a first process step adding value to the product. The first wood product that creates a higher added value in the wood processing chain is sawn wood. According to FAO definitions, sawn wood comprises planks, beams, boards, laths, sleepers, etc. that exceed 5 mm in thickness. It can be raw, planed, grooved, chamfered, etc., but excludes wooden flooring which is defined as a different finished product [15].

In 2018 the total global production of sawn wood reached 493 million m³. About 354 million m³ (72%) were from coniferous tree species and 139 million m³ (28%) were from non-coniferous trees. Taking into account that globally twice the amount of non-coniferous round wood is harvested than coniferous round wood, it appears that a higher percentage of coniferous round wood is processed for higher value uses than are non-coniferous round wood. This may be related to the shape, straightness, weight, anatomical and other biological differences between coniferous and non-coniferous trees and, possibly, the locations of processing centres for the resource.

Regionally, in 2018, Europe produced the largest volume of sawn wood (170 million m³ , 31% of total), followed by Asia-Pacific (151 million m³, 31%), North America (129 million m³, 26%), Latin America and the Caribbean (32 million m³, 6%), and Africa (11 million m³, 2%) [17]. Figure 15 shows the global sawn wood production (left) and the net trade by regions 2014 – 2018. Thirty-one percent of total sawn wood production (155 million m³) was traded in 2018, with trade occurring mostly in and between Northern America, Asia-Pacific, and Europe. Africa and Asia-Pacific are the main importing regions, as visible in Figure 15 (left), where Asia-Pacific and Africa have negative net trade flow.

FIGURE 15:GLOBAL SAWN WOOD PRODUCTION (LEFT) AND NET TRADE OF SAWN WOOD (RIGHT) BY REGION 2014 – 2018 [17].

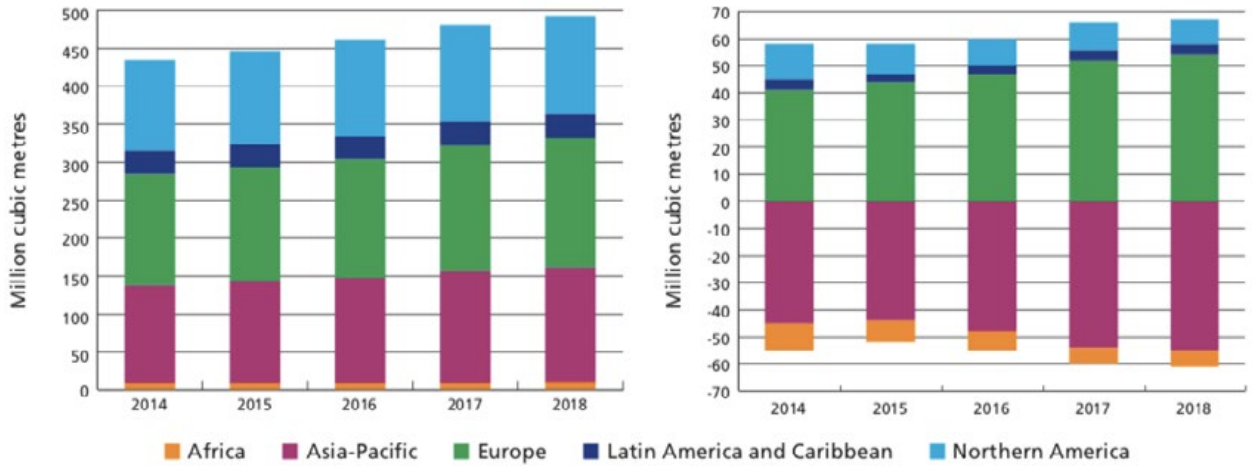


FIGURE 16: THE FIVE LEADING NATIONS IN SAWN WOOD PRODUCTION GLOBALLY, 2014 - 1018 [17].

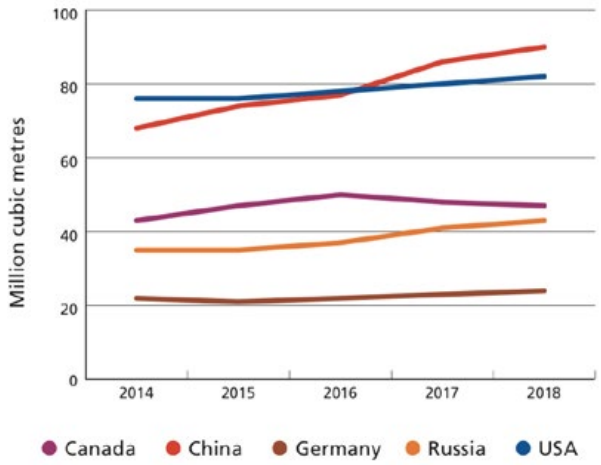
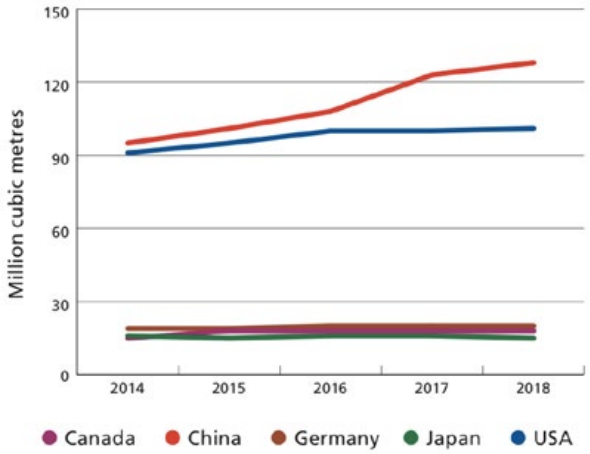


FIGURE 17: THE FIVE LEADING INDUSTRIAL SAWN WOOD CONSUMING NATIONS GLOBALLY, 2014 - 2018 [17].



As can be seen in Figure 16, China, the United States, Canada, the Russian Federation, and Germany are the largest sawn wood producers, globally, which combined produced 58% (286 million m3) of all sawn wood in 2018 [17]. China's production increased 32% from 2014 to 2018, making it the largest sawn wood producer globally. Figure 17 shows the five largest sawn wood consumers globally, with China and the United States, the two leading producers of sawn wood, also being the leading consumers. China, in 2018, consumed 128 million m3 sawn wood, the United States 101 million m3, followed by Germany, Canada, and Japan, which each consumed less than one-third of either China or the United States [17].

In 2018, the Russian Federation overtook Canada as the leading exporter of sawn wood ([17], Figure 18). Together, the five leading sawn wood exporters (the Russian Federation, Canada, Sweden, Finland, and Germany exported 92 million m3 of sawn lumber in 2018. Canada's sawn wood exports declined starting in 2017 due to the dispute over the Softwood Lumber Agreement with the United States, it's main export market. On the import side, in 2018, China imported 38 million m3 and the United States imported 27 million m3 of sawn wood, followed by the United Kingdom, Japan, and Germany ([17], Figure 19). Combined, these five leading importers imported 55% (84 million m3) of all sawn wood imported globally in 2018.

FIGURE 18: THE FIVE LEADING SAWN WOOD EXPORTING NATIONS GLOBALLY, 2014 - 2018 [17].

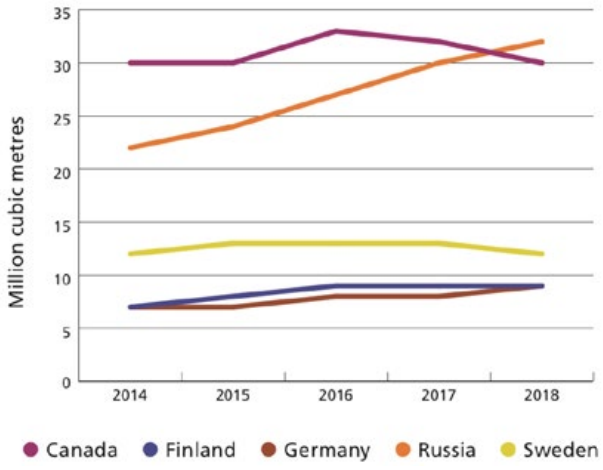
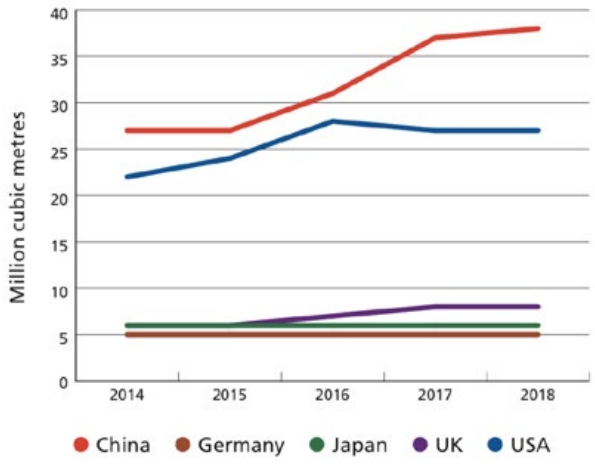


FIGURE 19: THE FIVE LEADING SAWN WOOD IMPORTING NATIONS GLOBALLY, 2014 - 2018 [17].



3.2.3 Global production, consumption and trade of wood-based panels

According to FAO definitions, the category of wood-based panels includes particleboards, fibreboards, oriented strandboard (OSB), plywood and veneer sheets [15]. Wood based panels have seen considerable increase in production and consumption over the past decades. In the 2018, the total production of particleboard fibreboard and plywood reached a volume of 408 million m^3 [17]. Comparing this growth with the rather stagnant production of round wood and sawn wood, it is evident that wood-based panels are increasingly replacing solid wood in many areas of application. Wood based panels have developed to a sector with a high market potential because of two main technological advantages. First, it is now possible to use a large variety of resources as basic materials for the wood-based panel production. Second, it is possible to control the properties of wood-based panels with regards to swelling and shrinking, homogeneity, and weight, to name a few.

More than half of the total production of wood-based panels occurs in the Asia-Pacific region, with China being the largest producer of wood based panel overall. The Asia-Pacific region, in 2018, produced 61% of global production (248 million m^3), followed by Europe (22%, 48 million m^3), Northern America (12%, 48 million m^3), Latin America and the Caribbean (4%, 19 million m^3), and Africa (1%, 3 million m^3) [17]. Figure 20 shows the global wood-based panel production and the net trade of wood-based panels for 2014 – 2018. Northern America and Africa have a negative net trade balance, while the Asia-Pacific region, Europe, and Latin America and the Caribbean have positive balances (right graphic, Figure 20). Asia-Pacific and Europe dominate the international trade in wood-based panels, with 71% of all imports and 82% of all exports.

China is the largest producer of wood-based panels by far, followed by the United States of America, the Russian Federation, Germany, and Canada (Figure 21). China accounted for roughly 50% of global production, with the remaining four countries contributing roughly 19% combined [17]. However, China is also the world's largest consumer of wood-based panels by far (Figure 22). China is followed by the United States of America, the Russian Federation, Germany, and Poland.

FIGURE 20: GLOBAL WOOD-BASED PANEL PRODUCTION (LEFT) AND NET TRADE OF WOOD-BASED PANEL (RIGHT) BY REGION 2014 – 2018 [17].

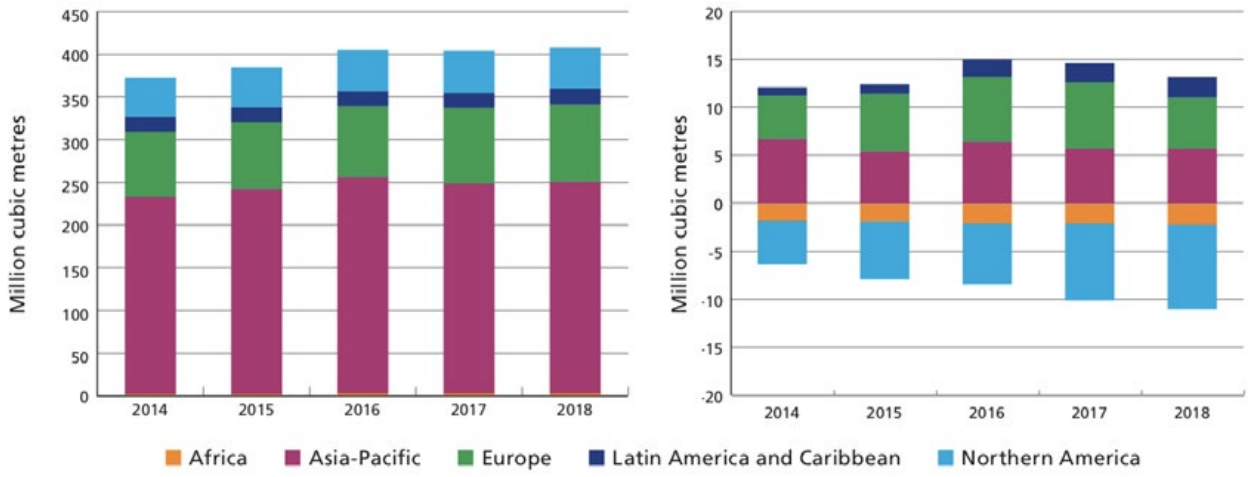


FIGURE 21: THE FIVE LEADING NATIONS IN WOOD-BASED PANEL PRODUCTION GLOBALLY, 2014 - 1018 [17].

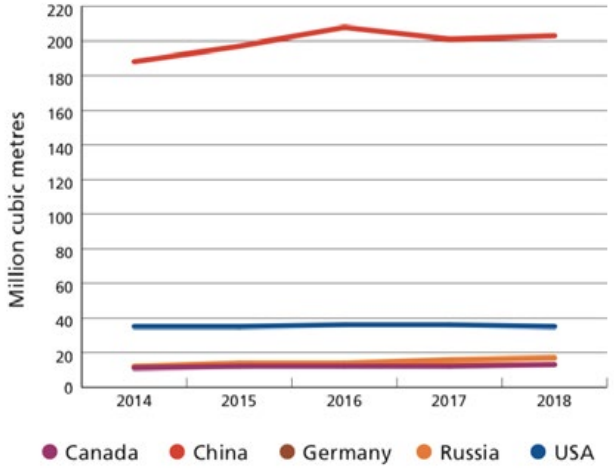


FIGURE 22: THE FIVE LEADING INDUSTRIAL WOOD-BASED PANEL CONSUMING NATIONS GLOBALLY, 2014 - 2018 [17].

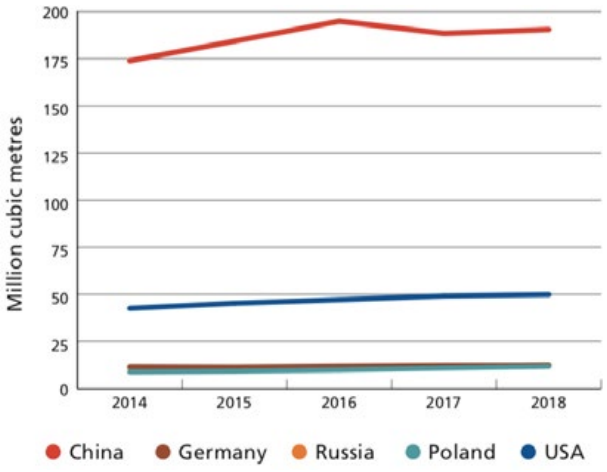


FIGURE 23: THE FIVE LEADING WOOD-BASED PANEL EXPORTING NATIONS GLOBALLY, 2014 - 2018 [17].

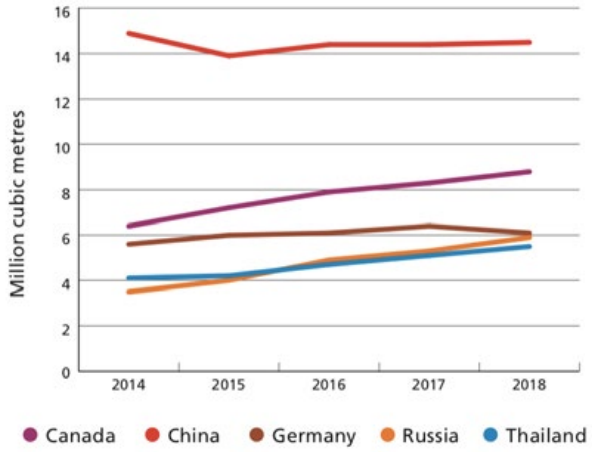
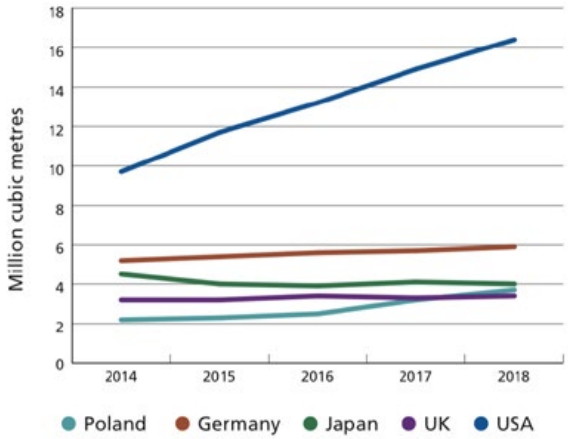


FIGURE 24: THE FIVE LEADING WOOD-BASED PANEL IMPORTING NATIONS GLOBALLY, 2014 - 2018 [17].



Forty-four percent of global exports (41 million m3) of wood-based panels derive from China, Canada, the Russian Federation, and Thailand (Figure 23). The Russian Federation saw large gains in exporting wood-based panels (71% between 2014 and 2018), as did Thailand (33% between 2014 and 2018) [17]. In 2018, the United States of America were the largest importer of wood-based panels, followed by Germany, Japan, Poland, and the United Kingdom (Figure 24, [17]).

As pointed out above, wood-based panels comprise of particleboards, fibreboards, oriented strandboard (OSB), plywood and veneer sheets [15]. Large regional differences in the use of the different types of wood-based panels exist. OSB, for example, is widely used and produced in North America and is becoming more common in Europe, while it still has to take hold in other regions. Volume-wise, plywood (including blockboard and Laminated Veneer Lumber (LVL)) is the largest wood-based panel group with 163 million m3 (40% of total). In 2018, 408 million m3 of wood-based panels were produced in the following categories [18]:

Plywood: 163 million m³ worldwide:

72% China, 7% United States of America,
3% Russian Federation, 2% Japan, 1% Canada

Particleboards: 97 million m³ worldwide:

28% China, 9% Russian Federation, 6% Germany,
5% Poland, 4% United States of America

MDF[4]/HDF[5]: 100 million m³ worldwide:

56% in China, 4% Poland, 3% Thailand,
the Russian Federation, and the United States of America

OSB: 32 million m3 worldwide:

43% United States of America, 27% Canada,
4% Russian Federation and Germany, 3% Poland

When looking at trade in these commodities on a value (US$) basis (as opposed to the volume basis above), the availability of data changes somewhat. Data on global trade can be found on the International Trade Centre's (ITC) trade map system [19]. However, ITC does use the Harmonized Commodity Description and Coding Systems (HS) [20], which does not correspond one on one with the FAO classification of wood products [15]. Thus, ITC data provides insights into the following groups of wood-based panels:

Code 4412: Plywood, veneered panel and similar laminated wood (excluding sheets of compressed wood, cellular wood panels, parquet panels or sheets, inlaid wood and sheets identifiable as furniture components).

Code 4410: Particle board, oriented strand board "OSB" and similar board "e.g. waferboard" of wood or other ligneous materials, whether or not agglomerated with resins or other organic binding substances (excluding fibreboard, veneered particle board, cellular wood panels and board of ligneous materials agglomerated with cement, plaster or other mineral bonding agents)

Code 4411: Fibreboard of wood or other ligneous materials, whether or not agglomerated with resins or other organic bonding agents (excluding particle board, whether or not bonded with one or more sheets of fibreboard; laminated wood with a layer of plywood; composite panels with outer layers of fibreboard; paperboard; furniture components identifiable as such)

Note that under the Harmonized Commodity Description and Coding System (HS), particle board is grouped together with OSB and other, similar products, and MDF/HDF is grouped with all other fibre boards [20].

In 2018, plywood, the largest wood-based panel group according to FAO statistics based on production volume [18], was also an extensively traded commodity. According to ITC data [19], over US$16 billion worth of plywood was imported globally in 2018 (Table 3). The United States of America were the largest importer of plywood, followed by Japan, Germany, the Republic of Korea, and the United Kingdom. China was the largest exporter of plywood according to ITC data (Table 3), followed by Indonesia, the Russian Federation, Malaysia, and Brazil [19].

In 2018, almost US$10 billion wood-based panels classified as "particleboard," which includes OSB according to the Harmonized Commodity Description and Coding System (HS) [20], were imported (Table 4). The largest importing country were the United States of America, followed by Germany, Poland, the United Kingdom, and Italy [19]. Major exporters, according to ITC include Canada, Austria, Germany, France, and the Russian Federation (Table 4).

In 2018, the United States of America was the largest

[4] MDF is an abbreviation for Medium Density Fiberboard (MDF), a wood-based panel product

[5] HDF is an abbreviation for Medium Density Fiberboard (HDF), a wood-based panel product

importer of fibreboard (Table 5) [19], which includes MDF/HDF according to the Harmonized Commodity Description and Coding System (HS) [20]. The United States of America were followed by Germany, France, the United Kingdom, and Canada. Conversely, the largest fibreboard exporting nation in 2018 was Germany, followed by China, Poland, Belgium, and Thailand (Table 5) [19].

TABLE 3: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR PLYWOOD (HS 4412) IN 2018. [19]

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$16,789,714	$747,164		World	$17,536,878	$747,164
1	United States of America	$3,592,376	($3,244,624)	1	China	$5,551,667	$5,396,006
2	Japan	$1,750,659	($1,685,776)	2	Indonesia	$2,059,602	$2,024,686
3	Germany	$1,002,513	($669,280)	3	Russian Federation	$1,354,809	$1,312,938
4	Korea, Republic of	$897,209	($893,646)	4	Malaysia	$1,134,711	$850,560
5	United Kingdom	$766,047	($719,136)	5	Brazil	$774,768	$773,087
6	Netherlands	$461,824	($366,246)	6	Viet Nam	$665,194	$470,762
7	France	$428,664	($235,357)	7	Finland	$659,389	$595,779
8	Canada	$420,217	($35,580)	8	Chile	$440,602	$383,267
9	Mexico	$366,792	($358,824)	9	Canada	$384,637	($35,580)
10	Australia	$352,208	($347,955)	10	United States of America	$347,752	($3,244,624)
62	Ukraine	$30,586	$24,914	31	Ukraine	$55,500	$24,914

TABLE 4: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR PARTICLEBOARD (HS 4412) IN 2018. [19]

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$16,789,714	$747,164		World	$17,536,878	$747,164
1	United States of America	$3,592,376	($3,244,624)	1	China	$5,551,667	$5,396,006
2	Japan	$1,750,659	($1,685,776)	2	Indonesia	$2,059,602	$2,024,686
3	Germany	$1,002,513	($669,280)	3	Russian Federation	$1,354,809	$1,312,938
4	Korea, Republic of	$897,209	($893,646)	4	Malaysia	$1,134,711	$850,560
5	United Kingdom	$766,047	($719,136)	5	Brazil	$774,768	$773,087
6	Netherlands	$461,824	($366,246)	6	Viet Nam	$665,194	$470,762
7	France	$428,664	($235,357)	7	Finland	$659,389	$595,779
8	Canada	$420,217	($35,580)	8	Chile	$440,602	$383,267
9	Mexico	$366,792	($358,824)	9	Canada	$384,637	($35,580)
10	Australia	$352,208	($347,955)	10	United States of America	$347,752	($3,244,624)
62	Ukraine	$30,586	$24,914	31	Ukraine	$55,500	$24,914

TABLE 5: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR FIBREBOARD (HS 4411) IN 2018 [19]

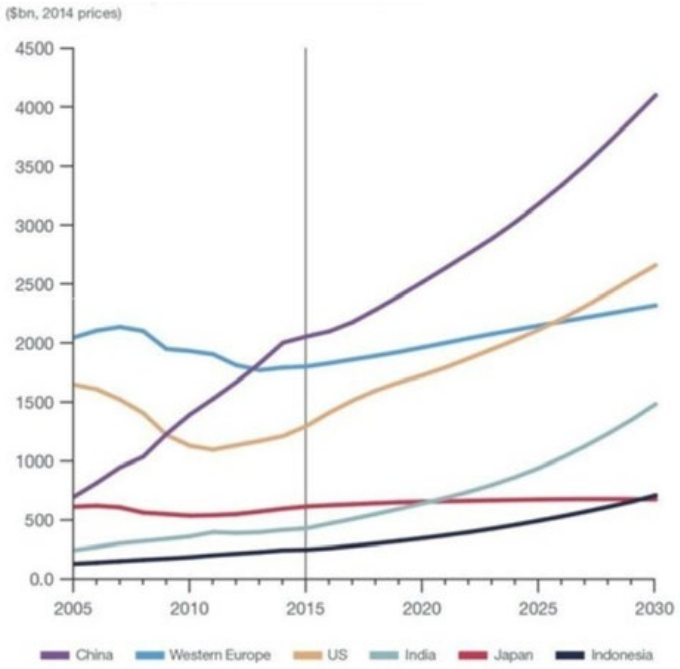
#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$10,214,254	$100,825		World	$10,315,079	$100,825
1	United States of America	$1,307,201	($1,086,704)	1	Germany	$1,989,231	$1,508,279
2	Germany	$480,952	$1,508,279	2	China	$1,119,854	$978,355
3	France	$457,294	($113,308)	3	Poland	$690,060	$457,556
4	United Kingdom	$435,820	($406,869)	4	Belgium	$634,862	$358,414
5	Canada	$410,393	($60,457)	5	Thailand	$601,328	$589,916
6	Italy	$343,007	($202,804)	6	Austria	$354,593	$226,059
7	Netherlands	$318,978	($233,253)	7	Turkey	$353,122	$308,950
8	Belgium	$276,448	$358,414	8	Canada	$349,936	($60,457)
9	Japan	$264,755	($259,984)	9	France	$343,986	($113,308)
10	Iran, Islamic Republic of	$240,946	($217,661)	10	Russian Federation	$340,437	$121,080
26	Ukraine	$120,618	($94,997)	35	Ukraine	$25,621	($94,997)

3.2.4 Global production, consumption and trade of construction wood / engineered wood

Defining the global volumes and values of wood and wood-based products used in the construction sector is challenging, as other, related products (e.g., lumber) are also used for different purposes outside the construction sector (e.g., interior design, furniture, oil drilling, etc.).

In developed countries, the construction sector is the main consumer of wood and wood-based products. In Switzerland, for example, a country with a long and rich tradition of constructing with wood, about 45% of the wood (excluding energy wood) [13] is used in the form of beams, boards, finger jointed structural wood, glulam, laminated veer lumber, form work, to name a few, for construction of all types of structures. While solid wood products are mainly made with coniferous species, wood-based panels are produced with coniferous and non-coniferous species. A useful overview of future market potentials can be achieved by considering, on the one hand the development of the whole construction sector, and on the other hand the production and importation of some key wood / wood-based products.

FIGURE 25: MARKET SIZE OF THE SIX TOP GLOBAL CONSTRUCTION MARKETS [21].



China is the most important and largest construction market globally, followed by Western Europe and the United States [21]. As China has a policy of preserving its own forest resources, the country is highly dependent on imports to satisfy the fast-growing construction sector. This is confirmed by China's increasing demand for round wood, sawn wood and wood-based panels as shown above. Figure 25 shows the 6 most important construction markets from 2005 to 2030, with all data after 2015 being forecasted [21].

Figure 25 shows that China, the United States of America, and India are forecasted for strong growth, more so than for Western Europe, Japan or Indonesia [21]. Globally, the economic crisis from 2007 to 2009, led to a dramatic decline of the construction sector. Even today, the US housing market has not reached pre-crisis level, with housing construction still well below pre-crisis levels [22]. The Canadian housing market is in a better state, although housing starts show signs of a slow-down [23]. The European housing construction market is relatively stable with projected growth rates of 2.0% for 2020 [24]. Generally, the construction activity in the northern EU countries is better than it is in the southernmost EU countries. Russia did implement its 2011- 2015 housing programme, which increased annual construction levels. However, the Institute of Urban Economics (Russia) estimates that 45% – 48% of Russians cannot afford their own housing, yet are still too rich to qualify for social housing [25]. With approximately 80 million m2 of housing construction in 2016, large volumes of wood and wood-based products are needed for construction. However, with Russia having the largest forested area globally, the country has the largest forest resources in the world and can, therefore cover its needs largely with its own materials.

3.2.5 Global production, consumption and trade of builder's joinery and carpentry

According to the Harmonized Commodity Description and Coding System (HS) product code 4418 encompasses "Builder's joinery and carpentry, of wood, incl. cellular wood panels, assembled flooring panels, shingles and shakes, of wood (excluding plywood panelling, blocks, strips and friezes for parquet flooring, not assembled, and prefabricated buildings [20]. Thus, builder's joinery and carpentry often are made with wood-based panels and other wooden materials. The United States of America, in 2018, was the largest importer of joinery / carpentry products for the building sector with US$ 2.4 billion [26]. The United States of America was followed by Japan (US$ 1.6 billion), Germany (US$ 1.3 billion), the United Kingdom (US$ 1.0), and France (US$ 0.6 billion), making these five countries the world's leading importing countries of joinery / carpentry products in 2018 (Figure 26, Table 6). Almost half of the imports to the United States of America originate in adjoining Canada and, to a far lesser extent, Mexico (48.0%, Table 6). Another third of the imports to the United States come from Asia (30.7%), followed by Latin America (14.2%) and Europe (7.6%). Japan obtains more than two thirds (72.0%) of its imported joinery / carpentry products from Asia with most of the rest coming from Europe (25.8%, Table 6). The three European nations all get large shares of their imported joinery / carpentry products from other European nations (Germany 88.0%, United Kingdom 62.0%, France 85.0%), with the rest coming mostly from Asia (Table 6).

FIGURE 26: FIVE LEADING IMPORTERS OF JOINERY / CARPENTRY PRODUCTS 2014 - 2018 [26].

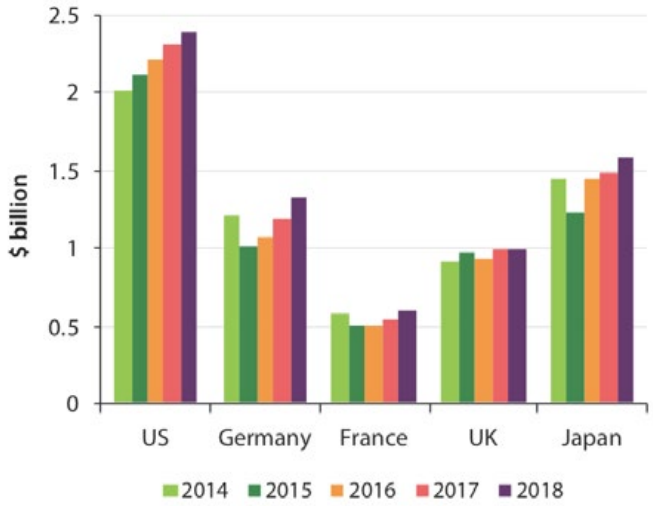


Table 7 shows the data for the same product code (CS 4418) using International Trade Center UNCTAD/WTO (ITC) data [19]. Depending on the exact definition on which products are included in the statistical data, the figures of key countries may differ slightly between the FAO/UNECE data (Table 6) and the UNCTAD/WTO (ITC) data (Table 7). However, Table 7, lists the five largest importers as United States of America, Japan, Germany, United Kingdom, and, Switzerland (as opposed to France in Table 6). Interestingly, when exporters are not listed as regions (as in Table 6), Austria becomes the largest exporting country of joinery / carpentry products, followed by Poland, Germany, Canada, and China [19].

TABLE 6: VALUE OF BUILDERS' JOINERY AND CARPENTRY IMPORTS, AND MARKET SHARE OF SUPPLYING REGIONS FOR THE TOP 5 IMPORTING COUNTRIES, 2017-2018 (VALUE IN BILLION US DOLLARS AND MARKET SHARE PERCENTAGE) [26].

	US		*Germany*		*France*		*UK*		*Japan*	
	2017	*2018*	*2017*	*2018*	*2017*	*2018*	*2017*	*2018*	*2017*	*2018*
Total value of imports	2.3	2.4	1.2	1.3	0.5	0.6	1.0	1.0	1.5	1.6
					Origin (%)					
Asia	30.7	29.9	12.3	11.6	9.7	11.1	31.8	33.2	69.5	72.0
Europe	6.5	7.6	87.1	88.0	87.2	85.0	64.0	62.7	27.7	25.8
North America	49.8	48.0	0.3	0.2	0.5	0.5	1.0	0.9	1.6	1.2
Latin America	12.6	14.2	0.0	0.0	1.0	1.8	1.7	1.5	0.0	0.0
Others	0.4	0.4	0.3	0.2	1.6	1.6	1.6	1.6	1.2	1.0

TABLE 7: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR WOODEN BUILDER'S JOINERY AND CARPENTRY (HS 4418) IN 2018 [19].

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$14,949,677	($459,264)		World	$14,490,413	($459,264)
1	United States of America	$2,386,787	($1,982,186)	1	Austria	$1,475,896	$1,171,555
2	Japan	$1,572,922	($1,558,803)	2	Poland	$1,435,113	$1,254,624
3	Germany	$1,329,822	$35,149	3	Germany	$1,364,971	$35,149
4	United Kingdom	$993,031	($901,045)	4	Canada	$1,193,283	$818,604
5	Switzerland	$760,650	($704,292)	5	China	$1,160,746	$1,058,917
6	France	$600,989	($487,977)	6	Italy	$449,657	($150,009)
7	Italy	$599,666	($150,009)	7	Indonesia	$441,352	$433,712
8	Norway	$526,888	($481,646)	8	Sweden	$412,039	$513
9	Netherlands	$462,445	($205,967)	9	United States of America	$404,601	($1,982,186)
10	Denmark	$418,257	($100,851)	10	Estonia	$367,397	$319,042
62	Ukraine	$19,773	$154,478	24	Ukraine	$174,251	$154,478

3.2.6 Global production, consumption and trade of profiled wood (mouldings)

Similarly to joinery / carpentry products, the United States of America, Germany, France, the United Kingdom, and Japan are the leading importers of profiled wood products (Figure 27, Table 8). Fifty-eight percent of imports to the United States of America in 2018 originated in Latin America, where Brazilian and Chilean pine plantations delivered the raw material. Latin America was followed by Asia with 26.4%, where China gas gained considerable market share and by now is the second largest single supplier after Brazil [26]. Interestingly, intra-continental trade in North America only covered 10.7% of the United States of America imports of profiled wood products, while all major European importer nations (Germany, France, and the United Kingdom) covered more than half of their imports from their continent (Table 8). Likewise, Japan imported over 70.0% of its need of profiled wood products from Asia, followed by Europe (11.8%).

FIGURE 27: FIVE LEADING IMPORTERS OF PROFILED WOOD PRODUCTS 2014 – 2018 [26].

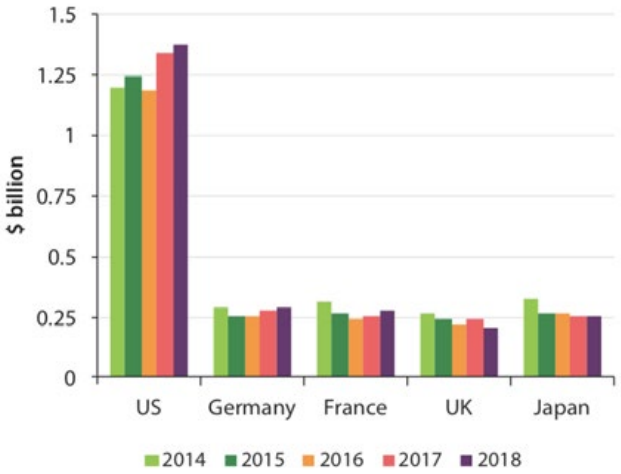


TABLE 8: PROFILED WOOD IMPORTS FOR THE TOP 5 IMPORTING COUNTRIES, 2014-2018 [26].

	US		*Germany*		*France*		*UK*		*Japan*	
	2017	*2018*	*2017*	*2018*	*2017*	*2018*	*2017*	*2018*	*2017*	*2018*
Total value of imports	1.3	1.4	0.3	0.3	0.2	0.3	0.2	0.2	0.3	0.3
					Origin (%)					
Asia	26.4	31.5	20.0	20.5	7.2	7.7	40.1	42.9	75.0	74.3
Europe	4.1	4.6	74.8	73.6	64.4	60.3	54.9	52.2	10.7	11.8
North America	10.7	8.3	0.6	0.6	0.6	0.6	3.4	3.3	9.7	9.6
Latin America	58.0	55.0	3.7	4.5	26.5	30.6	1.4	1.2	4.4	4.0
Others	0.8	0.7	0.9	0.8	1.2	0.8	0.3	0.3	0.3	0.3

3.2.7 Global production, consumption and trade of glulam, I-beams, LVL and CLT

Glulam (glued laminated timber), I-beams (also referred to as I-joists), LVL (laminated veneer lumber) and CLT (crosslaminated timber) are all products used mostly for building construction. Hence, these products are highly dependent on construction activities (also see 3.2.4 Global production, consumption and trade of construction wood / engineered wood). Comprehensive global data for all the above engineered wood products is unavailable, but regional data exist. Also, Figure 28 shows a dated snapshot of consumption of glulam by region in 2012. Europe is most likely still the largest user of glulam products, followed by Asia, but glulam production in North America, which collapsed during the great recession, has recovered somewhat and is a larger proportion of the global consumption as is shown in Figure 28 [26][27]. In 2018, Austria was the largest glulam producer in Europe (1.5 million m^3 in 2015), with a large share of its products being exported (with Italy being the largest importer of Austrian glulam). In North America, overall production of glulam is estimated at 468,000 m^3 in 2018, with the vast majority (>90%) in the United States of America (Table 9 [26]).

FIGURE 28: GLOBAL CONSUMPTION OF GLULAM PRODUCTS 2002 – 2012 [27].

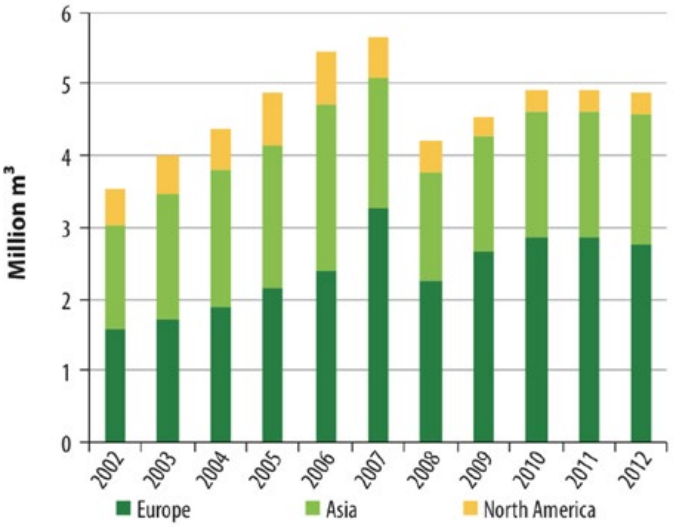


TABLE 9: GLULAM PRODUCTION AND CONSUMPTION IN NORTH AMERICA (2016 – 2017, FORECAST [26].

	2016	2017	2018f	Change (%) 2016-2017
US				
Production	416.9	432.3	432.3	3.7
Total consumption	421.5	436.9	438.5	3.6
Residential	246.2	258.5	258.5	5.0
Non-residential	153.8	156.9	158.5	2.0
Industrial, other	21.5	21.5	21.5	0.0
Inventory change	-4.6	-4.6	-6.2	0.0
CANADA				
Production	30.8	35.4	33.8	15.0
NORTH AMERICA				
Total production	447.7	467.7	466.2	4.5

Notes: f = forecast. Conversion factor: 1 m^3 = 650 board feet. Canadian imports are assumed to be minimal.

To a large degree, I-beams and Laminated Veneer Lumber (LVL) are North American products which have struggled to gain a global foothold. However, Cross Laminated Timber (CLT), originally invented in Switzerland in the 1980s, has become a globally used product with high forecasted growth potential. According to Zion Market Research, the global CLT market is expected to reach US$ 1,6 billion in 2024 up 260% from US$ 603 million in 2017 [26]. Europe's share of the global CLT market has been estimated at about 60%, with manufacturing centred in Austria, Germany and Switzerland. However, manufacturing capacity has been built and is being built in the Russian Federation, in North America, and in Japan. Some proponents of the wood industry see a large potential in CLT to compete with steel and concrete for larger and higher buildings as CLT has advantages in construction costs, construction time, and thermal embodied energy efficiency. The material also compares favourably with steel and concrete its environmental and carbon footprint [28].

3.2.8 Global production, consumption and trade of doors and windows

The door and window markets are strongly linked to the building construction sector. Apart from the volumes and sizes of newly built or renovated buildings, the number and type of doors and windows required also depend on the climatic conditions, requisite standards, type of use, available technologies, trends, purchasing power of customers, as well as other factors in a given country or region. All these factors influence the choice of the window frame material, too. Nowadays, windows are mainly produced with plastic polymers. However, wood, wood-metal or metal windows are also important and play a more or less important role, also depending on countries and regions.

In 2011 for example, all over Europe about 60% of the windows were produced with plastic polymers, about 19% with metal, 17% with wood and about 4% with wood-metal. Southern European countries use more windows made of metal, Northern European countries more wood and wood-metal windows while in Eastern European countries, the cheaper plastic polymer windows are predominant [29]. According to a projection of the Swiss Association of Windows and Facades (Verband Fenster und Fassaden, VFF) in 2012, Europe and its bordering countries had a demand of about 133.7 million window units (1.3 x 1.3 meter as average size) [30]. The required properties of the windows vary strongly between different countries and regions. However, insulated windows help save energy in buildings that need to be heated or be cooled.

Traditionally, wooden doors and windows were aesthetically preferred to plastic doors, but improvements in processing technologies now permit manufacturers to produce fiberglass doors or windows that closely resemble wood. According to a study from the Freedonia Group Inc. [31], the global demand for windows and doors is expected to grow 4.3% per annum to $167 billion in 2013. China was the world's largest window and door market in 2012 and it is expected that the country will demand about one-third of the global windows and doors in 2018. Continuing rapid economic growth and industrialization, as well as an increase in the average size of a housing unit in China (thus leading to additional demand for windows and doors), will boost demand. Table 10 shows the global development (2003 + 2008) and the expected demand (2013) for doors and windows.

TABLE 10: WORLD DEMAND FOR WINDOWS AND DOORS 2003 – 2013 [31].

World Window & Door Demand					
billions $					
				%Annual Growt	
	2003	2008	2013	2003-2008	2008
Total	92.9	135.6	167	7.9	
North America	29.4	35.2	41.3	3.6	
Western Europe	27.8	35	36.1	4.8	
Asia/Pacific	26.1	48	68.7	13	
Other Regions	9.7	17.4	20.9	12.4	

Other door and window markets like India and Indonesia are also growing quite fast although the demand in these countries is much smaller than that in China. In countries with limited purchasing power in particular, plastic doors and windows are attractive because of their relatively low cost and the reduced maintenance requirements. Increasing demands are also expected in other developing areas of the world, particularly in the Africa/Mideast region and Central and South America. However, gains are expected to be slightly below the world average, as the global financial crisis did not have as strong an impact in these developing regions as it did in the developed regions, thus having the developing regions start from a higher 2012 base [31].

The window and door market in the United States of America is, after a decline of more than 7% annually between 2007 and 2012, the US market for windows and doors has recovered and is projected to grow 4.8% annually through 2021 [32]. The primary driver of demand is the residential housing

market, which has improved from its mediocre performance immediately after the great recession [22]. The commercial market windows and doors market also experiences healthy growth, with building owners investing in high performance products to reduce energy consumption and to achieve green/LEED certification [32].

Table 11 shows the 10 largest importers and exporters of wooden windows and frames. While Germany is the largest importer, followed by the United Kingdom, Denmark, Switzerland, and the United States of America,, Poland is the largest exporters of wooden windows and frames followed by Germany and China (Table 11).

Internationally traded wooden doors can be roughly divided into three groups: interior doors, exterior doors and security doors. Wooden doors are made of solid wood, wood-based panels or a combination of materials such as wood-based panel and aluminium. The panels may be covered with veneer, colour, laminate, or some other material. The export of doors is dominated by China, which produces mainly low cost doors while higher quality doors are mainly made in Germany and Italy (Table 12).

TABLE 11: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR WOODEN WINDOWS AND FRAMES (HS 441810) IN 2018 [19].

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$1,858,795	$332,385		World	$2,191,180	$332,385
1	Germany	$331,946	($21,946)	1	Poland	$627,545	$600,525
2	United Kingdom	$272,275	($254,823)	2	Germany	$310,000	($21,946)
3	Denmark	$207,170	($64,768)	3	China	$180,703	$178,401
4	Switzerland	$114,184	($109,864)	4	Denmark	$142,402	($64,768)
5	United States of America	$113,047	($50,628)	5	Hungary	$107,545	$81,049
6	France	$84,937	($79,642)	6	Austria	$87,208	$43,449
7	Netherlands	$65,284	($62,208)	7	Canada	$78,030	$40,731
8	Sweden	$64,793	($52,485)	8	Slovakia	$68,433	$58,645
9	Norway	$64,180	($48,074)	9	Belgium	$65,070	$3,526
10	Belgium	$61,544	$3,526	10	Lithuania	$63,110	$57,947
38	Ukraine	$2,916	$2,334	29	Ukraine	$5,250	$2,334

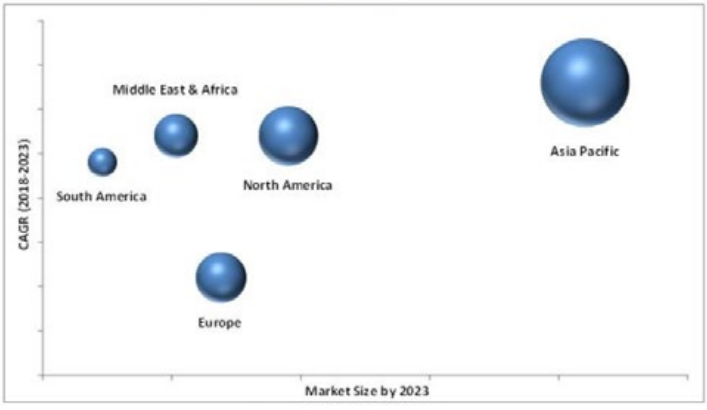
TABLE 12: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR WOODEN DOORS, FRAMES AND THRESHOLDS (HS 441820) IN 2018 [19].

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$3,629,565	$243,319		World	$3,872,884	$243,319
1	United States of America	$694,214	($600,786)	1	China	$675,536	$668,975
2	United Kingdom	$356,259	($312,278)	2	Poland	$268,725	$263,426
3	Germany	$160,158	$83,638	3	Canada	$249,710	$137,956
4	Norway	$158,128	($143,843)	4	Germany	$243,796	$83,638
5	Japan	$156,170	($154,755)	5	Brazil	$223,261	$222,722
6	Sweden	$151,815	($29,395)	6	Indonesia	$215,737	$214,634
7	Switzerland	$125,594	($122,745)	7	Italy	$166,543	$154,723
8	Netherlands	$117,776	($66,374)	8	Estonia	$141,381	$128,303
9	France	$116,274	($82,300)	9	Sweden	$122,420	($29,395)
10	Canada	$111,754	$137,956	10	Malaysia	$112,887	$100,655
105	Ukraine	$2,536	$31,145	32	Ukraine	$33,708	$31,145

3.2.9 Global production, consumption and trade of interior woodwork and flooring

The market for interior woodwork comprises products like stairs, handrails, panelling, built-in wardrobes, and similar items are strongly related to the construction sector. The same is true for wooden flooring products, where activities are strongly correlated with the activities in the (residential) construction sector. Wood flooring competes with a plethora of other floor covers such as Carpets from various materials, Vinyl, Cork, Linoleum, Ceramics, Stone, Bamboo and others, to name a few. However, flooring products of all types have seen fairly strong growth over the past decades due to increasing wealth in numerous nations and due to the increasing urbanization globally. The global flooring market is slated to grow 5.7% per annum to US$447 billion in 2023 according to MarketsandMarkets, a data research firm [33]. However, growth and market size will vary greatly between different regions with the Asia Pacific growing the fastest and Europe the slowest (Figure 29).

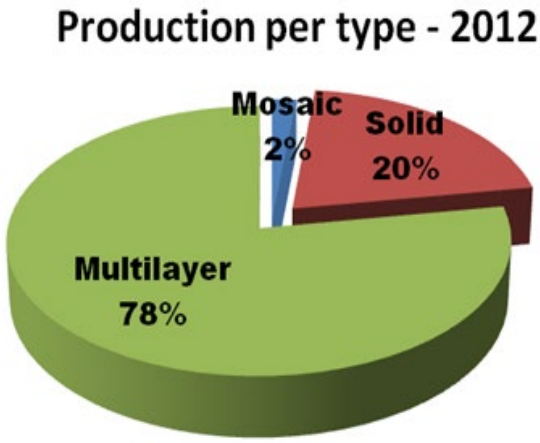
FIGURE 29: FLOORING MARKET BY REGION 2023 [33].



The global wood flooring market is challenging to asses. Numerous different types of wood flooring exist such as solid wood flooring, multilayer wood flooring, laminate flooring, to name a few. Due to this diversity of products, markets are difficult to assess. In Europe, multilayer parquet has the biggest market share followed by solid wood parquet and a small amount of mosaic parquet (Figure 30). For the past several years, oak has been the dominant species used for European parquet, with a share of almost 70% in 2012 while tropical timber had a share of 6.2%. In fact, European countries are major importers and exporters of parquet (Table 13). Also, the United States of America is a major importer of parquet. For Europe, in absolute production figures, Poland is the biggest producer with19%, followed by Germany with 15% and Sweden with 13% (Figure 31). In terms of consumption by country, Germany is the leading country with about 24%, followed by France with 14% and Italy with 9%. Per capita highest parquet consumption is found in Austria and Switzerland followed by Sweden [34].

Over the recent decade, China and some other countries in Asia have increased their production and export of parquet. This rise is also due to the fact that bamboo has become an important material on the parquet market. However, data from the International Trade Center [19] shows that multilayer wood flooring (HS 441875, [20]) is predominantly exported from European countries with Germany, Poland, Austria, Sweden, and Lithuania being the largest exporters globally, respectively. Major importers include, in ascending order, Germany, the United States of America, Switzerland, Italy, and Norway (Table 13).

FIGURE 30: PRODUCTION OF PARQUET BY TYPE IN EUROPE, 2012 [34].



Although only about a quarter the size of multilayer wood flooring in international trade, trade in solid wood flooring (HS 441879, [20]) is noteworthy in that Ukraine is found to be the 10th largest exporter of solid wood flooring globally (Table 14). Leading exporter of solid wood flooring is Malaysia, followed by Brazil, Vietnam, Denmark, and Indonesia. Leading importers include the United Kingdom, the United States, Sweden, Australia, and the Netherlands. Eight of the largest ten importing countries are in Europe (United Kingdom, Sweden, the Netherlands, Belgium, Poland, Switzerland, France, and Germany, Table 14).

FIGURE 31: DEVELOPMENT OF THE PRODUCTION AND CONSUMPTION OF PARQUET IN EUROPE 1990 - 2012 [34].

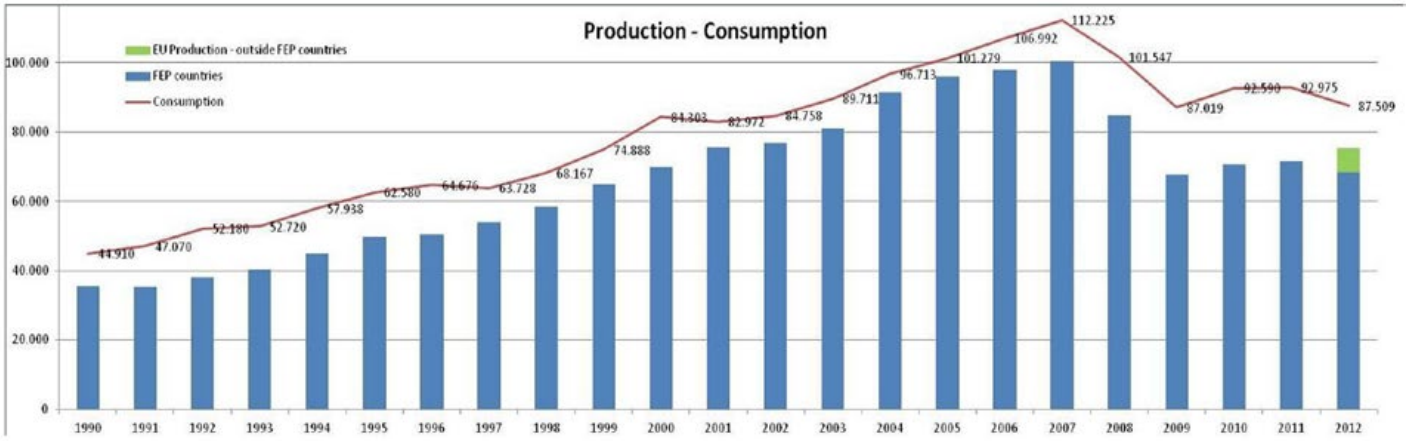


TABLE 14: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR SOLID WOOD FLOORING PANELS (HS 441879) IN 2018 [19].

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$557,357	($41,220)		World	$516,137	($41,220)
1	United Kingdom	$61,839	($57,086)	1	Malaysia	$87,939	$85,428
2	United States of America	$43,206	($35,239)	2	Brazil	$54,493	$54,196
3	Sweden	$34,946	($28,697)	3	Viet Nam	$54,346	$53,708
4	Australia	$29,224	($28,460)	4	Denmark	$35,621	$25,564
5	Netherlands	$26,508	($14,248)	5	Indonesia	$30,804	$30,414
6	Belgium	$26,480	($1,316)	6	Germany	$28,986	$12,628
7	Poland	$24,616	($5,395)	7	Belgium	$25,164	($1,316)
8	Switzerland	$21,388	($20,015)	8	Poland	$19,221	($5,395)
9	France	$20,022	($15,455)	9	China	$18,857	$7,552
10	Germany	$16,358	$12,628	10	Ukraine	$15,188	$14,758
84	Ukraine	$430	$14,758	10	Ukraine	$15,188	$14,758

3.2.10 Global production, consumption and trade of wooden ware

Wooden ware is a general term used for a multitude of different products like wooden frames, kitchenware, caskets, clothes hanger, toys, and many other items made of wood. In most cases wooden wares are products of small size with a high degree of added value. Depending on the use, they have to fulfil specific requirements with regard to size, form, and surface treatment. However, the Harmonized Commodity Description and Coding Systems (HS) [20] does not have a comprehensive category of all items that are typically categorized as wooden ware. Hence, three categories are investigated here: 1) HS code 4414: Wooden frames for paintings, photographs, mirrors or similar objects, 2) HS code 441700: Tools, tool bodies, tool handles, broom or brush bodies and handles, of wood; boot or shoe lasts and shoetrees, of wood (excluding forms used in the manufacture of hats, forms of heading 8480, other machines and machine components, of wood), and 3) HS code 441990: Tableware and kitchenware, of wood other than bamboo (excl. interior fittings, ornaments, coopers' products, tableware and kitchenware components of wood, brushes, brooms and hand sieves) [20].

The USA, Germany, the United Kingdom, Japan, and France are the biggest importers of wooden frames for painting, photographs, mirrors or similar objects while the largest exporters are, in ascending order China, Poland, Indonesia, Italy, and Germany (Table 15).

In tools, tool bodies, tool handles, broom or brush bodies and handles, of wood; boot or shoe lasts and shoetrees, of wood (excluding forms used in the manufacture of hats, forms of heading 8480, other machines and machine components, of wood) the largest importers in ascending order include the United States of America, Germany, France, Mexico, and the Netherlands (Table 16) while the largest exporters are China, the United States of America, Italy, Brazil, and Germany (Table 16). Ukraine, in 2018, was the 11th largest exporter of tools, tool bodies, tool handles, broom or brush bodies and handles made of wood, exporting over 7 million US$ (Table 16).

TABLE 15: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR WOODEN FRAMES FOR PAINTING, PHOTOGRAPHS, MIRRORS OR SIMILAR OBJECTS (HS 4414) IN 2018 [19].

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$893,624	$113,808		World	$1,007,432	$113,808
1	United States of America	$330,121	($308,353)	1	China	$501,921	$498,967
2	Germany	$86,893	($54,593)	2	Poland	$84,654	$76,435
3	United Kingdom	$62,934	($48,319)	3	Indonesia	$50,380	$49,851
4	Japan	$35,320	($35,199)	4	Italy	$35,622	$14,117
5	France	$32,151	($15,199)	5	Germany	$32,300	($54,593)
6	Canada	$30,752	($25,084)	6	Malaysia	$30,660	$27,726
7	Netherlands	$26,477	($3,575)	7	Viet Nam	$28,099	$27,254
8	Australia	$25,523	($24,363)	8	Belgium	$26,665	$3,198
9	Spain	$23,895	($14,964)	9	Netherlands	$22,902	($3,575)
10	Belgium	$23,467	$3,198	10	United States of America	$21,768	($308,353)
77	Ukraine	$390	$50	45	Ukraine	$440	$50

TABLE 16: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR WOODEN TOOLS, TOOL BODIES, TOOL HANDLES, BROOM OR BRUSH BODIES AND HANDLES, BOOT OR SHOE LASTS AND SHOETREES OR SIMILAR OBJECTS (HS 441700) IN 2018 [19]

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$358,334	$170,925		World	$529,259	$170,925
1	United States of America	$61,854	($28,692)	1	China	$262,588	$261,027
2	Germany	$39,608	($22,513)	2	United States of America	$33,162	($28,692)
3	France	$25,722	($21,483)	3	Italy	$31,971	$26,654
4	Mexico	$22,281	($19,252)	4	Brazil	$28,778	$28,583
5	Netherlands	$16,273	($9,893)	5	Germany	$17,095	($22,513)
6	Japan	$15,773	($14,446)	6	Poland	$12,385	$7,857
7	Canada	$13,350	($12,214)	7	India	$10,689	$8,509
8	United Kingdom	$11,139	($6,979)	8	Slovakia	$9,337	$6,191
9	Belgium	$9,541	($3,265)	9	Portugal	$7,901	$4,335
10	Austria	$8,401	($3,961)	10	Sweden	$7,337	$2,435
71	Ukraine	$348	$6,656	11	Ukraine	$7,004	$6,656

The United States of America, Japan, Germany, the Republic of Korea, and the United Kingdom are the five largest importers of tableware and kitchenware, of wood other than bamboo (Table 17), while China, Vietnam, Germany, Thailand and Indonesia are the five largest exporters (Table 17).

TABLE 17: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR WOODEN TABLEWARE AND KITCHENWARE (HS 441990) IN 2018 [19]

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$935,089	($228,223)		World	$706,866	($228,223)
1	United States of America	$179,296	($161,301)	1	China	$314,536	$279,638
2	Japan	$172,382	($166,720)	2	Viet Nam	$44,272	$43,861
3	Germany	$66,272	($24,741)	3	Germany	$41,531	($24,741)
4	Korea, Republic of	$55,026	($53,629)	4	Thailand	$25,177	$23,839
5	United Kingdom	$53,594	($36,597)	5	Indonesia	$21,681	$21,248
6	France	$40,924	($33,514)	6	United States of America	$17,995	($161,301)
7	China	$34,898	$279,638	7	United Kingdom	$16,997	($36,597)
8	Netherlands	$34,842	($18,128)	8	Italy	$16,788	($3,209)
9	Australia	$25,816	($25,398)	9	Netherlands	$16,714	($18,128)
10	Canada	$24,354	($21,738)	10	Romania	$15,206	$9,748
--	Ukraine	no data	no data	--	Ukraine	no data	no data

3.2.11 Global production, consumption and trade of furniture

In 2017, the global furniture production (all types and materials) reached a value of about US$470 to US$480.7 billion, depending on the source for the data [26], [35]. According to Grand View Research [35], the market is slated to grow 5.1% annually per year through 2025, with MaketLine predicting 6.5 CAGR (Compound Annual Growth Rate) through 2022. The growth is driven by rising disposable incomes, growth in real estate and hospitality industries, and demand from certain consumer sections. UNECE/FAO [26] estimates that 30% of global furniture production (US$ 145 billion) is traded internationally, up from US$ 96 billion in 2009 [26]. In emerging-market economies, furniture production has grown remarkably during the past 10 years, an average of 18% per year [38]. With a growing economy, people are investing more in real estate for home and office space, pulling furniture demand with it. Hence, success in building industries that export their products in emerging market economies grows domestic demand at the same time. China is with almost 24,000 furniture manufacturing establishments [37] the largest furniture manufacturing country globally, followed by the US, Italy and Germany [38]. The United States of America is by far the largest importer of furniture globally, followed by Germany, France, the United Kingdom, and Japan (Figure 32). Table 18 shows the leading role of Asia in the export of furniture, especially to the United States of America.

FIGURE 32: FIVE LEADING IMPORTERS OF FURNITURE 2014 – 2018 [26].

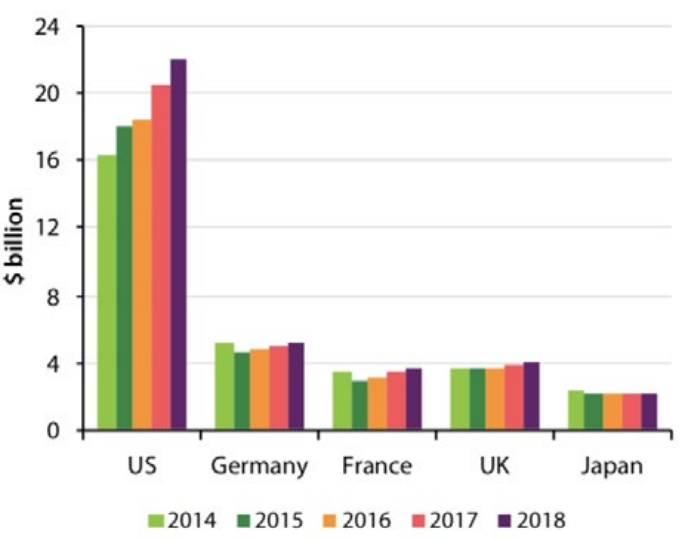


TABLE 18: ORIGIN BY REGION OF FURNITURE IMPORTS OF THE TOP 5 IMPORTING COUNTRIES, 2017-2018 [26].

	US		*Germany*		*France*		*UK*		*Japan*	
	2017	*2018*	*2017*	*2018*	*2017*	*2018*	*2017*	*2018*	*2017*	*2018*
Total value of wooden furniture imports	20.4	22.0	5.0	5.1	3.4	3.7	3.9	4.0	2.2	2.2
				Origin (%)						
Asia	78.7	78.9	17.7	17.3	25.9	26.8	54.3	52.2	92.9	92.3
Europe	8.7	8.7	81.6	82.0	72.5	71.6	38.0	39.2	6.6	7.1
North America	7.1	6.7	0.1	0.1	0.3	0.3	3.8	4.4	0.4	0.5
Latin America	5.4	5.6	0.3	0.3	0.7	0.7	2.1	2.2	0.0	0.0
Others	0.1	0.1	0.3	0.3	0.6	0.6	1.8	2.0	0.0	0.1

Imports to the United States of America reached US$ 22 billion in 2018 (Figure 32), whereof 47% originated in China. Hence, China was by far the most important country exporting furniture to the United States of America until 2018, when the United States imposed tariffs of 25% on most furniture imports from China [39] [40]. After the introduction of the new tariffs, furniture manufacturers started shifting their production and sourcing from China to Vietnam, but also to Malaysia, Mexico, India, and Indonesia, all emerging economies with low labour costs allowing manufacturers to hit the price target of American importers [41]. Figure 33 shows the immediate effect that the tariffs had on shipments from China to the United States of America [42].

The Harmonized Commodity Description and Coding Systems (HS) [20] employed by the International Trade Center (ITC) breaks down wood furniture into the four main categories: HS code 940350: Wooden furniture for bedrooms (excluding seats); HS code 940330: Wooden furniture for offices (excluding seats); HS code 940340: Wooden furniture for kitchens (excluding seats); and HS code 940360: Wooden furniture (excluding for offices, kitchens and bedrooms, and seats) [20]. Table 19 below shows the major importing and exporting countries including their trade balances for wood bedroom furniture (HS 940350); while Table 20 shows the same information for wooden office furniture (HS 940330); Table 21 shows the data for wooden kitchen furniture (HS 940340); and Table 22 shows the information for wooden furniture (HS 940360).

FIGURE 33: US IMPORTS OF WOOD FURNITURE 2000 - 2019 [42].

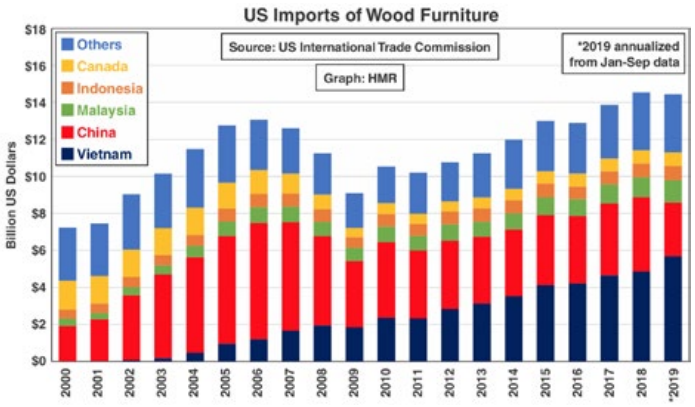


TABLE 19: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR WOODEN BEDROOM FURNITURE (HS 940350) IN 2018 [19].

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$10,975,954	($287,007)		World	$10,688,947	($287,007)
1	United States of America	$4,103,835	($3,870,469)	1	China	$3,122,497	$2,899,713
2	Germany	$755,180	($160,103)	2	Viet Nam	$1,218,064	$1,210,282
3	United Kingdom	$652,928	($605,818)	3	Poland	$848,310	$784,185
4	Canada	$372,961	($160,165)	4	Malaysia	$719,148	$693,056
5	France	$337,597	($227,696)	5	Germany	$595,077	($160,103)
6	Switzerland	$317,261	($249,089)	6	Turkey	$558,256	$533,967
7	Australia	$300,688	($298,871)	7	Italy	$469,988	$323,957
8	Netherlands	$282,367	($186,038)	8	Brazil	$302,158	$298,459
9	Iraq	$242,663	($242,640)	9	United States of America	$233,366	($3,870,469)
10	China	$222,784	$2,899,713	10	Canada	$212,796	($160,165)
101	Ukraine	$4,546	$29,483	35	Ukraine	$34,029	$29,483

TABLE 20: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR WOODEN OFFICE FURNITURE (HS 940330) IN 2018 [19].

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$3,576,201	$790,755		World	$4,366,956	$790,755
1	United States of America	$1,052,201	($883,602)	1	China	$1,200,598	$1,165,965
2	France	$198,425	($153,763)	2	Canada	$449,431	$303,325
3	Germany	$169,752	$113,671	3	Viet Nam	$325,789	$320,929
4	Canada	$146,106	$303,325	4	Italy	$295,705	$247,988
5	United Kingdom	$139,139	($78,334)	5	Germany	$283,423	$113,671
6	Switzerland	$101,155	($90,286)	6	Poland	$204,092	$173,634
7	Netherlands	$101,121	($49,997)	7	United States of America	$168,599	($883,602)
8	Saudi Arabia	$80,843	($79,560)	8	Lithuania	$136,728	$129,241
9	India	$71,763	($38,139)	9	Sweden	$133,875	$88,159
10	Norway	$70,586	($69,531)	10	Malaysia	$113,164	$66,161
73	Ukraine	$3,954	$592	43	Ukraine	$4,546	$592

TABLE 21: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR WOODEN KITCHEN FURNITURE (HS 940340) IN 2018 [19].

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$6,654,936	$1,128,006		World	$7,782,942	$1,128,006
1	United States of America	$2,274,742	($2,171,303)	1	Germany	$2,417,897	$2,303,554
2	France	$595,383	($499,982)	2	China	$1,905,508	$183,202
3	Netherlands	$447,454	($420,065)	3	Italy	$974,454	$933,058
4	Switzerland	$362,485	($359,840)	4	Canada	$337,619	$209,325
5	Norway	$208,336	($207,607)	5	Viet Nam	$287,695	$282,618
6	Austria	$194,271	($108,891)	6	Denmark	$263,775	$183,179
7	China	$183,202	$1,722,306	7	Malaysia	$180,616	$157,724
8	Japan	$147,379	($144,816)	8	Spain	$154,168	$77,944
9	United Kingdom	$142,711	($80,743)	9	Poland	$129,214	$102,179
10	Belgium	$140,458	($117,684)	10	Portugal	$104,666	$69,981
75	Ukraine	$4,128	$12,941	30	Ukraine	$17,069	$12,941

TABLE 22: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR WOODEN FURNITURE (HS 940360) IN 2018 [19].

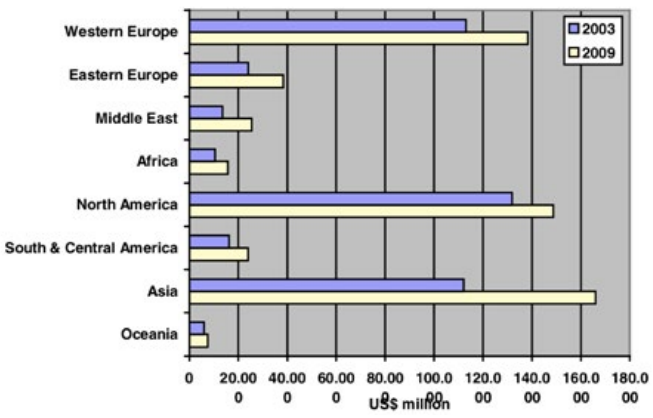
#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$25,467,527	$979,815		World	$26,447,342	$979,815
1	United States of America	$6,915,055	($6,328,557)	1	China	$7,282,661	$6,800,037
2	Germany	$2,142,382	($811,647)	2	Poland	$2,500,900	$2,251,762
3	United Kingdom	$1,913,412	($1,626,700)	3	Italy	$2,145,448	$1,752,656
4	France	$1,391,942	($873,609)	4	Viet Nam	$1,699,149	$1,681,501
5	Japan	$1,137,026	($1,117,090)	5	Germany	$1,330,735	($811,647)
6	Netherlands	$874,639	($382,672)	6	Indonesia	$778,570	$725,476
7	Switzerland	$656,730	($573,788)	7	Malaysia	$609,256	$473,952
8	Canada	$645,559	($242,645)	8	Lithuania	$587,934	$530,174
9	Australia	$490,841	($483,307)	9	United States of America	$586,498	($6,328,557)
10	China	$482,624	$6,800,037	10	Spain	$562,060	$94,473
72	Ukraine	$24,359	$68,262	36	Ukraine	$92,621	$68,262

The United States of America is the leading importer of all types of wooden furniture (furniture for bedrooms (excluding seats), furniture for offices (excluding seats), furniture for kitchens (excluding seats), and furniture (excluding for offices, kitchens and bedrooms, and seats)) [20]. Germany is the second largest importer of wooden bedrooms furniture and wooden furniture not separately classified, and third largest importer of wooden office furniture after the United States of America and France. The situation is different for wooden kitchen furniture, however, where Germany imports relatively little but is the world largest exporter. When looking at exporters, China is the largest exporter of wooden furniture globally by exporting the largest (by far) exporter of wooden bedroom furniture, wooden office furniture, wooden furniture, and being the second largest wood kitchen cabinets exporter in 2018 [19].

3.2.12 Global production, consumption and trade of packing materials

Globally, the packing sector is dominated by products made of paper and board, plastic and metal. According to estimates of the World Packaging Organization (WPO), the global turnover of the packaging market is about US$ 500 billion [43], with packaging material in general getting greener and demand for E-commerce packaging soaring [44]. Figure 34 shows the world regions and their market size for 2004 and 2009 [45].

FIGURE 34: PACKAGING MARKET SIZE BY REGION 2004 – 2009 (DATA IN CONSTANT 2004 US$) [45].



Asia, North America, and Western Europe are the largest markets for packaging materials (Figure 34), in which paper and paperboard is the most important material (Figure 35).

Wooden packaging materials are tightly regulated in particular those pertaining to sanitary measures, because of the danger of infesting vermin and insects. Trade in packing cases, boxes, crates, drums and similar packings, of wood; cable-drums of wood; pallets, box pallets and other load boards, of wood; pallet collars of wood (excluding containers specially designed and equipped for one or more modes of transport) (HS code 4415, [20]) is dominated by European countries, with Germany, France, the Netherlands, Belgium, and Italy being the largest importers globally (Table 23). Exports are dominated by European countries as well, with Poland, Germany, the Czech Republic, the Netherlands, and Belgium being the largest exporting nations globally (Table 23).

FIGURE 35: PACKAGING MATERIALS BY MARKET SIZE 2004 – 2009 (DATA IN CONSTANT 2004 US$) [45].

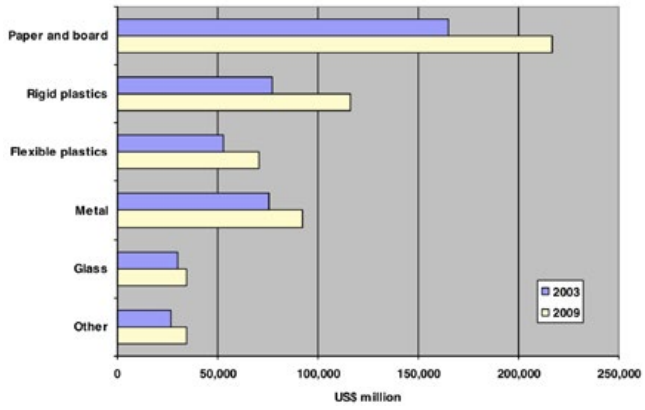


TABLE 23: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR WOODEN PACKING MATERIAL (HS 4415) IN 2018 [19].

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$3,665,926	$979,815		World	$4,048,416	$979,815
1	Germany	$654,231	($248,719)	1	Poland	$656,465	$571,922
2	France	$295,371	($163,280)	2	Germany	$405,512	($248,719)
3	Netherlands	$256,981	($31,884)	3	Czech Republic	$259,116	$163,309
4	Belgium	$245,183	($34,631)	4	Netherlands	$225,097	($31,884)
5	Italy	$196,418	($62,531)	5	Belgium	$210,552	($34,631)
6	United States of America	$163,107	($5,786)	6	United States of America	$157,321	($5,786)
7	Austria	$140,355	($82,947)	7	Italy	$133,887	($62,531)
8	Switzerland	$107,104	($83,300)	8	Lithuania	$132,125	$110,434
9	Czech Republic	$95,807	$163,309	9	France	$132,091	($163,280)
10	Sweden	$92,388	($28,091)	10	Latvia	$128,669	$117,536
61	Ukraine	$4,879	$59,271	16	Ukraine	$64,150	$59,271

3.3 Trends in the global wood market

Global trends in the wood processing sector are related to numerous different factors like demand, technology, economic development, environmental impact, population growth, and efficient use of the available resources, among other things. Below, some of the emerging trends are briefly discussed:

» Solid wood products are likely to be more and more replaced by engineered wood products. This will have a strong influence on the processing technologies and the requirements onto the raw materials.

» Demand for energy wood will continue to increase due to population growth (mainly in Asia and Africa), the shift from fossil and nuclear power to green energies (mainly in EU-countries).

» Innovative products include lightweight panels for the growing ready-to-assemble (RTA) furniture market or wood composite materials with improved properties due to the combination of different materials. They offer a huge potential for research and development and will compete with pure wood products in the future.

» Agricultural residues, bamboo, and other fast-growing plants will become more sought after for the productions of panels and beams, thereby replacing wood-based materials.

» The shortages of numerous well-known and internationally traded wood species will promote the testing of lesser-known wood species and their introduction into the international markets.

» Plantation wood will replace ever larger quantities of roundwood from natural forests. This does have an influence on the wood processing sector in regard to wood properties and qualities.

» The fast-growing construction sector will consume larger volumes of wood- and wood based products. There will be an increased demand for new engineered products.

» Technology and quality requirements for wood- and wood-based products will increase because the general improvement in living conditions will lead to higher standards and regulations.

» The indispensable need to manage the global forests in a more sustainable manner and a stricter implementation of binding regulations like the European Timber Regulation or the US Lacey Act may strengthen the position of international certification systems like FSC, PEFC, and others, especially in countries which face problems to practice sustainable forest management.

3.4 Leading countries in production, consumption and trade of wood products

The analysis of the production, consumption and trade of wood and wood-based products has shown the dominant and increasing role of China in the international wood processing sector. China with a population of about 1.4 billion [8], protects its own forest resources, whilst it intensively procures round- and sawn wood from all over the world. The way the Chinese purchase raw materials in other countries is often criticized because of missing sustainable forest management criteria and transparency of the deals. The most important export markets for Chinese wood products are the USA, Japan, and the United Kingdom, whilst the country imports most of its wood products from Russia, USA, and Canada. Also, developing countries from Asia, Africa, and South America also sell round- and sawn wood to China. Many of these countries are critical of the business behavior of China, but they still sell round- or sawn wood because China orders large volumes of all qualities, is interested in countertrade (infrastructure development), and does not dictate ecological and social conditions unlike the European Union or the United States of America. The imported round- and sawn wood is processed in China to higher value-added products and a large part of it is then exported all around the globe while a part of it is used to satiate the increasing domestic demand. Of the total global exports in 2018 in wood and articles of wood including charcoal (HS code 44, [20]), of 147 billion US$, China's share was more than 10% (roughly 15 billion US$, [19]), while the country's imports were valued at almost 25 billion US$ for a trade deficit in wood and articles of wood including charcoal of about 10 billion US$ (Table 24). While China's export numbers are impressive, on cannot forget the size of its domestic market with over 1.4 billion potential customers.

TABLE 24: MAJOR IMPORTING AND EXPORTING COUNTRIES AND UKRAINE INCLUDING THEIR TRADE BALANCES AND RESPECTIVE RANKS IN GLOBAL TRADE FOR WOOD AND ARTICLES OF WOOD INCLUDING CHARCOAL (HS 44) IN 2018 [19].

#	Importers	Value imported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)	#	Exporters	Value exported in 2018 (USD thousand)	Trade balance in 2018 (USD thousand)
	World	$156,002,354	$979,815		World	$148,175,867	$979,815
1	China	$24,914,415	($10,026,085)	1	China	$14,888,330	($10,026,085)
2	United States of America	$22,606,015	($12,737,746)	2	Canada	$14,282,132	$11,199,517
3	Japan	$11,164,416	($10,846,814)	3	Germany	$9,869,766	$250,581
4	Germany	$9,619,185	$250,581	4	United States of America	$9,868,269	($12,737,746)
5	United Kingdom	$7,629,291	($7,034,128)	5	Russian Federation	$9,009,169	$8,301,904
6	Italy	$4,931,062	($2,720,162)	6	Poland	$5,561,312	$3,455,738
7	France	$4,675,174	($1,646,650)	7	Austria	$5,253,105	$2,139,146
8	Netherlands	$4,003,139	($2,325,914)	8	Indonesia	$4,435,145	$3,987,178
9	Korea, Republic of	$3,787,644	($3,698,838)	9	Sweden	$4,227,000	$1,865,160
10	Belgium	$3,157,181	($116,862)	10	New Zealand	$3,629,700	$3,348,172
58	Ukraine	$294,487	$1,198,058	27	Ukraine	$1,492,545	$1,198,058

The USA with a population of 329 million and Canada with 36 million [8] are two other important participants of the global wood processing sector. The USA is a major consumer and importer of almost all types of wood products along the value chain except for roundwood. The main trade partners of the USA for wood products are Canada and China for both imports and exports. Brazil is another important exporter of wood products to the USA while Japan imports big volumes of wood products from the USA [19]. In 2008, the USA made an amendment to the existing Lacey Act with the aim to ban illegal logging [47]. The defined ban on illegal timber was, however, not supported by a clear framework of regulation guidelines for importers, exporters and traders. Instead, operators are vaguely urged to exhibit due care and implement due diligence systems in order to minimize the risk of illegal wood entering supply chains. Canada is globally the second biggest exporter of wood products behind China (Table 24). Canada's position is based on its extensive forest resources, its well-developed wood processing sector, and its geographical closeness to the world's second largest importer of wood products, the United States of America with which Canada has a free trade agreement (the United States – Mexico – Canada Agreement (USMCA) [46]). Canada main export destinations include the United States of America, China, Japan and the United Kingdom [19].

Another important group of countries in the international wood processing sector are the countries of Central and Northern Europe. Germany with a population of 80 million [8] is the third biggest exporter and fourth biggest importer worldwide of wood products (Table 24), whilst the United Kingdom with 65 million habitants is the fifth biggest importer of wood products globally, followed by Italy with 62 million and France with 68 million inhabitants ([8], Table 24).

The above-mentioned countries are characterized by strong import and export activities within Europe, and to a lesser extent, by trade with China, Russia and the United States of America. The European Union has set high requirements regarding the ecological, economic, and social sustainability of wood products. In 2013, the EU Timber Regulation Act (EUTR, [48]) was established as a new law to prohibit the marketing of illegally harvested timber and wood products derived from such timber by the implementation of a due diligence system.

Japan with a population of 126 million [8] is another large importer of wood products, albeit only about half as large as China or the United States of America (Table 24). Japan, however, hardly exports any wood products. In fact, in regards to the trade value, Japan imports about 10 times more wood products than it exports (2018 Imports: 11 billion US$; 2018 Exports: 0.3 billion US$, [19] . China, the United States of America, and Indonesia were the biggest exporters of wood products to Japan in 2016 by value [49].

Russia, the country with the largest area of the world, has a population of 142 million [8] and, with an estimated growing stock of 75 billion m^3 round-wood [50], it possesses the

largest wood resources in the world. The country is one of the biggest exporters of coniferous round- and sawn wood worldwide. The government decided a few years ago to highly tax the export of round-wood in order to encourage the further processing of wood in the country. This aim has not yet been completely achieved, but considerable investments have been made in this direction and it is evident that Russia is placing more and more semi-finished products and wood-based panels on the international wood market. Particularly in the east towards the border to China, the illegal harvesting and trade of wood is a big challenge. Russia is striving to improve the situation with new control mechanisms on the wood value chain, but these aims are rather thwarted by the high level of corruption.

In summary, China is the world's biggest importer and exporter of wood and articles of wood including charcoal (Table 24, Figure 36, Figure 37). China's rapid ascent from an agricultural country to a developed, middle class country in roughly 20 years is built on its ability to import raw materials, add value to these materials, and successfully selling them on the world markets while at the same time satisfying its domestic demand. At the same time, traditional industries in developed countries like the United States of America declined rapidly and have become insignificant [51]. However, the emergence of a renewed focus on fairness in international trade [52] may bring large readjustment to the global trade of wood products.

FIGURE 36: MAP SHOWING SHARE (%) OF WORLD IMPORTS BY COUNTRY OF WOOD AND ARTICLES OF WOOD, WOOD CHARCOAL (HS 44) FOR 2018 [19].

FIGURE 37: MAP SHOWING SHARE (%) OF WORLD EXPORTS BY COUNTRY OF WOOD AND ARTICLES OF WOOD, WOOD CHARCOAL (HS 44) FOR 2018 [19].

3.5 Norms and standards of key importers of wood products

In general, the international trade of (wood) products is subject to the regulations of the World Trade Organization (WTO) which officially commenced in 1995, replacing the General Agreement on Tariffs and Trade (GATT) [53]. The original purpose of GATT was the substantial reduction of tariffs and other trade barriers between countries on a reciprocal and mutually advantageous basis:

"Technical regulations and standards are important, but they vary from country to country. Having too many different standards makes life difficult for producers and exporters. If the standards are set arbitrarily, they could be used as an excuse for protectionism. Standards can become obstacles to trade. But they are also necessary for a range of reasons, from environmental protection, safety, national security to consumer information. And they can help trade. Therefore the same basic question arises again: how to ensure that standards are genuinely useful, and not arbitrary or an excuse for protectionism [54]."

Globally, Europe, the USA, China, and Japan are key importers of wood products. They are therefore potential export markets for Ukrainian products. Technical and environmental standards have become an important issue in the international trade of timber products. Producers interested in selling their products on the world markets must comply with the requirements of the relevant technical and environmental standards in order to compete. To be able to prove compliance with the respective standards, an accredited testing laboratory is required.

3.5.1 Overview of Standards in the World Trade Context

The World Trade Organization (WTO) stipulates that products emanating from other WTO countries shall not be accorded treatment less favourable than like products of national origin. The three most relevant WTO agreements are summarized below [55]:

1. The Agreement on Technical Barriers to Trade (TBT) seeks to ensure that standards and testing and certificating procedures do not create unnecessary barriers to trade.
2. Sanitary and Phytosanitary Measures (SPS) are used to guarantee that a producer has the capacity to clean, sanitize, sterilize or by any means render the products free of unwanted dirt, pests and disease.
3. Under the WTO's Government Procurement Agreement (GPA), technical specifications should be based on international standards, where such exist, or otherwise on national standards. The ISO 14001: Environmental Management System would be acceptable under the GPA. Government purchases make up a significant share of global markets: up to 10-25% of gross domestic product [56].

The WTO standards undoubtedly afford an advantage to industrialized countries which have superior technologies and rigorously follow their own standards. Emerging market countries are at a disadvantage because they typically play no significant role in the development of international standards and are thus less able to safeguard their interests. Furthermore, their laboratories are often sub-standard and can hardly help the national producers to fully comply with the strict standards of the industrialized countries.

Wood products are regulated under a large number of international and national standards. Normally, the relevance of standards grows along with increasing value-added (e.g., increasing degree of processing). In low value-added primary products, the main purpose of standards is to help buyers and sellers agree on the physical dimensions, volumes, grades and ultimately the prices of their primary goods. However, in some important markets like the EU and the USA, strict rules on the legality and certification are applied, also for primary wood products.

For high value-added wood products for sale to customers, the role of standards becomes more orientated towards fitness for purpose and consumer safety. This is where good practices in manufacturing, the testing of strength and durability, and issues related to flammability and toxic emissions of substances like formaldehyde come into play. All these tests require accredited, well-functioning laboratories to acquire the certificates needed to be able to sell the product on the global markets.

3.5.2 Non-tariff export barriers of wood products

The above mentioned Agreement on Technical Barriers to Trade (TBT Agreement) [55] tries to ensure that regulations, standards, testing, and certification procedures do not create unnecessary obstacles, while also providing members with the right to implement measures to achieve legitimate policy objectives, such as the protection of human health and safety, or the environment. The TBT agreement is also closely linked to the Agreement on the Application of Sanitary and Phytosanitary Measures, which has similar goals.

The following guidelines and mechanisms are designed to promote the objectives of the TBT Agreement:

- The TBT agreement strongly encourages countries to recognize the results of other countries' conformity assessment tests – tests that determine whether a product conforms to a given standard.
- The TBT promotes the development of international standards and provides governments and inter-governmental bodies with guidance on how best to develop such standards. TBT members are urged to adopt international standards as their technical requirements whenever possible.

» All TBT members are required to establish "enquiry points" – offices that provide information about the country's technical regulations, test procedures, and adherence to various international standards.

» A technical assistance program helps developing countries to meet international standards and to get involved in the establishment of such standards

The WTO Agreements imply some special rights for developing countries and give developed countries the possibility to treat developing countries more favorably than other WTO Members. These special provisions are referred to as "special and differential treatment" provisions and include:

» Longer time periods for implementing agreements and commitments

» Measures to increase trading opportunities for these countries

» Provisions requiring all WTO members to safeguard the trade interests of developing countries

» Support to help developing countries build the infrastructure for WTO work, handle disputes, and implement technical standards

During the past few years, tariff-barriers like tariffs, duties, and taxes have been considerably reduced, but they have often been replaced by non-tariff-barriers. A global list of all the non-tariff barriers does not exist but common border rejections of wood products are:

» General or quantitative import restrictions for specific wood products

» An insufficient proof of the legality of the wood products

» Non-fulfilment of international agreements / conventions

» Non-fulfilment of required technical regulations and standards

» Non-fulfilment of required phytosanitary regulations and standards (e.g. vermin)

» Not properly declared products (e.g., in order to save taxes)

3.5.3 CITES

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, [57]) is an international agreement which up to date has been ratified by 182 countries . The aim of CITES is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. About 30'000 plants (out of which 48 are tree species) are listed in one of the three CITES Appendices which categorise the plants according to how threatened they are by international trade. All international trade activities of species covered by the convention have to be authorized through a licensing system which is managed by the designated Authorities.

3.5.4 International certification systems

Globally, there are more than 50 certification programs which pertain to the forest – and wood processing sectors. The two most important international certification programs are the Forest Stewardship Council (FSC, [58]) and the Programme for the Endorsement of Forest Certification (PEFC, [59]). Globally, about 440 million ha (19.7% of the total global forested area) of forest are certified by FSC or PEFC [60].

Certified forests produce certified lumber and wood fibre that may be further processed and sold on the market. In order that a labelled wood product may be sold to a client, it is compulsory that all actors along the production process are also certified according to the same system. Chain of Custody Certification (CoC, [61]) tracks the certified material through the entire production process from the forest to the consumer, including all successive stages of processing, transformation, manufacturing, and distribution. It provides evidence that certified material in a certified product originates from certified forests. About 33'000 wood processing companies around the world have a CoC certification of FSC or PEFC [62]. Certification for both FSC- and PEFC is voluntary; the majority of the certified forests and the wood processing companies are located in the Northern hemisphere. Further information on FSC activities in Ukraine to be found in chapter 4.6.4

3.5.5 Europe

On March 2011, the European Parliament passed the regulation (EU) No 305/2011 of the European Parliament and of the Council on laying down conditions for the marketing of construction products [63]. It provides a definition of harmonized conditions for the marketing of construction products, which includes timber and timber products. Regulation (EU) No 305/2011 is valid for all members of the EU as well as the ECAC (European Economic Area Countries). Please refer to the Appendix for information on those norms and standards that are adapted or in place in Ukraine.

Regulation (EU) No 995/2010 of the European Parliament and of the Council of 20 October 2010 [64] lays down the obligations of operators who place timber and timber products on the market. The Timber Regulation counters the trade in illegally harvested timber and timber products through three key obligations:

1. It prohibits the placing on the EU market of illegally harvested timber and products derived from such timber.
2. It requires EU traders who place timber products on the EU market to exercise due diligence.

3. Once on the market, the timber and timber products may be sold on and/or transformed before they reach the final consumer. To facilitate the traceability of timber products, economic operators in this part of the supply chain have an obligation to keep records of their suppliers and customers.

The three key elements of the "due diligence system" are:

» **INFORMATION:** The operator must have access to information describing the timber and timber products, country of harvest, species, quantity, details of the supplier and information on compliance with national legislation.

» **RISK ASSESSMENT:** The operator should assess the risk of illegal timber in his supply chain, based on the information identified above and taking into account criteria set out in the regulation.

» **RISK MITIGATION:** When the assessment shows that there is a risk of illegal timber in the supply chain, that risk can be mitigated by requiring additional information and verification from the supplier.

The Regulation covers a wide range of timber products listed in its Annex using EU Customs Code Nomenclature. The defined timber products include solid wood products, flooring, plywood, pulp and paper. Not included are recycled products, as well as printed papers such as books, magazines and newspapers. The regulation, which came into effect on March 3, 2013, applies to both imported and domestically produced timber and timber products.

There are several technical standards which govern the material properties of wood and wood products. With regard to emissions for example, the following testing standards are frequently used to assess carcinogen agents such as formaldehyde, which is often present in adhesives used in the wood industry:

» ISO 16000 Indoor Air Pollution

» EN 717-1 Formaldehyde Emissions

With regard to wood-based panels, the following standard applies:

» EN 13986 Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking.

There are several standards, which regulate furniture products. Whilst the customer generally decides aesthetic, functional, and quality aspects, the standards often emphasize safety as a key criterion. The European general product safety directive [65] emphasizes the importance of this issue by indicating that responsibility for the product safety lies with the company placing the product on the market. The market is the competence of the individual countries. The European Commission maintains the Rapid Alert System for dangerous non-food products (RAPEX, [65]) where dangerous furniture within other products frequently appears.

The standardization handles furniture in different product groups:

» Office furniture

» Educational furniture

» Domestic furniture

» Non-domestic furniture

» Children furniture

» Outdoor furniture

Windows, doors and façade products are covered by the European Construction Products Regulation (CPR, [66]). For windows and external pedestrian doors as well as for curtain walling (façades) are harmonized product standards applicable. The CE mark is mandatory for these products when putting into market, which makes it necessary to test and declare some characteristics like air permeability or water tightness. The product standards refer to all available test and classification standards applicable to the products.

» EN 14351-1 Windows and doors - Product standard, performance characteristics - Part 1: Windows and external pedestrian doorsets

» EN 13830 Curtain walling - Product standard

For interior doors a product standard is in preparation but a whole range of test and classification standards exist.

3.5.6 USA

The USA, like the European Union, also has norms and standards which pertain to wood and wood products. The concerns are often similar in many ways to the European standards mentioned above.

Similar to the EU-Timber Regulation, the USA responded in 2008 to the growing concerns about illegal trade of logs and wood products with an amendment to the existing Lacey Act [47]to cover a broader range of plants and plant products (Section 8204: Prevention of illegal logging practices, [68]). The amendment strengthens the Lacey Act as follows:

» The Lacey Act makes it illegal to import into the United States plants that have been harvested contrary to any applicable Federal Law, State Law, Indian Tribal Law or Foreign Law. If a plant is found to have been harvested in violation of the laws of the country where it was harvested, that plant would be subject to seizure and forfeiture if imported into the USA.

» The Lacey Act also makes it unlawful to import certain plants and plant products without a plant and plant product import declaration. This Plant and Plant Product Declaration must contain (among other things) the genus, species, and country of harvest of every plant found in commercial shipments of certain products.

The Consumer Product Safety Improvement Act (CPSIA) of 2008 [69] requires importers of certain goods into the USA for trading purposes to get additional conformity certification. The rules are particularly strict for products for children; here the law prescribes tests by independent testing institutes. The products covered include wood products, in particularly their possible emissions (for a review of requirements see http://www.arb.ca.gov/homepage.htm).

3.5.7 China

China is a major buyer of unprocessed logs in many tropical countries. The following recent timber standards are relevant to tropical logs, whereby “GB” denotes “national standards” and “LY” forestry industry standards:

» GB/T 155-2006: Defects in logs

» LY/T 1680-2006: Code for wood integrated utilization

» GB/T15779-2006: Logs of peeled veneer

» GB/T 15106-2006: Logs of sliced veneer

» GB/T 4812-2006: Logs of super grade

» GB/T 15787-2006 Terms in log inspection

At the same time, China is reacting to the criticism from the EU and the USA in regards to environmental hazards of wood products. The Evaluation Standard for Green Buildings (GB/T 50 378-2006), for example, evaluates the limitation of harmful substances (e.g. formaldehyde) in glues, paints, furniture etc.

3.5.8 Japan

Japan’s wood and wood processing standards are generally closer to those of the EU and the USA than to other Asia countries. Japan’s regulations with regard to formaldehyde emissions by adhesives and other chemical emissions are generally considered the most stringent in the world.

4

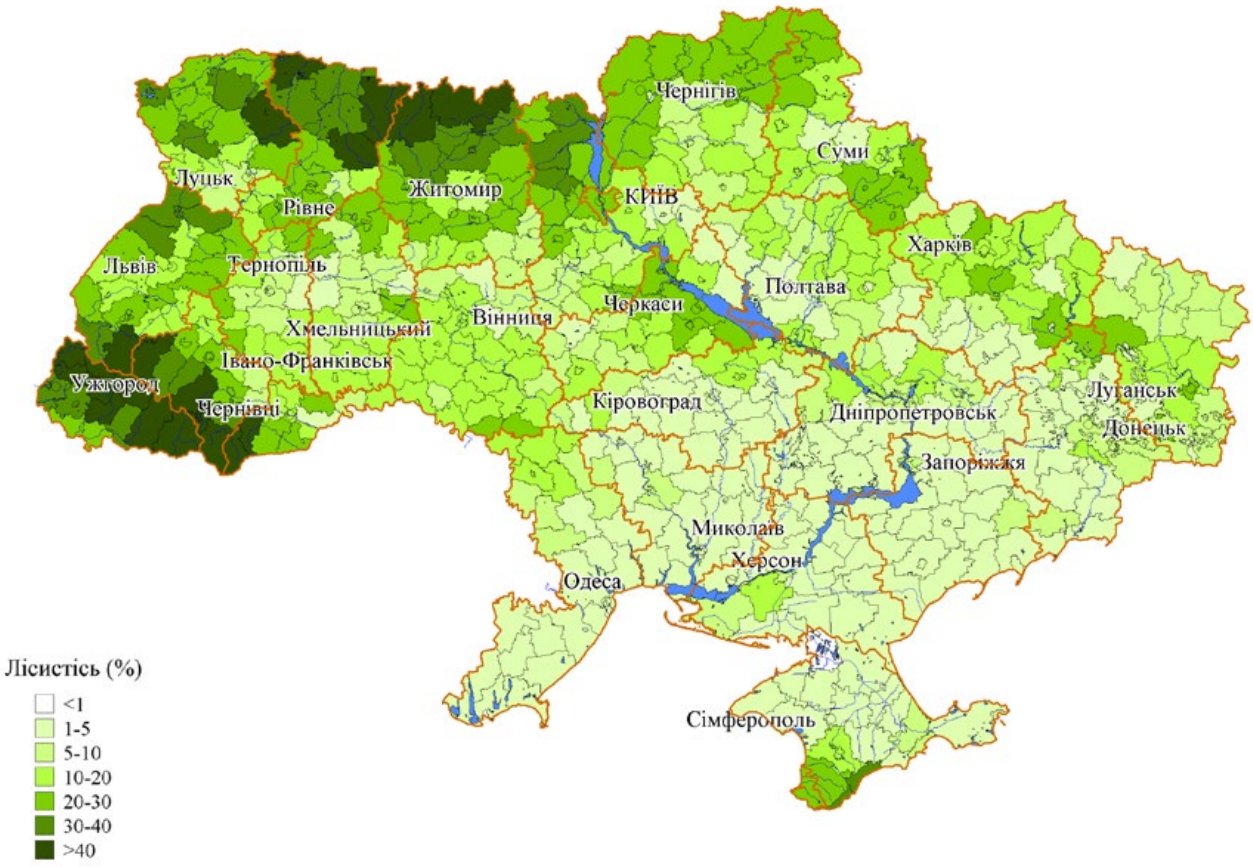
ASSESSMENT OF THE WOOD SECTOR IN UKRAINE

The following chapter provides an overview of the wood sector of Ukraine. Please note that the results of several research programs on the quality of the available statistical data show that Ukrainian statistics on the export of wood and wood products in general do not reflect the real market situation in this area as explained by [70]. Hence, special attention was paid to crosschecking data and reports from all available sources. However, some of the data may not reflect the actual market situation accurately.

4.1 Ukraine's forest sector

Ukraine is an agricultural-industrial country with relatively low forest cover (16% of the countries surface, rank 34 in Europe). However, the country's total forested area of 105'000 km² is substantial when compared to other European countries (rank 9 in Europe). Ukraine's forests contain mainly commercially important tree species that are useful sources of timber. The main species are Pine (Pinus sylvestris, 35%), Oak (Quercus ssp., 26%), Spruce, (Picea abies, 10%), Beech (Fagus sylvatica, 9%), and Birch (Betula ssp., 5%). The largest continuous forest areas are to be found in Western Ukraine (incl. Carpathians) and the Polissya region (north-west, Figure 38). Ukraine's total stock is estimated at 2.1 billion m³ with an average annual increase of 35 million m³, which largely exceeds the annual harvest of about 22 million m³ [71], [76].

FIGURE 38: FOREST COVER IN UKRAINE AS A PERCENTAGE OF LAND AREA [76].



The forest cover is relatively stable and slightly growing due to afforestation measures. However, there are several factors that may have a large impact on wood quantity and quality in the future. Those include the Ukrainian silviculture and timber harvest practices that continues to switch from mainly clear-cut harvesting to gradual and selective harvesting of the close-to-nature silviculture [76], [73]. This, if applied, in the long-term future, may result in a better stability and quality of timber and continuous forest cover. Another issue is the spruce and pine dieback that has a negative effect for some of Ukrainian regions where spruce/pine are prevailing. Anticipative long-term silvicultural measures are needed and will prove decisive here, too (Figure 39, [76], [73]).

FIGURE 39: SPRUCE DIEBACK AND WINDFALL DAMAGE IN RAKHIV REGION, ZAKARPTTIYA, UKRAINE [74].

Connected to these issues are the loss of about 190 km² per year of standing forest area (0.2% of the total forest area) due to forest pests, diseases, fires, adverse weather conditions and other reasons. Also, as of early 2019, 4,000 km² (5% of the total forest area) are affected from forest dieback. For the whole of Ukraine, 69% of timber comes from sanitary cuts which impacts the quality of timber. These three issues gain additional importance under the different climate change scenarios contemplated and are considered in the public reports of the SFRAU 2018 [75] and SFRAU 2019 [76].

The above mentioned close-to-nature silvicultural approaches are based on selective harvesting where the forest cover does exist continuously, the biotic diversity is preserved, the structure of natural different-age forests is recovered, the forest stand durability is maintained, and the timber is harvested in the amount equal to the annual increment. Based on the expert opinion, for the Carpathian region, annual growth of 2.0-2.5 million m³ of wood may be achieved by means of close-to-nature silviculture methods. Nowadays, one of the bottlenecks for wider application of close-to-nature silviculture is the low density of mountain forest roads and the limited use of the low impact harvesting machinery [77].

Another important topic in Ukrainian forestry is illegal logging. According to the forest protection and law enforcement agencies of Ukraine, there are about 8,000 cases annually and over 20,000 cubic meters of illegal logging causing damage to the forestry to about EUR 3.7 million. It is estimated that about 10% of Ukrainian timber is harvested illegally. The multiple possibilities and degrees of bypassing national laws are summarized in the 2018 report "Country overview to aid implementation of the EUTR" of the United Nations Environment Program (UNEP) [78].

One of the measures linked to illegal logging was the roundwood export ban (10-year moratorium) starting in 2015 (for pine starting in 2017) [79]. The export ban also includes the prohibition of exporting sawn wood from valuable tree species. The main objective for the moratorium was to achieve a decrease of forest cuttings for the export of timber to address the environmental problems of the Ukrainian forests. Also, the economic issue of increasing added value in Ukraine was the second reason [80].

Today, the impact of the moratorium on the development of the wood and furniture industries is estimated to be low to negligible [81], [78], [82]. The expected decrease of cuttings did not take place and, in many cases, roundwood was declared firewood for export. Capital investments into wood sawing, wood processing or furniture facilities did not increase as projected and the volumes of production of domestic products by companies did not increase substantially either. [83], [84]. Moreover, none of the companies interviewed in the framework of the present study mentioned notable differences in their businesses connected to the moratorium.

4.1 Ukraine's wood sector

4.2.1 Import and export activities of the Ukrainian wood sector

Table 25 shows Ukraine's international relative ranking to all other reporting countries and imports, exports, and trade balance for various wood products in 2018 [19], the latest year for which data is available. In 2018, Ukraine had a positive trade balance of almost US$ 1.2 billion for all wood and articles of wood and wood charcoal (HS code 44, [20]), with exports of almost US$ 1.5 billion vastly larger than imports of close to US$ 0.3 billion (Table 25). Ukraine ranks close to the leaders in exporting flooring panels, assembled, of wood (HS 441879, #10) and tools, tool bodies and tool handles (HS 441700, #11). In absolute values, wooden furniture (excluding for offices, kitchens and bedrooms, and seats, HS 940360) is with exports of US$ 92 million the leading export industry of Ukraine, followed by wooden packaging (HS 4415) with US$ 64 million, followed by wood doors and frames (HS 441820) with US$ 33 million for 2018 (Table 25). Ukraine also exports a sizeable amount of wooden bedroom furniture (HS 940350), and wooden kitchen furniture (HS 940340, Table 25). With the exception of fibreboards (HS 4411), where Ukraine has a negative trade balance of almost US$ 95 million, the country exports more plywood (HS 4412, trade balance almost US$ 25 million) and particle board and OSB (HS 4410, US$ almost US$ 25 million) than it imports (Table 25). Also, as shown in Table 25, Ukraine does not report any data on flooring panels, multilayer, (HS 441875) and tableware and kitchenware, of wood other than bamboo (HS 441990) according to the International Trade Center (ITC, [19]).

TABLE 25: UKRAINE INTERNATIONAL RELATIVE RANKING TO ALL OTHER REPORTING COUNTRIES (#) AND VALUE OF IMPORTS, EXPORTS, AND TRADE BALANCE ($1,000 - 2018) FOR VARIOUS WOOD PRODUCTS IN 2018 [19].

Product		Value imported		Value exported	Trade balance
	#	$1000 - 2018	#	$1000 - 2018	$1000 - 2018
Wood, charcoal	58	$294,487	27	$1,492,545	$1,198,058
Builders' products, others	62	$19,773	24	$174,251	$154,478
Wooden furniture	72	$24,359	36	$92,621	$68,262
Wooden packaging	61	$4,879	16	$64,150	$59,271
Wood doors and frames, others	105	$2,536	32	$33,708	$31,145
Wooden bedroom furniture	101	$4,546	35	$34,029	$29,483
Plywood, others	62	$30,586	31	$55,500	$24,914
Particle board, OSB, others	33	$64,709	27	$89,290	$24,581
(Solid) wood flooring	84	$430	10	$15,188	$14,758
Wooden kitchen furniture	75	$4,128	30	$17,069	$12,941
Wooden tools, handles, others	71	$348	11	$7,004	$6,656
Wood windows and frames, others	38	$2,916	29	$5,250	$2,334
Wooden office furniture	73	$3,954	43	$4,546	$592
Wooden frames	77	$390	45	$440	$50
Fibreboard, others	26	$120,618	35	$25,621	$94,997
Flooring panels, multilayer	--	no data	--	no data	no data
Tableware, kitcheware, others	--	no data	--	no data	no data

4.2.2 General overview on Ukraine's wood sector

The Ukrainian wood sector is well-diversified and includes a plethora of products, among others various categories of furniture, construction elements such as glued laminated timber and windows, semi-finished products such as furniture parts, wood-based panels, as well as pulp and paper. This diversity is a considerable asset creating competition, but also creates synergies in the value-added network for the benefit of the wood sector as a whole.

Moreover, wood processing, production of wood products and furniture are among the most dynamic industries in Ukraine. The industry profits from the inexpensive skilled labor costs in Ukraine that are linked to the devaluation of Ukraine's national currency Ukrainian (the hryvna) in recent years (Figure 40). Regardless of the value of the country's currency, which can be a blessing and a curse to exporters, the Ukrainian wood products industry has made improvements to its international competitiveness over the past years. In 2016, Ukrainian timber products were more than twice as competitive as the global average, as indicated by the RCA index, which is calculated by the product's share in a country's exports in relation to its share in the world trade (RCA indicator Ukraine 2.14 [86], Table 26, Figure 41).

FIGURE 40: EURO TO HRYVNIA EXCHANGE RATE 2011 TO 2020 [85].

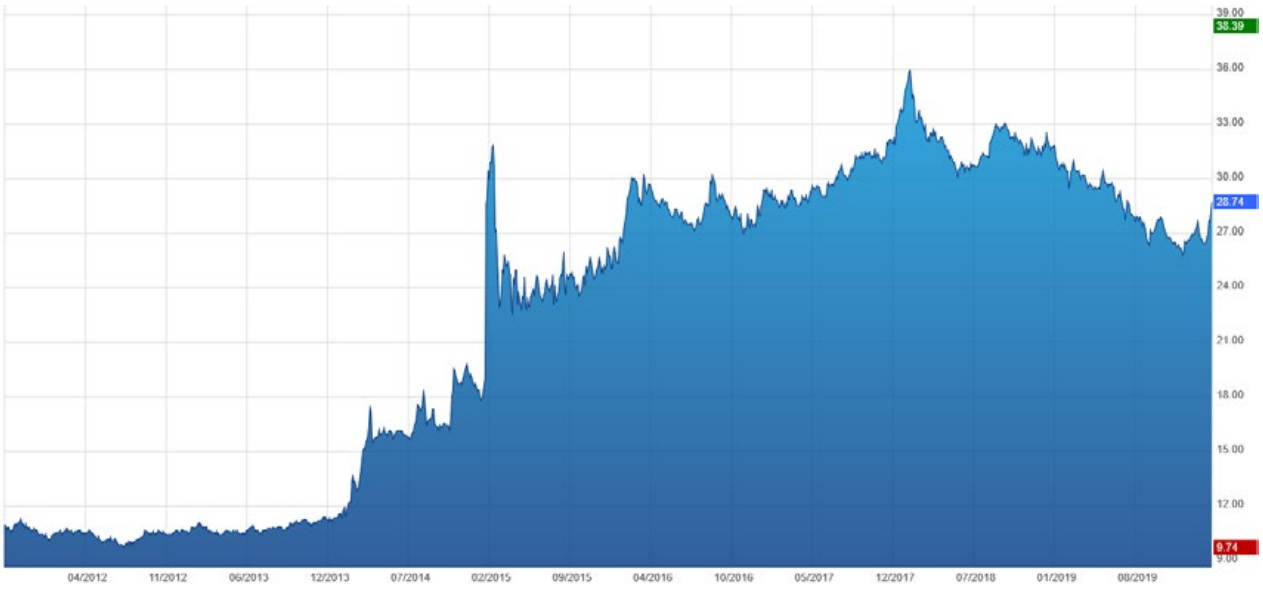
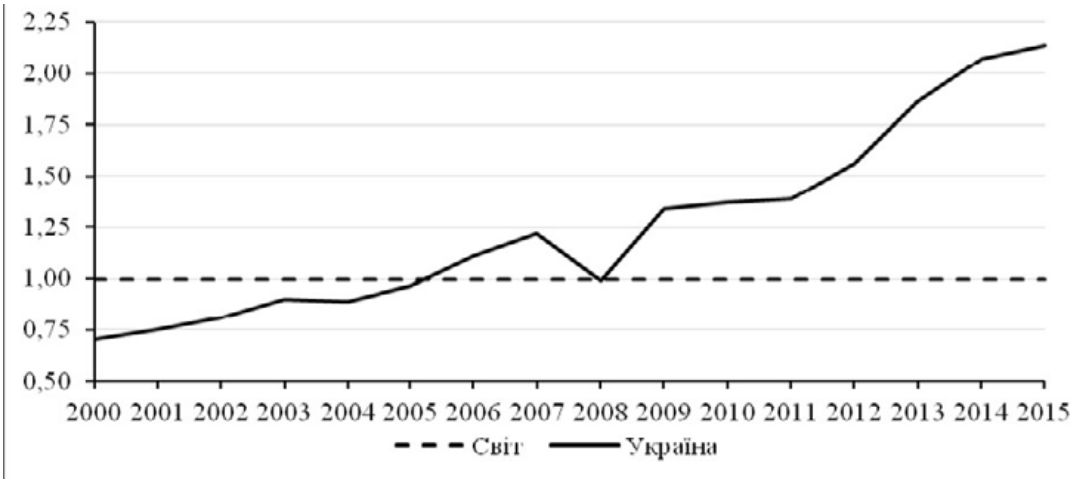


TABLE 26: RELATIVE COMPARATIVE ADVANTAGES OF UKRAINE'S WOOD INDUSTRY PRODUCTS IN COMPARISON TO CHOSEN COMPETITORS IN 2016 [86].

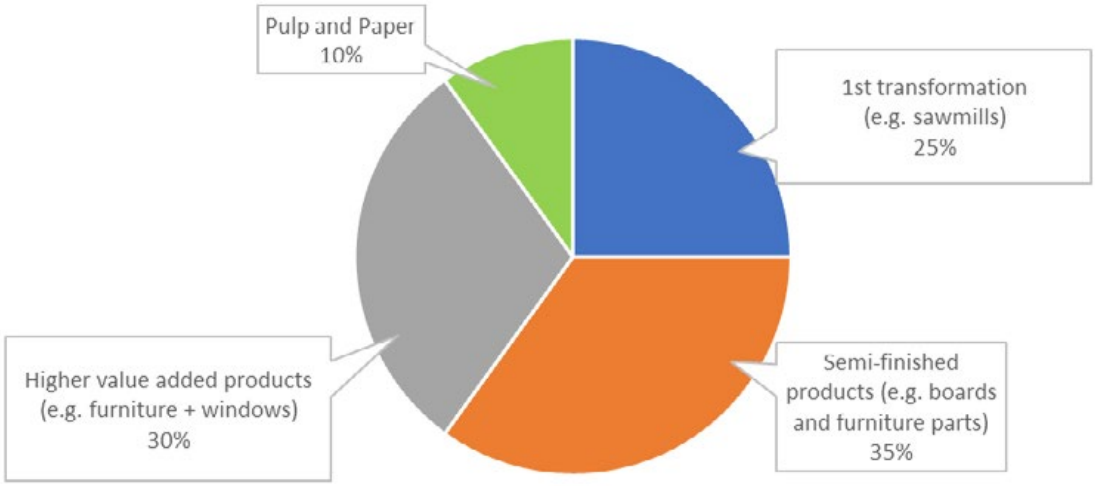
Country	RCA indicator
Poland	2.19
Ukraine	**2.14**
Russia	1.38
USA	1.20
Germany	1.11
Malaysia	0.89
China	0.67

FIGURE 41: RELATIVE COMPARATIVE ADVANTAGES OF UKRAINE'S WOOD INDUSTRY PRODUCTS IN COMPARISON TO WORLD AVERAGE FROM 2000 TO 2015 [86].



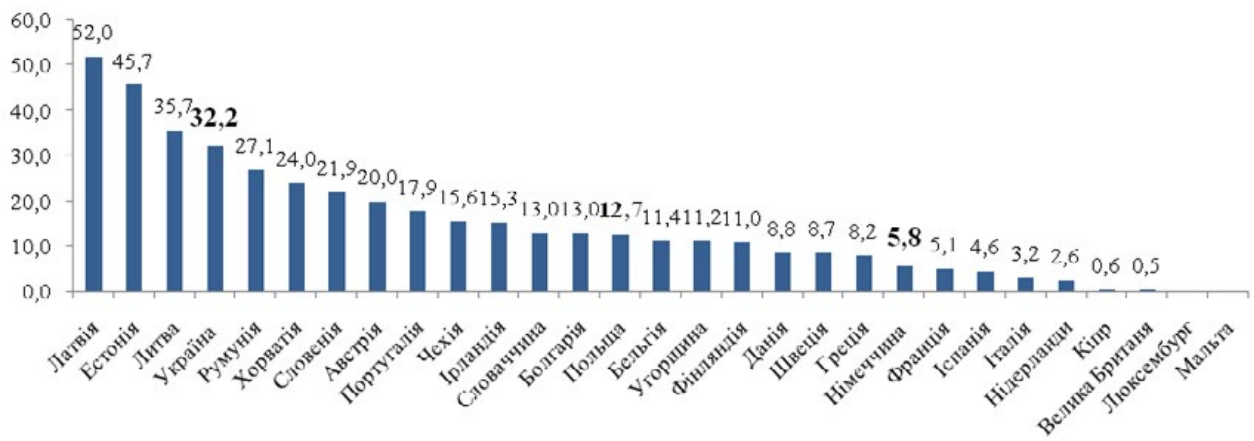
Ukraine's wood processing industry is comprised of approximately 6,500 enterprises, including approximately 500 are large and medium enterprises [87]. In fact, if sole proprietors were included in this statistic, the total number of enterprises would be approximately 25,000, however, as these sole proprietorships do not necessarily relate to actual economic activities, they were not included in this report [87]. Approximately 25% of the 6,500 enterprises mentioned above correspond to the 1st transformation (e.g. sawmills), 35% are active in the 2nd transformation, i.e. production of semi-finished products (e.g. boards and furniture parts) and about 30% of the companies correspond to the 3rd transformation and focus on higher value-added products (e.g., furniture, windows). The remaining 10% are active in the pulp and paper industry (Figure 42,[87] These data are approximate values due to diverging categorizations and a substantial number of micro-companies (up to 10 employees) of which a big part are not considered in the statistics, among other reasons.

FIGURE 42: DISTRIBUTION OF THE NUMBER OF COMPANIES ACCORDING TO THE LEVEL OF TRANSFORMATION [87].



The total annual production volume of wood and wood products was approximately EUR 4,290 million in 2017. The export share was 34.5% or EUR 1,435 million with increasing tendency. This corresponds to approximately 3% of all Ukrainian exports [88]. In 2016, Ukraine ranked 4th among EU countries in terms of share of exports of total production of wood products after Latvia, Estonia and Lithuania [88]. Other countries with high levels of exports of wood products (› 20%) are Romania, Croatia, Slovenia and Austria (Figure 43). The share of exports of total wood products produced in a country appears to be linked to both, resource availability for the development of relevant industries and relatively small domestic markets. For example, the economic leaders of the EU's (Germany, France, Spain and Italy) share of exports to total production is below 6% as their domestic markets are substantially larger with large numbers of customers and strong purchasing power (Figure 43, [88]).

FIGURE 43 : SHARE OF EXPORT IN PRODUCTION OF WOOD PROCESSING PRODUCTS IN UKRAINE AND OTHER EU COUNTRIES IN 2016 IN PERCENT [88].



From 2013 to 2017 the level of export orientation of the Ukrainian wood products industry increased by 20% (or 7.7 percentage points). In terms of exports of wood products in 2017 (EUR 1,435 million), Ukraine ranked 16th among EU countries (against 17th in 2014-2015 and 13th in 2012-2013), competing with Estonia, Hungary, Latvia and Romania [88]. However, to keep the volume of Ukrainian exports in perspective, Germany exported approximately 16 times the volume of Ukraine in 2017 [88]. Moreover, Poland's export volume was 4.75 times higher than Ukraine's, although both countries possess similar timber stock and Poland's a share of exports is only 13% [88]. Hence, Ukraine's export products have considerably lower added value than major competitors.

4.2.3 Company structure in the furniture sector

In 2018, the Ukrainian furniture sector consisted of 1,300 officially registered companies and 36,000 employees [87]. Geographically, the companies are distributed all over Ukraine, many of them having their own regional markets. The company locations depend on several factors, including closeness to forests, availability of suppliers, transportation infrastructure and traditions (some companies work since Soviet times). The Ukrainian furniture industry consists of a large number of micro-companies (up to 10 employees), some small (up to 50 employees) and medium-sized companies (up to 250 employees) and few large companies of over 250 employees.

Micro-companies include approximately 5,000 companies (including informal sector businesses, which are not considered by the Ukrainian state statistic service, or sole proprietors, which are not considered in this report). The smaller ones (4-5 employees) often buy components, assemble them and then sell directly to final users or on street markets using non-sophisticated, manual tools and portable machines. Such micro-companies include poor households looking for additional sources of income. Although the number of companies in this segment is relatively large, micro-companies have limited economic impact and their number and importance is likely to shrink as the economy grows [89].

The larger micro-companies, defined as having 6-10 employees, some stationary machines, a production area of 100-600 m^2, are more important to the Ukrainian production compared to the previous group, but are less important than SMEs. They can be registered as LTDs or as private companies, are relatively flexible and often produce craft products and furniture of medium quality. They focus on direct sales including smaller custom-made orders. Some of these companies may grow in the future, although the majority lacks a suitable strategy [89].

Small companies (10-50 employees) make up a relatively large group of approximately 300 companies. Just as the micro-companies, they are oriented towards the domestic market, working either with in-house designers or via design bureaus. Small companies' production systems are more industrialized; however, their production remains focused on custom-made orders with lot size one rather than industrialized mass production. Small companies' focus is typically on medium quality furniture, but often with more complex design. Some companies are active in export markets within small contract projects [89].

Medium sized companies (50-250 employees) include approximately 200 companies, some of which use industrialized processes designed for mass production. Typically, medium sized companies use mainly standard processing machines including, at times, computer numerical control machines (CNC). Medium sized companies' main focus is on the medium quality furniture segment. They often pay little attention to product design, however, there are some companies employing designers, who create one to two collections per year. These medium sized companies mostly produce for the domestic market while their exports depend rather on individual opportunities than on well-developed export channels. Medium sized companies sell their products mainly through independent dealers, but they can also work with large distributors, with some few companies having established their own brands [89].

In Ukraine, there are no more than 30 - 40 large furniture companies (companies with more than 250 employees), some with 1,000 or even more employees. In their production, they use a mixture of rather old non-automatized equipment and CNC machines. Generally, the technology level employed is high although sometimes not used with the efficiency required. Large companies focus on large volumes of production, mostly of no-brand products or products for customers' brand names. Large companies often specialize on cheap furniture for network shops and mass markets, predominantly produced from wood-based panels, while only a few large companies focus on solid wood furniture. Some large companies are great exporters and only very few are companies with forest investments [89]. Some of the largest and most prominent large Ukrainian furniture companies include:

- Largest companies: AMF, Merx, Mebel Servis, Svit Mebliv, VMV Holding, Lismaster, Ukraïna factory.
- Large companies: Grade, Sokme, Enran.
- Large companies producing furniture from solid timber: Lamella, Interstyle.
- Companies with foreign investment or joint companies: Morgan Furniture (Home Group, Estonia), Novy Styl (Poland), BRW (Poland), Ambiente Furniture (Actona, Denmark)

4.2.4 Company structure in the wood-based panel sector

Due to the type of industrial product and the very high investment costs, the wood-based panels market is dominated by strong international players in all countries. The main types of wood-based panels produced in Ukraine include oriented strand board (OSB) particle board, medium density fibre board (MDF), and plywood. OSB is used in construction and packaging, the three latter are widely used in the Ukrainian furniture industry [89]. The main producers in Ukraine are:

» Swiss Krono – a Swiss company working in Ukraine since 2000, invested in new production lines in 2003-2004. Produces particle board and OSB.

» Kronospan – Austria based and one of the world biggest producers of wood-based panels, controls Ukrainian company through a Cyprus based company. In 2007 they bought majority shares in Korosten Zavod MDF. At this plant MDF and laminates for floors are produced.

» Swisspan – belongs to Switzerland based Sorbes Group and produces mainly laminated particle board.

» Odec – a Ukrainian company, is the biggest producer of plywood in Ukraine. The majority of products is exported, with only small share used for furniture production.

» Wood panels are also imported from other countries, by companies like Egger, Cleaf, Pfeiderer, etc. Those imported panels are mainly used by companies focusing on more complex products with special surfaces, specific density or non-standard dimensions.

Ukraine has a small share in the global production and consumption of furniture, ranking 52nd and 62nd, respectively, among 100 countries listed in CISL 2018 report [89]. The Ukrainian demand for furniture has been historically satisfied by both, domestically produced and imported furniture. In general, the upper market segment was satisfied by imports from Italy and Germany, whereas imports from Asian countries supplied the less-expensive furniture. The domestic furniture industry had a substantially smaller market share than imported furniture and focused on satisfying the demand in the lower and medium quality segments [89].

However, the available data on export and import of furniture provides diverging information depending on the sources. According to the CISL 2018 report [89] and shown in Figure 44, starting with the world economic crisis of 2008 until 2014, import volumes decreased, mainly because the devaluation of the Ukrainian currency (Figure 40) led to higher prices for imported furniture. Consequently, the Ukrainian trade balance for furniture turned positive in 2014. At the same time and for the same reason, Ukrainian exports became cheaper for foreign buyers. In 2014, due to the war in the Eastern Ukrainian Donbass region both, imports and exports decreased substantially. However, since 2016 imports increased slightly again [89].

In contrast, according to the Ukrainian Association of Furniture Manufacturers (UAFM, [90]) and shown in Figure 45, imports increased until 2012 to US$ 543 million, then dropped down to US$ 162 million, most likely due to the war in the Eastern Ukrainian Donbass region. In 2019, imports are back on the level of 2010 (US$ 372 million). The same source shows that exports increased until 2013 up to US$ 555 million, changing the trade balance to positive in the same year. After this, similar to the imports, exports dropped to US$ 397 million in 2015 and afterwards increased up to US$ 675 million in 2019. Hence, with a positive trade balance of US$ 302 million, Ukrainian furniture exports are roughly twice as high as the imports. 84% of the furniture was exported to Europe and 59% of the imports came from Asian countries (Figure 45, [90]).

FIGURE 44 : EXPORT-IMPORT STATISTICS OF THE UKRAINIAN FURNITURE INDUSTRY FROM 2011 TO 2016, MILLION USD [89]

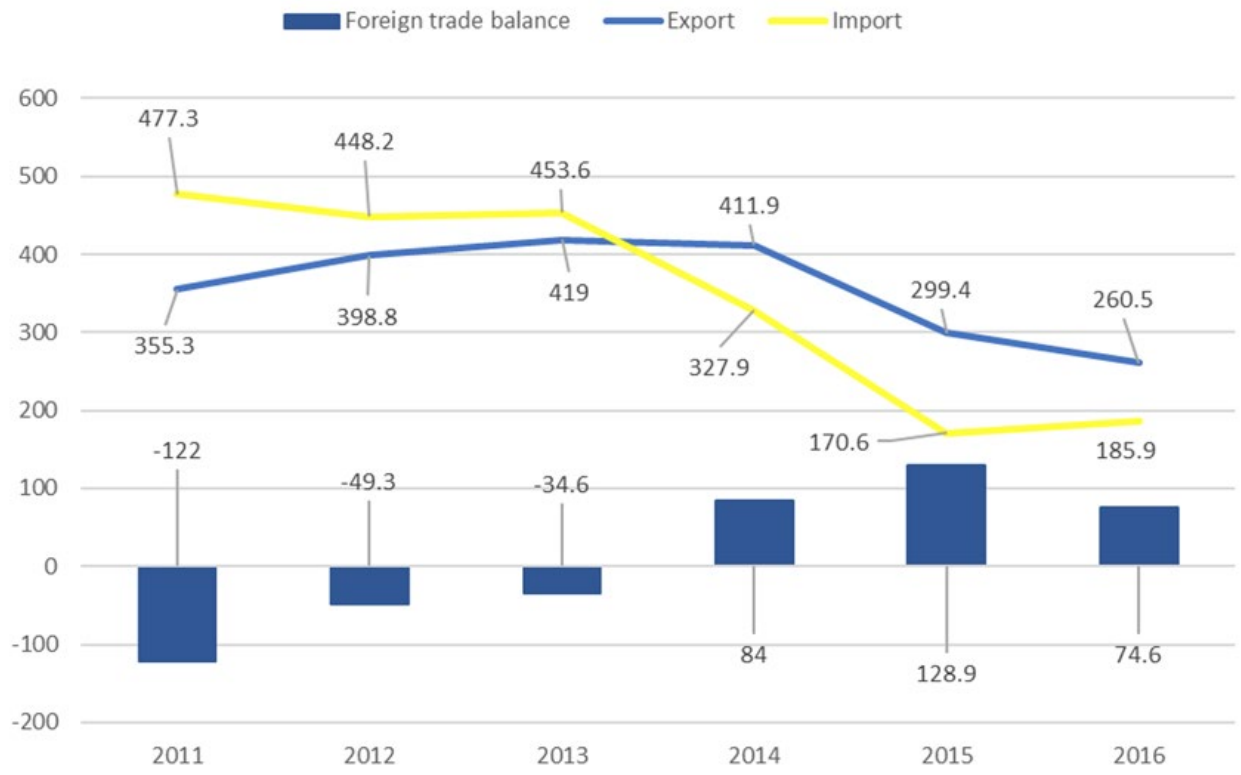


FIGURE 45 : EXPORT-IMPORT STATISTICS OF THE UKRAINIAN FURNITURE INDUSTRY FROM 2009 TO 2019, MILLION USD [90]

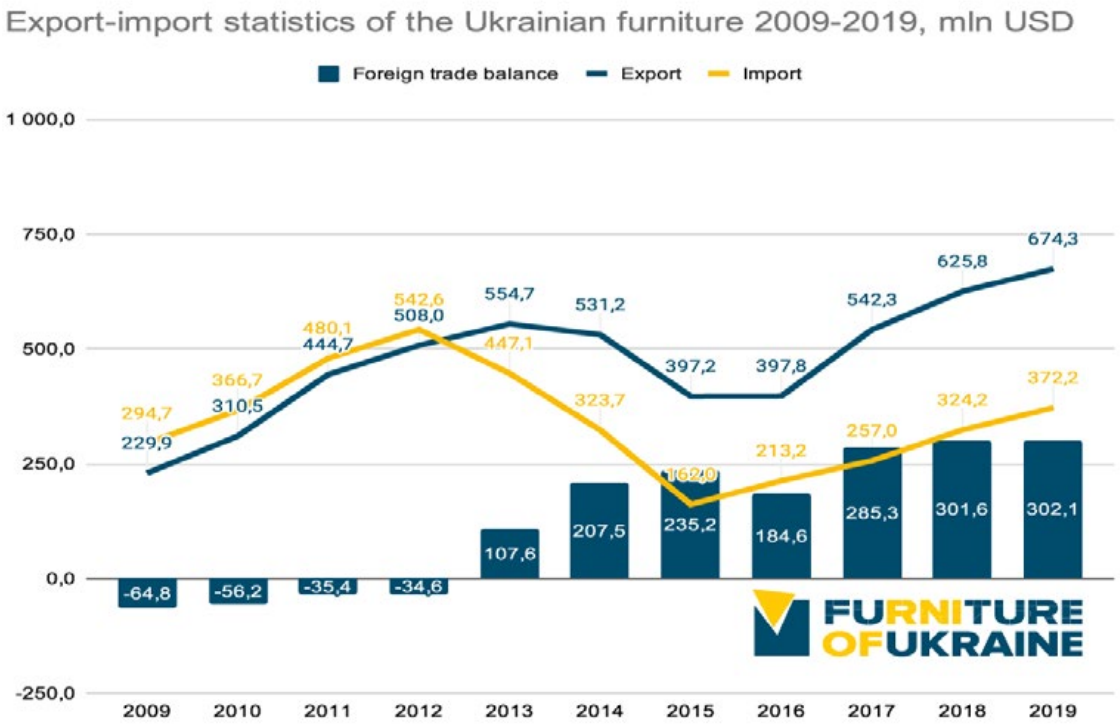


Table 27 shows country specific details on the decrease of imports, highlighting the 60% reduction of imports to Ukraine from 2011 to 2016, on average. The share of imports on the Ukrainian consumption is estimated to be about 25-30% considering the entire market (including shadow markets) [89]. Unfortunately, the data available to estimate market share vary greatly for various reasons (illegal imports, diverging classifications, triangulations, etc.).

TABLE 27: IMPORT OF FURNITURE TO UKRAINE FROM 2011-2016 BY COUNTRIES OF ORIGIN, MILLION USD [89]

	2011	2012	2013	2014	2015	2016	% share 2011	% share 2016	% change 2011-2016
World	477.3	448.2	453.6	327.9	170.6	185.9	100.0%	100.0%	-61.0
Italy	194.0	171.6	169.4	124.0	62.7	64.8	40.7%	34.9%	-66.6
China	100.6	98.1	96.0	65.9	31.8	33.8	21.0%	18.2%	-66.3
Germany	33.2	33.3	31.9	24.9	16.8	18.4	7.0%	9.9%	-44.7
Poland	45.1	43.3	49.5	37.6	16.5	18.2	9.4%	9.8%	-59.7
Turkey	9.6	12.9	13.9	13.2	5.1	6.8	2.0%	3.7%	-29.0
Other countries	95.1	89.1	92.8	62.4	37.6	44.0	19.9%	23.6%	-53.8

Imports from Asia, especially from China, had a substantial market share of imported furniture because Asian producers offered fairly low-quality products with rather poor design, but for a competitive price. However, starting in 2014, the labour costs in Ukraine decreased in comparison to China and other Asian countries. Therefore, the competitiveness of the Ukrainian producers in the domestic market increased and hence reduced the market share of Chinese producers from 21% in 2011 to 18% in 2016 [89].

Higher quality furniture, estimated to make up 10% -15% of the total domestic Ukrainian furniture market, is mostly imported from Italy and Germany, the main foreign suppliers in this market niche (Table 27). While Italy's market share decreased slightly by 2016 to 35% from 41$ in 2011, Germany's market share increased to 10% in 2016 from 7% in 2011, respectively [89].

However, in summary, the process of import substitution of furniture in Ukraine has gained strength thanks to the

improved competitive position of the country initiated with the devaluation of its currency in 2014. This trend is ongoing in the middle and middle-lower price segments of the domestic furniture market. Clearly, the devaluation of the Ukrainian currency has opened up new opportunities for domestic producers domestically and abroad by becoming more competitive by offering the same quality for a lower price, unless they buy expensive components or fixtures from abroad. Thus, Ukraine has considerable upside potential for its furniture industry. Domestically, Ukraine consumes about 4 times less furniture per capita than the world average and 10 times less than the average European country (Figure 46, [89]).

FIGURE 46 : CONSUMPTION OF FURNITURE PER CAPITA 2017 [89].

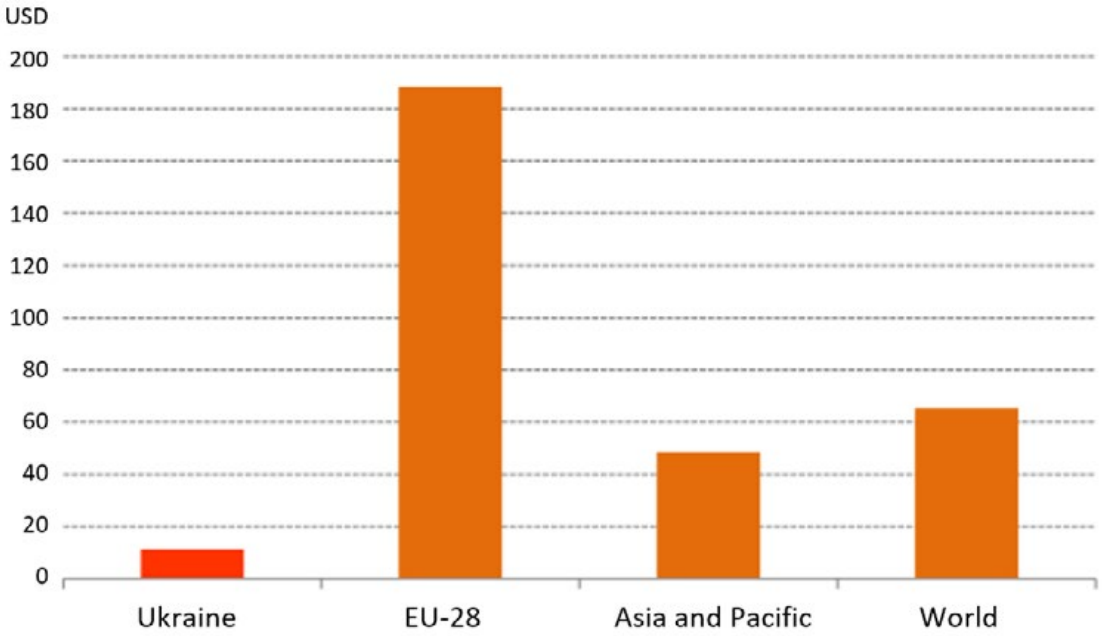
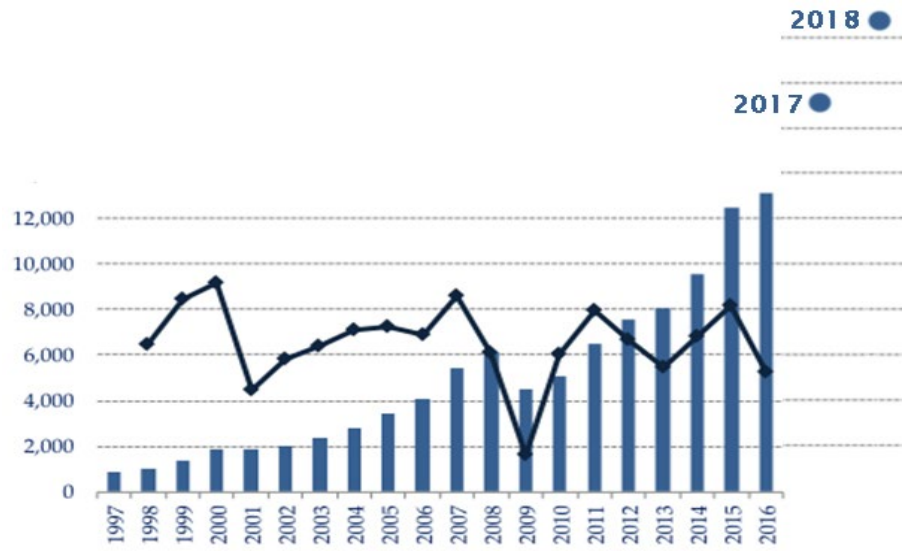


Figure 47 shows that the Ukrainian furniture consumption from 1997-2016 was steadily increasing in nominal currency (UAH) apart from the consequences of the world economic crisis in 2008. However, in real terms, when considering the UAH devaluation during the same period, fluctuations are much higher (Figure 47) and real furniture spending is only now approaching the levels reached in the last decade of the last century [89].

FIGURE 47: UKRAINIAN FURNITURE CONSUMPTION FROM 1997-2016 IN MILLION UAH (RED BARS) AND IN NORMALIZED MONEY CONSIDERING DEVALUATION OF HRYVNA (DARK RED LINE) (UAH 10 BILLION ≙ EUR 380 MILLION). ADAPTED FROM [89].

FIGURE 48: UKRAINIAN FURNITURE PRODUCTION 1997-2018 IN MILLION UAH (BLUE BARS) AND IN INFLATION ADJUSTED TERMS TAKING INTO ACCOUNT THE DEVALUATION OF THE HRYVNA (BLACK LINE) (UAH 10 BILLION ≙ EUR 380 MILLION). ADAPTED FROM [89].



Furniture exports of Ukraine account for about 40% of the total production (EUR 804 million in 2018, [89]). In money terms, the export of Ukrainian furniture is moderate. It is 260 million USD in 2016 and 313 million USD in 2017 (preliminary assessment). Lithuania and Slovakia, where furniture industry is similar by share of export (Figure 43), export four times more [89].

The Ukrainian furniture production volumes in UAH shown in Figure 48 displays steady growth in real values (blue bars), but shows a less promising picture in inflation adjusted terms (black line). In inflation adjusted terms, the Ukrainian furniture production in 2016 was below the production in 1998. With the devaluation of Ukraine's national currency and the resulting inflation, prices for imported components and hardware increased, driving up the cost of domestic furniture thereby lowering demand and, hence, production.

Figure 48 also shows that after 2008, the production volumes decreased due to the global economic crisis. Starting in 2010, growth resumed, but it was again negatively affected in 2014 by the war in the Eastern Ukrainian Donbass region. Moreover, Ukraine lost Russia and other Commonwealth of Independent States (CIS) countries as the main sales markets for Ukrainian furniture producers as well as many of the production facilities located in Eastern Ukraine. The data in Table 28 reflects these events and highlights the decline of Russia's share in the Ukrainian furniture export from over 50% in 2011 down to 14% in 2016.

In 2017, the Free Trade Agreement with the European Union (DCFTA, [91]) came into force and as a result, the geographically close European market gave Ukraine the opportunity to become an integral part of the European supply chain and create new economic centers of production to replace capacities lost in the east (Table 28). However, this readjustment of markets is a long-term process and it will take years to compensate for the losses in the markets of Russia and the CIS [89], [91].

TABLE 28: EXPORT OF FURNITURE FROM UKRAINE FROM 2011-2016 BY COUNTRIES OF DESTINATION, MILLION USD ([89].

	2011	2012	2013	2014	2015	2016	% share 2011	% share 2016	% change 2011-2016
World	355.3	398.8	419.0	411.9	299.4	260.5	100.0%	100.0%	-26.7
Poland	10.1	9.4	8.2	19.0	18.7	45.4	4.0	19.3	348.0
Russia	142.4	174.6	197.4	195.3	113.0	33.5	55.8	14.3	-76.4
Belorussia	17.8	23.6	29.3	27.8	14.1	30.4	7.0	12.9	71.1
Germany	16.1	12.7	13.4	16.4	26.3	29.1	6.3	12.4	81.4
Kazakhstan	63.4	84.8	83.5	65.3	35.8	12.5	24.9	5.3	-80.4
Other countries	105.5	93.7	87.1	88.1	91.5	109.6	41.4	46.6	3.9

4.3 The Ukrainian wooden door and window sector

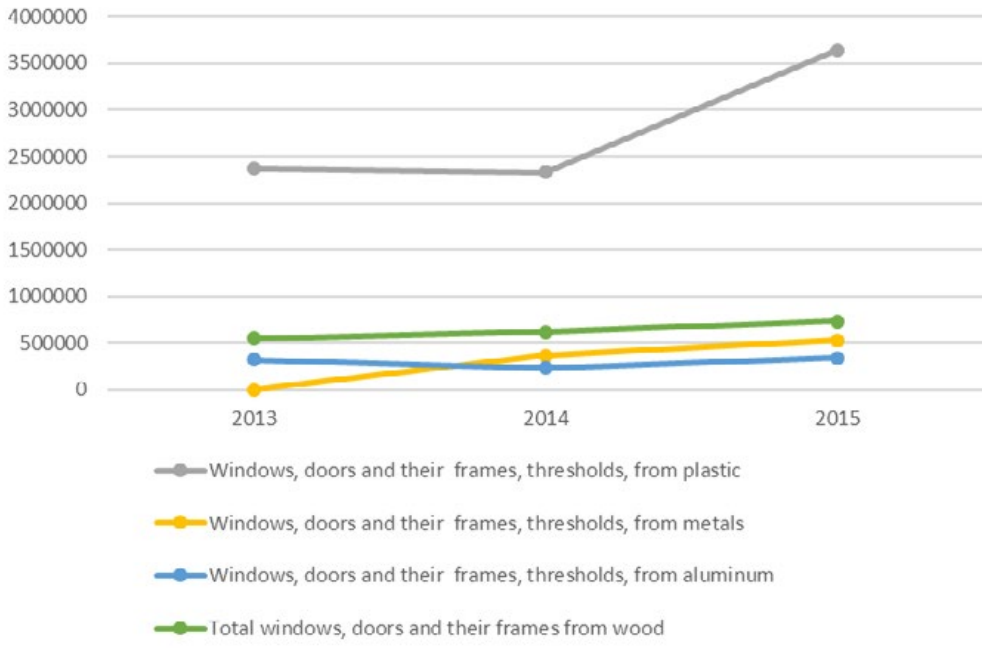
Windows and doors for buildings are produced and used not only for new construction, but also for the repair and remodelling market, especially combined with thermo-modernization efforts to improve energy efficiency. Considering the high prices for gas and energy in Ukraine and given the fact that the majority of buildings were built during Soviet times with little attention to energy efficiency, creates a dire need for thermo-modernization. Furthermore, efforts to make buildings more energy efficient are supported by state programs (128 local programs in 2016 that support "warm loans" for thermo-modernization of residential buildings [92]. According to the Ukrainian Association of Window Systems (UAWS), in 2019, approximately 90% of the total production of wooden windows were exported (personal communication 2020 cf. Appendices A-9.1).

Ukrainian wooden windows production steadily increased in recent years both in number of pieces and total value added (Table 29, [93]). However, as in most economies around the globe, plastic windows and doors make up the largest share of total window and door production in Ukraine (Figure 49).

TABLE 29: SALES OF DIFFERENT WINDOWS AND DOORS SEGMENTS AND MATERIALS FROM 2013-2015 [93].

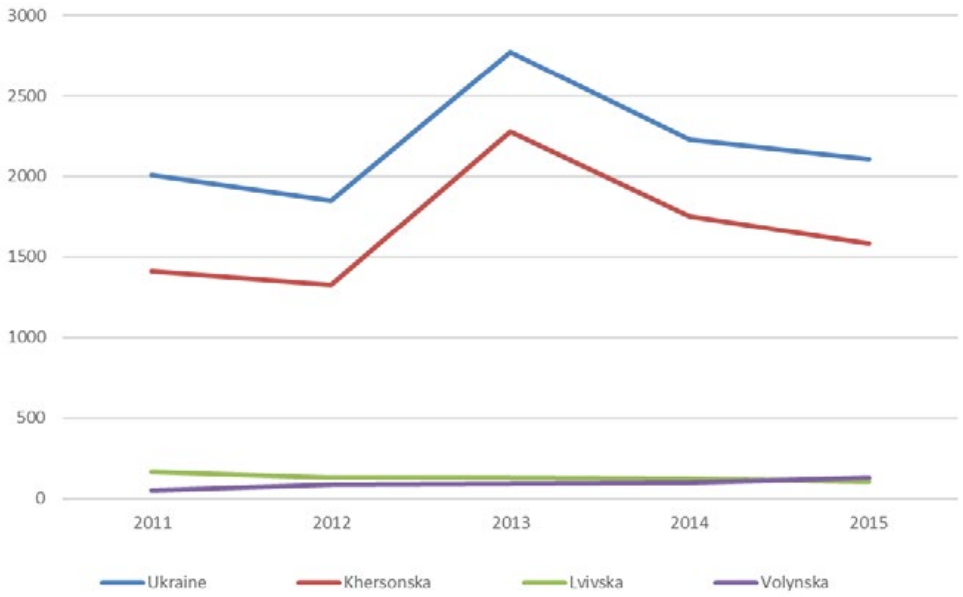
Products	2013		2014		2015	
	Quantity 1,000 units	Value 1,000 UAH	Quantity 1,000 units	Value 1,000 UAH	Quantity 1,000 units	Value 1,000 UAH
Windows, doors for balcony and their frames, from wood	81	146,276	80	181,763	87	229,762
Doors and door frames, from wood	393	402,552	386	440,883	419	503,894
Total windows, doors and their frames from wood	474.6	548828	467.3	622646	507.6	733656
Windows, doors and their frames from plastic	2,531	2,373,248	2,080	2,330,101	2,227	3,640,793
Windows, doors and their frames from metals	201	280,176	191	368,430	207	531,332
Windows, doors and their frames from aluminium	270	324,712	200	233,162	168	343,065

FIGURE 49: SALES OF DIFFERENT WINDOWS AND DOORS BY AND MATERIALS FOR 2013 TO 2015 IN THOUSAND UAH [93].



Windows and doors are produced in most Ukrainian regions (oblasts). However, 86% of the total Ukrainian production in 2105 were produced in only 3 oblasts. In fact, 75% of the total national production are produced in Khersonska oblast (Figure 50).

FIGURE 50: UKRAINIAN PRODUCTION OF WOODEN WINDOWS, DOORS, THEIR FRAMES AND THRESHOLDS FROM 2011-2015 INCL. THE THREE OBLASTS WITH THE HIGHEST PRODUCTIONS (IN THOUSAND PIECES) [94].



4.4 The Ukrainian wooden door and window sector

Construction output in Ukraine increased by 17% in 2016 to 2015, after a cumulative decline of 42% between 2012 and 2015. During the first quarter of 2017, construction output in the Ukrainian non-residential sector increased by almost 21%, in the residential construction sector by 17% and in civil engineering by 17%, compared to the same period of the previous year [95]. In 2017, Ukraine's construction market was valued at Euro 7.1 billion, and a rise of 4.4% was forecasted for 2018, with further increases of 2.8% for 2019 and 3.1% for 2020 forecasted. In 2018, Ukraine put an estimated 103,141 residential units into service, with an average area of 84.2 m^2. The total area of residential buildings in 2018 was 8.69 million m^2, a decline of 5.7% from 2017 (when it was 9.22 million m^2).

In 2018, an estimated 26,554 single-family units were put into place, with an average floor area of 160 m^2. Also, 76,587 new apartment units with an average area of 58 m^2 were constructed in 2018. in 2017, 39.970 residential buildings were started, an increase of 1.5% from 2016 (when there was 39.360 starts). The average size of starts also increased, from 10.014 m2 in 2016 to 11.368 m2 in 2017. In 2019 too many housing units were put in service and are slightly oversupplied. This overbuilding is a result of Ukraine's past housing deficit. However, looking forward, the Ukrainian residential construction sector is projected to decline [96].

Construction is one of the largest consumers of timber products in the EU countries, however, the situation is different in Ukraine. In 2015, construction consumed 10.8% of wood processing output in Poland and 8.5% in Germany. In Ukraine, construction consumed only 2.1% of wood processing output in 2015 and for 4.5% in 2017. Consumption of wood products by the Ukrainian construction sector for 2017 amounted to UAH 4149 million, an increase of 138% compared to 2016 and 195% more than in 2013 (in UAH equivalent). In dollar terms, this difference was +129% and -11% for 2016 and 2013, respectively. To put these numbers in perspective, the consumption of wood products by the construction sector in Poland's economy was more than 30 times higher (2015), and in Germany by almost 88 times higher (2015) [88].

4.5 Available Services for the Wood Sector6 7

4.5.1 Public Sector Support Institutions

Ministry of Development of Economy, Trade and Agriculture of Ukraine (MDETA)

MDETA is the main authority in the system of the central government of Ukraine responsible for formation and realization of state economic and social development policies (business economics); regulation of consumer prices; industrial, investment and trade economic policies; development of entrepreneurship; technical regulation and security of consumer rights; inter-agency coordination of economic and social cooperation of Ukraine with the European Union. The ministry is headed by a minister, first deputy and other deputies to assist the minister.

National Accreditation Agency of Ukraine (NAAU)

The main functions of the NAAU are accreditation of conformity assessment bodies and further control over conformance of accredited bodies to the accreditation requirements. NAAU is a member of the International Laboratory Accreditation Cooperation (ILAC) and a signatory to the Mutual Recognition Arrangement (ILAC MRA).

Ukraine Standardization Agency (UAS)

Ukraine Standardization Agency is the new name of the agency formerly known as the Ukrainian Research and Training Center of Standardization, Certification and Quality. The Law of Ukraine "On Standardization" which came into force on January 3, 2015 [97], sets the conditions for the harmonization of the national standardization system to international and European criteria, as well as the implementation of the Association Agreement between Ukraine and the European Union, in particular in regards to the implementation of the necessary administrative and institutional reforms.

Technical committees for standardization TC

TCs play a key role in standardization as a TC is a group responsible for the development and the drafting of standards. The draft is then ratified by the national standards organizations. All stakeholders interested in the draft standard are entitled to participate. Stakeholders are composed of experts in a specific field representing national committees, industry, professional associations, government, trade unions as well as other stakeholders and national standardization bodies. Relevant TCs for the Ukrainian wood sector include:

- 18 Forest Resources
- 218 Timber/ISO
- 151 Furniture
- 300 Doors and Windows

State Enterprise "Ukrmetrteststandard"

As in other countries, the metrology system in Ukraine has three levels: (i) national measurement standards (scientific metrology); (ii) calibration (industrial metrology); and (iii) verifications (legal metrology). MDETA in this system takes the role of the Central Metrology Authority and is responsible for scientific metrology and for the coordination of industrial and legal metrologies. There are four Designated Institutes (DIs) in the area of metrology, which are referred to as Scientific Metrology Centers in domestic legislation. These Scientific Metrology Centers are located in Kyiv, Kharkiv, Lviv, and Ivano-Frankivsk; from the technical perspective, these, together, constitute a virtual National Metrology Institute (NMI).

The State Enterprise (SE) "Ukrmetrteststandard" is the all-Ukrainian state research and production center for metrology, certification, testing and consumers' rights protection. It is also organizational and methodological center for certification of electro-technical equipment (UkrTEST) [98].

State Research Institute of Building Constructions (NIISK)

According to NIISK "the Institute is the base organization for scientific and technical activities in construction in the areas of creating the national regulatory framework integrated into the international legal and regulatory space of technical regulation in construction, improving the buildings and structures reliability and safety, ensuring the energy efficiency and improving the energy performance of buildings and structures". On their testing site in Kyiv they test i.a. construction elements such as beams and wall-elements, windows and doors including weathering, sound and air permeability.

State Forest Resources Agency of Ukraine (SFRAU)

About 70% of the Ukrainian forests are managed by the State Forest Resources Agency of Ukraine which as of 2019 is coordinated by the Ministry of Energy and Environment of Ukraine. Regional forest directorates, one for each province, serve as the Agency's regional bodies, with 310 state enterprises subordinated to them.

The State Forest Resources Agency of Ukraine (SFRAU) is the central executive body that implements state policy in the forest sector. The variety of roles (control, administration, legislation and management and commercial activities) carried out by SFRAU, its subordinate institutions and enterprises is noted to contain inherent conflicts of interest and is extensively prone to corruption. Calls for separating regulatory functions from the operational ones have increased within the government but also from the side of the private sector [99].

[6]This report uses materials and concepts found in UNIDO 2019 [1][1] freely to avoid duplication of efforts.

[7]Those institutions consulted for the present study are listed in Appendice A-9.1

Since 2013 SFRAU implemented the unified state system of electronic timber tracking in enterprises under SFRAU supervision. The system provides accurate accounting of forest resources in the online mode and is based on marking timber by special barcode tags and use of mobile electronic devices for accounting operations in forest conditions. SFRAU also implement the "Prozorro.Sales" project

the sale of lots of unprocessed wood through the system of electronic auctions. The project will run from April 2020 until April 2021. The objective is to reduce corruption illegal logging and sale of Ukrainian timber [100].

Ukraine Association of Quality (UAQ)

In 1989, according to the plan of the Union of the engineering-research societies of Ukraine, and with support of the State Committee of Ukraine for Technical Regulation and Consumer Policy, a national non-governmental association in the quality area was established for the first time in Ukraine. This association, named Ukrainian Association for Quality (UAQ), has initiated the public movement towards quality in Ukraine and became its leader.

Nowadays UAQ unites about 450 leading enterprises form all regions of Ukraine and about 1000 specialists in the quality area from different countries. UAQ has regional branches, branch technical committees, units, clubs, and professional organizations for quality. Among UAQ's public structures there is Quality Leader's Club, which united the best Ukrainian enterprises 10 years ago, e.g., the winners and laureates of the Ukrainian National Quality Award. UAQ has wide international recognition. UAQ conducts its activity without governmental financial support and pays fees to international quality organizations from its own budget.

In accordance with the statutes, the main goal of UAQ is formation of the public opinion and policy in the quality sphere. During the last 15 years, the main activity of UAQ was focused on the formation of the new quality philosophy, summarizing and promotion of the national and international best practices in business management, support of Ukrainian enterprises in business excellence improvement and competitiveness and on their integration at the world markets as well as on Ukraine's integration to the WTO and to the European Union [101].

State Company Forest Innovation-Analytical Center

State Company Forest Innovation-Analytical Center is a state company responsible for the implementation of electronic timber tracking, timber auctions, certificates and mobile applications (including the "Forest in the Smartphone" project). It issues a quarterly newsletter about timber supply and demand, pricing and trends [102].

Export Promotion Office EPO

Until recently, the export promotion office (EPO) was an NGO and today is an advisory and consultative body to the Ministry of Development of Economy, Trade and Agriculture of Ukraine. The EPO has been founded as one-stop-shop to help Ukrainian exporters in opening new markets. The objective is to help Ukrainian businesses to be successful on the international markers by developing their export competencies, ensuring partnership and cooperation between Ukrainian and foreign businesses, promoting Ukrainian products and services abroad. EPO works in cooperation with the Ukrainian and foreign businesses and associations, trade support organization (e.g., German Import Promotion Desk (IPD)) and foreign consultants. They focus on 4 main areas:

- Export Information: export and trade databases, analytics on priority markets and industries.
- Export Education: training, seminars, webinars and other educational events to develop the export competencies of Ukrainian business.
- Export services: Initial consulting of Ukrainian companies and potential foreign importers, who are looking for partners in Ukraine; export readiness assessment for Ukrainian businesses, assistance in finding business partners, consulting on tender procedures in GPA-countries[8].
- Business Opportunities: events that can open new export opportunities, such as Trade Missions, Exhibitions, B2B and B2G meetings, and other business networking events.

Their export strategy focuses on several priority industries: machinery, agricultural food, IT, but also "creative industries" – including handicrafts and furniture. The wood sector is considered in their portfolio including valuable data on business and trade. As a public body, they fulfill a key function for public and private partnerships [103], [104].

Ukraine Investment & Trade Facilitation (ITFC)

Ukraine Investment & Trade Facilitation Center (ITFC) is an independent non-profit organization serving as an expert platform of highly specialized professionals focusing on investment, trade, and trade-related policy matters offering both international expertise and local insight.

Created in 2014 as a multi-stakeholder initiative, the ITFC's goal is to advance Ukrainian economy through the best international experience for developing and implementing sweeping reforms, export promotion, removing barriers to trade, and addressing sector-specific issues of Ukraine's most promising industries.

Today, the IFTC does not focus on the wood sector. However, they play a key role in Ukrainian business and trade and can be considered a valuable source of information and potential cooperation partners [105].

Union of the Entrepreneurs of Small, Middle-Sized and Privatized Enterprises of Ukraine

The Union of the Entrepreneurs of Small, Middle-Sized and Privatized Enterprises of Ukraine is an all-Ukrainian, non-government organization which includes entrepreneurs, small-scale and middle-scale enterprises, and joint stock companies that counts all in all about 13,000 enterprises. Their objectives are to create organizational and technical preconditions for enterprise development, to encourage the realization of National and regional programs in enterprise development, market infrastructure, to consider small-scale business problems, to favor the development of the legal basis for the state support of small-scale, middle-scale and private enterprises and to extend foreign investments in the Ukrainian economy and to support small-scale, middle-scale and private enterprises in foreign market entry [106].

State Enterprise "Ukrainian Industry Expertise" (UEX)

UEX, established in 1993, is a leading company in Ukraine that studies Ukrainian and international markets, provides business consultant services and conducts industrial policy research. UEX constantly interacts with state authorities. Specifically, they provide price information to such government bodies as the State Fiscal Service of

[8] WTO Agreement on Government Procurement (GPA) [108].

Ukraine, Prosecutor's Office, Security Service of Ukraine, and other. They prepare information and analytical materials used by the Ministry of Development of Economy, Trade and Agriculture of Ukraine for trade investigations. They also provide information and analytical materials for the Antimonopoly Committee of Ukraine concerning the impact of concentration on market competition [107].

4.5.2 Academic and Research Institutions

Ukrainian National Forestry University (UNFU, sometimes incorrectly referred to as "NLTUU" which is the transliteration of the abbreviation in Ukrainian (НЛТУУ))

The National Forestry University of Ukraine is situated in Lviv and considered the Ukrainian higher education institution with the specialization forestry. During its history, the university has become a prominent centre of both forest and wood engineering education and science in Ukraine, which actively integrates into the European education system [109].

Ukrainian Research Institute of Forestry and Forest Melioration (URIF&FM)

URIF&FM is the leading forestry research centre in Ukraine. URIF&FM has a Steppe division in Kherson and a Polissya division in Zhytomyr. It also has 7 forest research stations: in Vinnytsa, Kyiv, Krasnotrostyatets, Crimea, Luhansk, Mariupol and Novgorod-Siverskiy [110].

Ukrainian Research Institute for Mountain Forestry (UkrRIMF)

UkrRIMFis a research centre that carries out research related to forest management in mountainous areas. UkrRIMF conducts research in the mountainous Carpathian region (in Ivano-Frankivsk, Zakarpattia, Lviv and Chernivtsi Oblasts). The institute has a research and experimental base in Mukacheve, a control station in Ternopil and also hydro stations [111].

National University of Life and Environmental Sciences of Ukraine (NUBIP)

NUBIP is a leading public university in the field of agriculture in Ukraine and located in Kyiv. NUBIP also includes the Education and Research Institute of Forestry and Park Gardening incl. its field experimental station in Boyarka. In 2011, the National FSC office was set up on the basis of this Institute, headed by Prof. Pavlo Kravets. Professors of NUBIP also are currently heading and participate in the Technical Committee 18 "Forest resources". Some of them act as auditors / advisors to the FSC and FSC COC certification [112]. The university also hosts the Regional Eastern Europe Fire Monitoring Centre [113].

National University of Kyiv-Mohyla Academy (NaUKMA)

NaUKMA is a national research university located in Kyiv. The Ukrainian Association of Furniture Manufacturers (UAFM) cooperates with NaUKMA students for organizing buyer trade fairs for the furniture sector in Kyiv (UAFM, personal communication 2020 cf. Appendices A-9.1).

4.5.3 Business, trade and consulting organisations

Ukrainian Association of Furniture Manufacturers

The Ukrainian Association of Furniture Manufacturers (UAFM) is a voluntary, independent, non-profit association of enterprises established on the basis of equality, self-determination and community to advance the economic, legal, social and other interests of its members. The association's objective is to combine efforts of furniture manufacturers for the purpose of protecting and expanding their rights and interests, as well as promoting the national furniture manufacturing business [114].

Association of Furniture, Woodworking Enterprises and Organizations of Ukraine "MEBLIDEREVPROM"

Association of furniture and woodworking enterprises of Ukraine "Mebliderevprom" was founded in December 1998. Today, the Association unites leading companies for the production of, furniture and other wood products. Member enterprises of the Association use more than 5 million cubic meters of wood annually. Enterprises included in the Association produce for the domestic consumption and for the export. The main purpose of the Association's activity is to develop domestic production, increase the competitiveness of wood products, and expand its sales in domestic and foreign markets. The main objective of the Association is to achieve the statutory goals of its activities within the framework of the current legislation of Ukraine, namely: the formation and implementation of a strategy for the development of the furniture and woodworking industry; to promote and provide practical assistance to the members of the Association in developing and strengthening their production and economic base; resolving issues of stable raw material provision; organization of exhibitions, conferences and seminars. "Mebliderevprom" actively cooperates with the Verkhovna Rada and the Government of Ukraine and other state bodies of government and the mass media. The association "Mebliderevprom" is a member of European Federation of Furniture Manufacturers (UEA) and World Furniture Confederation [115].

Union of Ukrainian Entrepreneurs (SUP)

SUP unites over 500 companies from various sectors. It was established free of political interests with the goal of protecting entrepreneurs' interests and creating a favorable business environment in Ukraine [116]. One of its aims is to support export of Ukrainian made goods, and one of its committees deals particularly with furniture [117] and has developed projects like "Buy from your locals" and mandated a research of Ukrainian Export Strategy for Furniture companies [118].

Ukrainian Association of Window Systems (UAWS)

UAWS refers to all types of windows incl. wooden windows. They are also leading the Technical Committee "300 Doors and Windows" [119].

Associations of the woodworking industry

Currently strong associations have yet to evolve, but numerous regional actors are emerging and interested in lobbying for access to raw resources and promotion. Innovation projects are not yet on their agendas. Among these fledging associations are:

- Ukrainian Association of Wood Processing Equipment [120].
- Cluster „Woodworking Industry", Lviv as part of Lviv Industry Hub [121].
- Wood Processing and Furniture Cluster, Lviv [122].
- Wood processing cluster of Cherkasy region [123].
- Association „Wood processors of Ukraine" of Vinnytsya [124].
- Wood processing associations on the district or regional level including of Zakarpattia; Chmelnytsky; Volyn; Nadvirna rayon of Lviv oblast; Kyiv; Bukovyn; Prykarpattia; Lviv Union of wood processors and forest harvesters – to name just a few. Their activities are mostly situational, and often relate to lobbying access to and improvement of regulations in terms of access to raw resources.

Import Promotion Desk (IPD)

German Import Promotion Agency funded by the German Federal Ministry for Economic Cooperation and Development. "The[ir] goal is sustained and structured promotion of the import of certain products from selected partner countries – in compliance with high quality, social and environment standards. The IPD brings together the interests of German importers with those of exporters in emerging growth markets. By promoting market access for small and medium enterprises from preselected partner countries to the European market, we advocate the creation of new jobs and enhanced national export capacities. Meanwhile, European companies are able to optimize their import processes from these markets".

IPD has been present in Ukraine for many years and is more recently also focusing on the wood sector. They are a valuable resource for all issues connected to demand side export promotion of Ukrainian wood products [125].

Swiss Import Promotion Programme (SIPPO)

The Swiss Import Promotion Programme (SIPPO) is a longstanding, well-established initiative of the Swiss State Secretariat for Economic Affairs (SECO) with the overall vision of sustainable and inclusive economic growth and integration of SIPPO partner countries into world trade, through its mission of supporting Business Support Organizations (so called BSOs - which includes public or private associations, chambers of commerce, export promotion agencies, among others) to increase their export promotion capacity and service provision to export-ready companies.

At the present time, SIPPO is not active in Ukraine. However, SIPPO has been active in the Ukrainian wood sector in the past and might be active again in the future. Similar to IPD, they are a valuable resource for all issues connected to demand side export promotion of Ukrainian wood products [126].

The German-Ukrainian Agro-Political Initiative provides consultations to Ukrainian businesses and supports, among other things, transparent forest policy and the increase of competitiveness of Ukrainian exports in view of Association Agreement EU-Ukraine [127].

European Bank for Reconstruction and Development (ERBD)

The EBRD provides a comprehensive support package for Ukraine to assist its stabilization and the anchoring of its reforms. They also focus on strengthening energy efficiency and energy security, unlocking its agricultural and industrial potential, providing quality infrastructure and strengthening the financial sector. Today IFTC does specifically focus on the wood sector. However, IFTC plays a key role in Ukrainian business and trade and can be considered a valuable source of information and potential cooperation partners [128].

The European Union's EU4Business initiative

EU4Business is an umbrella initiative that covers all EU activities supporting SMEs in the Eastern Partnership countries. To Ukraine, it provides a set of programs focusing at consulting, trainings and capacity buildings for SMEs [129].

Canada-Ukraine trade and investment Initiative (CUTIS)

The Canada-Ukraine Trade and Investment Support project is a 5-year (2016-2021) initiative designed to lower poverty in Ukraine through increasing exports from Ukraine to Canada and attracting investments from Canada to Ukraine. The Furniture sector is one of four priority sectors and selected participants supported by industry consultants are to participate in trade shows in Canada [130].

Ukraine Investment & Trade Facilitation Centre (ITFC)

ITFC is an independent non-profit organization serving as an expert platform of highly specialized professionals focusing on investment, trade, and trade-related policy matters offering both international expertise and local insight [131].

Chambers of commerce

There are several chambers of commerce that are relevant for the Ukrainian Wood sector. These include:

- Ukraine Chamber of Commerce and Industry UCCI UCCI is a non-governmental, non-profit, self-governing organization that unites legal persons and citizens of Ukraine, registered as entrepreneurs, and also their associations, on a voluntary basis. The goal of the chamber is to develop competitive Ukrainian business in the world markets [132].
- The German–Ukrainian Chamber of Commerce provides no direct support of wood processing or furniture sectors, but provides valuable information and acts as partner to related initiatives promoting export Ukrainian goods and services to Germany [133].

4.5.4 Civil Society Groups (CSG)

The roles of the Civil Society Groups (CSG) include groups devoted to the dissemination of information to the public and industry and the organization of capacity building activities for the trade associations. They also play an advocacy role (watch dogs) for society.

Agency for Sustainable Development of the Carpathian Region (FORZA)

FORZA is a professional, independent, non-governmental, non-commercial and non-profit organization of like-minded people that aims at promoting the sustainable development of the Carpathian region of Ukraine in the economic, environmental and social aspects of natural resource management and community development. It is the offspring of the Swiss-Ukrainian forest development project (2004-2010) funded by the Swiss Agency for Development and Cooperation (SDC). For the last ten years FORZA actively worked in the region participating in a range of trans-border (ENPI/ENI) and international projects (FP7, Horizon 2020, Norway Grants, SI, USFS) aimed at supporting capacity building and strengthened the understanding of sustainable multi-functional forest management, climate change issues, energy-efficiency and energy-saving, enhancing competitiveness in wood-based sector, and forest-based ecotourism development. FORZA is a member of the Danube Civil Society Forum, Ukrainian Climate Network, the Public Council of the Transcarpathian Regional State Administration and a member of United States Forest Service NGO Network. The NGO collaborates with a wide range of different organizations, such as research institutions and universities, local and regional governments and natural resource professionals [134].

Forest Stewardship Council (FSC)

FSC is an international non-profit, multi-stakeholder organization established in 1993 to promote responsible and sustainable management of the world's forests. The FSC does this by setting standards on forest management and tracks forest products made from material harvested from such forests with Chain of Custody (COC) certification. Such products are certified, along with certifying and labelling them as environmentally appropriate, socially beneficial and economically viable. This may also include the COC system that allows the tracking of FSC certified material from the forest to the consumer. Such certification is more and more demanded by importers in the EU and in many cases helps convincing authorities that EUTR compliance is fulfilled. FSC focuses on five goals:

1. Advancing globally responsible forest management.

1. Ensure equitable access to the benefits of FSC systems.

2. Ensure integrity, credibility and transparency of the FSC system.

3. Create business value for products from FSC certified forests.

4. Strengthen the global network to deliver on goals 1 through 4.

FSC Ukraine has a demand-side oriented approach and works in close cooperation with forestry and wood transformation companies and supports their efforts to comply with the standards. The institutionalization of FSC Ukraine is directly related to the development of voluntary forest certification and the drafting of a national standard for responsible forest management based on the Principles and Criteria of the Forestry Trustees' Council. In 2019, FSC Ukraine finalized the Ukrainian national standards that are closely aligned to the global certification standard and its criteria but are adapted to local context conditions [135].

Programme for the Endorsement of Forest Certification (PEFC)

PEFC is an international, non-profit, non-governmental organization that promotes sustainable forest management through independent third-party certification. In Ukraine PEFC started in 2019 with the development of the national forest management standard "Association National System of Voluntary Forest Certification". Currently public discussion of the first edition of the standard is ongoing, with final version to be prepared and submitted for approval in 2021 [136].

Open Forest

Open Forest (Ukraine) is a news and discussion place of all actualities happening to forestry, forest management and wood processing [137].

Other civil society organizations:

» Environment. People. Law [138].

» Ekoaction [139].

» Eciclub Rivne [140].

» Forest Watch project by WWF [141].

Better Regulations delivery Office (BRDO)

BRDO is an independent analytical center funded by the European Union as part of the FORBIZ project and the EU4Business Initiative. BRDO focuses on improving the Ukrainian business environment, attracting investment to Ukraine, promoting the development of entrepreneurship, and establishing a public dialogue between the government and businesses. Their focus areas include construction, IT and telecommunications, energy, agriculture, transportation and infrastructure, market control and supervision. The main activities include reviewing the regulatory environment and removing outdated and illegal acts, attracting investments in Ukraine per the Doing Business rating, introducing a risk-based approach in the work of inspection bodies, providing support to those starting a business, facilitating public administration reform, among other things [142].

4.6 SWOT analysis of the Ukrainian wood value chain

	Strengths	Weaknesses
INTERNAL	» Availability of substantial natural and plantation forests for raw materials supply » High product diversity and well-developed value-added network » Fairly skilled human resources » Established professional associations and cluster organisations » Sufficient capacity for EUTR and sustainability certification compliance » High competitiveness through comparably low labour costs	» Limited processing efficiency » Limited quality management » Limited strategic orientation and planning » Middle management gap » Substantial language gaps for export communication » Unreliable resource provision » Not enough focus on high value-added products » Lack of innovative wood testing facilities » Little collaboration in research and development » Lack of well innovative companies leading the sector » A lot of small actors, weak coordination between them, high fragmentation of the industry » Limited awareness for quality and standard compliance and accordingly limited cooperation and dialogue with QI institutions

	Opportunities	Threats
EXTERNAL	» Geographical closeness of the EU market » Access to the EU market through DCFTA free trade agreement » Increasing awareness and demand for sustainable renewable products » Booming wood construction sector in EU and globally will further increase demand for respective products » Presence of national and international export promotion agencies focusing on the wood sector (e.g. Export Promotion Office, German Import Promotion Desk) » Approximation of Ukrainian legislation to EU legislation in fields of trade, customs and tax regulations » Increasing demand on the EU market for wood products, especially in the construction sector » Availability of a national QI system that is internationally recognized	» Relatively unstable political situation limiting domestic and foreign investments » High rates of credit of commercial banks limit investments and number of innovations of companies » Little collaboration in research and development » Legal impossibility of product testing in Ukraine for compliance with EU Construction Products Regulation [143], [144]and Machinery Directive » Highly competitive EU-Market » High devaluation of UAH » Approximation of Ukrainian legislation to EU legislation in fields of trade, customs and tax regulations » National state institutions and the documentation that they issue (e.g. in terms of test certificates) considered as not trustworthy » Limited demand orientation of Ukrainian QI institutions » Limited availability of EU standards in Ukrainian language » Limited availability of Ukrainian testing bodies with appropriate infrastructure for testing according to EU standards

5

IDENTIFICATION AND SELECTION OF PRIORITY WOOD PRODUCTS FOR FURTHER IN-DEPTH STUDY

The background of this study is to propose priority products with the highest export potential and geographical focus considering the key export markets of Ukrainian wood products. The main focus of the study is on export markets; however, the domestic market must also be taken into consideration because of its considerable size. In any case, Ukraine intends to increase quality and safety of wood products with the rigorous application of improved standards.

5.1 Criteria for the pre-selection of priority wood products

As mentioned in the project document [1], the choice on the wood and wood products value chain in Ukraine for technical assistance delivery is supported by the following arguments:

5.1.1 Economic opportunities

Existing economic opportunities that are aligned with the government priorities of Ukraine include:

- Assuring sustainable exploration of existing substantial reserves of raw material.
- Stressing the importance of the processing of wood in regards of Ukraine's ban on exporting raw timber.
- Mining opportunities for moving processing downstream – into higher value-added products (e.g., furniture, doors, windows) and thereby promoting trade in goods with a higher value-added content.
- Exploring a broad range of potential products in different value categories.
- Scaling up opportunities for export in the wood products sector, which are untapped.
- Creating opportunities for jobs in rural areas in the Ukrainian regions, considering that there is already a high share of enterprises and employment engaged in the sector throughout the nation.

5.1.2 Existing quality infrastructure related challenges and opportunities

Existing quality infrastructure related challenges and opportunities addressing which actions would open export potential from the value-added wood products sector in Ukraine by specifically implementing:

- EU Technical regulations (in terms of product safety); building up internationally recognized testing facilities and calibration services, as well as product certification capabilities.
- Voluntary social/environmental forestry standards like FSC and PEFC, which are considered as "de-facto" market requirements by the end consumers.
- EU Construction Products Regulations, which clarifies the affixing of CE markings to construction products and defines clear rules for the assessment and verification of constancy of performance (AVCP) systems applicable to construction products [143], [144]. For many construction products testing by notified bodies is required. However, this is linked to Mutual Recognition Agreements [145] that do not exist for Ukraine yet.
- The EU Machinery Directive applies to all products that can be declared machines (e.g., furniture, doors with motors for opening or lifting mechanisms) [146].
- Voluntary management system standards such as ISO 9001 (Quality); ISO 14001 (Environment); ISO 45001 (Occupational health & safety).
- Strengthened capabilities of the National Accreditation Agency of Ukraine (NAAU) to accredit local certification bodies, specifically focusing on technical competence in wood and wood products.
- Work with Ukraine Standardization Agency (UAS) to achieve greater international exposure and recognition. Ukraine currently holds the Secretariat for ISO/TC 2018 Committee for Timber. ISO is also in the process of developing a standard (ISO 38200) for chain of custody of wood and wood-based products, an effort in which Ukraine could strengthen its involvement.

5.1.3 Synergies and complementarities

Opportunities realized through synergies and complementarities by focusing on the value chain for wood and wood products include:

» Continue and build on the past successful initiatives of SECO with SIPPO and FORZA.

» Form an ongoing partnership with BFH.

» Link up with ongoing projects in Ukraine by other donors (e.g. USAID, EBDR and CUTIS [130]) that provide direct support to export-oriented SMEs active in the processed wood sectors (e.g., furniture). This support amounts to access to credit, training, and advisory services. However, these initiatives do not address QI related challenges to gain access to foreign markets. This project's main objective is to address QI related challenges that Ukraine faces [1]. Hence, while there are numerous positive complementarities between the different existing initiatives, the lack of overlaps between the initiatives will assure that there is no duplication of efforts and hence avoiding overlaps will be assured. This unique focus on the Ukrainian quality infrastructure (QI) combined with other ongoing initiatives will allow to tackle the problems of exporters in a holistic manner.

5.1.4 Challenges facing the sector not direct related to quality

Challenges facing the wood and wood products sector that do not directly relate to quality include:

» Illegal exploitation of forest resources (illegal cutting, poaching etc.) has increased, especially since the export ban of unprocessed logs toke effect. In regions with extremely high unemployment level (60-70%), this illegal exploitation reaches levels with severe consequences posing threats to environment and people. This uncontrolled, unprofessional exploitation of Ukraine's natural resources leads to a lack of raw materials as well as to poor quality of the raw material.

» A sawmill is considered illegal if the owner does not register the sawmill properly in the tax administration records or if he does not register the sawmill in the correct activity type. Also, it is equally illegal not to register a business who obtains logs in the correct activity type or not to register a business who obtains timber illegally.

» Furthermore, it is illegal to wrongly declare logs during export or to misstate logs during harvest operation. One source estimates that 10% of logs disappear due to such misstatements [147].

» The existence of an abundance of large numbers of companies that perform low level of technological woodworking leading to limited and poorly processed products at lower price ranges. This contributes to the risk of over-exploiting the forest resources without creating substantial added value.

» Inappropriate quality control or registry/management systems of collected lots of timber according to quality and certifications, or stamps. Also, loss of records and hence traceability and incorrect parameters about product available for commercialization.

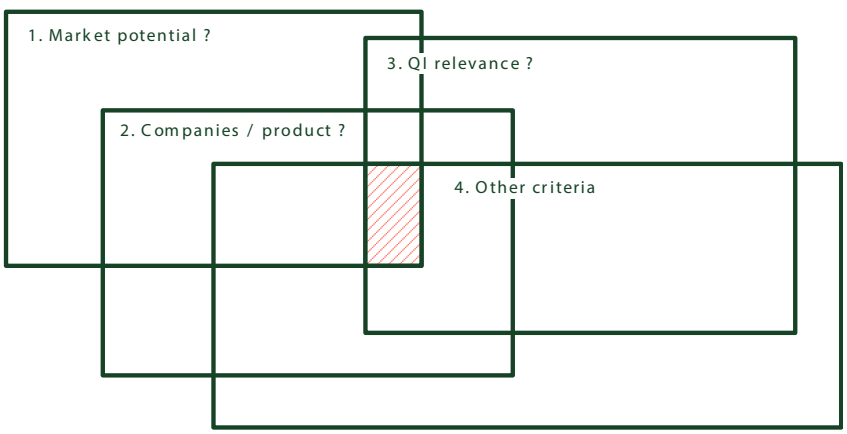
» Lack of proper knowledge and awareness of requirements and pre-conditions for trading internationally.

» Business support organizations often lack tools and resources (e.g., trained employees) to support value chain actors in their efforts to access international markets.

Based on these findings, several criteria to rank potential products were developed to create a framework for the pre-selection of the products (Figure 51). The criteria are regrouped into the four main groups:

1. Market potential of the products (demand side)
2. Potential of the companies producing the products (supply side)
3. Relevance of quality infrastructure (QI) to exploit the market potential
4. Other framework conditions

FIGURE 51: LIMITATIONS OF THE RANGE OF POSSIBLE PRODUCTS FOR THE IN-DEPTH STUDY. THE RED-HATCHED RECTANGLE IN THE CENTER OF THE FIGURE SYMBOLIZES THE PRODUCTS THAT BEST FULFILL ALL CRITERIA.



5.2 List of pre-selected products for further assessment

The following products are those who best fulfil the above-mentioned requirements concerning market potential (demand), product production (supply), quality infrastructure (QI), and other framework conditions:

- Furniture (HS 94)
- Children Furniture (no HS code)
- Toys & Gadgets (no HS code)
- Multilayer wood flooring (HS 441875)
- Solid wood flooring (HS 441879)
- Exterior wood flooring (no HS code)
- Wooden doors (HS 441820)
- Interior doors (no HS code)
- Exterior doors (no HS code)
- Wooden windows (HS 441810)
- Wooden builders' joinery and carpentry (HS 4418)
- Glulam (no HS code)
- Cross-laminated timber (CLT), no HS code)
- Wooden tools, tool bodies (HS 441700)

5.3 Criteria for the assessment and the prioritization of the pre-selected products

The four main groups of criteria were then refined in more specific sub-criteria and related questions to rate the products on their ability to be included for the in-depth study.

5.3.1 Market potential of the product (demand side)

Leading questions

- Which export markets are the most promising for Ukrainian wood products, taking into account economical, ecological and social sustainability factors?
- What kind of wood products are demanded by the selected export markets?
- Are the international trade channels of these products well developed?

Criteria for assessment

- Demand for the product on the domestic market in the short-, middle- and long-term.
- Demand for the product in the European market.
- Demand for the product in the GUS-States.
- Demand for the product in world markets.
- Existing export channels.

5.3.2 Potential of the companies producing the products (supply side)

Leading questions

- What are these companies' main characteristics and their key figures?
- Does Ukraine currently export these wood products and, if yes, to what degree and value-added?
- Are these wood products currently produced at reasonable costs and quality in Ukraine?
- How are the specific value chains organized and where do leverage points for future interventions in the present project under a QI perspective exist?

Criteria for assessment

- Number of producers in the sector.
- Key figures of average producers of the sector (employees, turnover, productivity).
- Proportion of SME's in the sector.
- Proportion of companies owned by a majority by Ukrainian nationals.
- Potential for innovation in the sector.
- Potential upstream/downstream processing in the sector.
- Potential to create jobs in the sector.
- Competitive advantage against sub-regional competitors (outside Ukraine).
- General motivation of potential participants (companies, associations) to participate in the project.
- Willingness to financially contribute to product testing.
- Availability of a skilled workforce in the sector.
- Availability of educational infrastructure for future participants in the sector.
- Potential for increased export orientation in the future.
- Availability of product-related promotion organizations.

5.3.3 Relevance of Quality Infrastructure for exploiting the market potential

Leading questions

» Which standards do products have to meet to be eligible for exporting?

» What are the needs of the Ukrainian wood processing companies and the Ukrainian exporters in terms of product testing?

» What kind of test equipment is needed to carry out the tests required?

» How large is the investment needed for installation, training and maintenance of the test equipment/infrastructure?

» Can the test equipment be used for other purposes like product development?

» Is it financially reasonable to purchase, install, and operate the required test equipment to meet the standards required?

» Are the expected financial earnings for the tests high, middle or low?

Criteria for assessment

» General potential for QI-development in the sector.

» International demand for test certificates in the sector.

» Condition of existing QI in Ukraine.

» Cost-benefit assessment for the infrastructure development.

» Availability of a skilled workforce for testing activities (academic level) in the sector.

» Funding for QI through services for alternative sectors (other products - same sector, other products - other sector).

» Potential for involvement of main Ukrainian counterparts (MEDT, UAS, NAAU, UMTS).

» Readiness and willingness of main counterparts (MEDT, UAS, NAAU, UMTS).

» International competition of and for testing facilities.

5.3.4 Other criteria

Leading questions

» Are there potential synergies with other projects or progams that were, are or will be implemented in Ukraine in the field of wood or QI?

» To what degree can the specific value chains (e.g. furniture, windows, doors, etc.) support gender equality in the sector?

» How strong are the specific value chains (e.g. furniture, windows, doors, etc.) affected by corruption?

» Are there any limitations in the specific value chains (e.g. furniture, windows, doors, etc.) because of international sanctions or trade restrictions?

Criteria for assessment

» Synergies with other programs/institutions (e.g. IPD, SECO, UNIDO, EBRD, CUTIS, and others).

» Gender equality in the sector.

» Impact of corruption in the sector.

» International sanctions or trade restrictions in the sector.

» General regional potential of the sector.

5.4 Assessment of pre-selected products

After evaluation of the pre-selected products according to the above mentioned criteria, the total scores, expressed as total rating indicators are shown in Table 30 (cf. Appendices A-1.2 for the entire evaluation table).

TABLE 30: RANKING OF ASSESSED PRODUCTS AND PRIORITIZATION OF PRODUCTS TO BE CONSIDERED FOR THE IN-DEPTH STUDY

Ranking	Products	Total rating indicator for QI
1.	Children Furniture (no HS code)	3.31
2.	Wooden windows (HS 441810)	3.15
3.	Glued laminated timber Glulam (no HS code)	3.10
4.	Furniture (HS 94)	3.06
5.	Interior doors (no HS code)	3.05
6.	Wooden builders' joinery and carpentry (HS 4418)	3.05
7.	Cross laminated timber CLT (no HS code)	2.96
8.	Wooden doors (HS 441820)	2.93
9.	Exterior doors (no HS code)	2.90
10.	Multilayer wood flooring (HS 441875)	2.66
11.	Solid wood flooring (HS 441879)	2.60
12.	Toys & Gadgets (no HS code)	2.51
13.	Wooden tools, tool bodies (HS 441700)	2.51
14.	Exterior wood flooring (no HS code)	2.48

Below, please find further insights on the performance score of each of the 14 products with regards to the four main criteria groups:

1. Market potential of the products (demand side)
2. Potential of the companies producing the products (supply side)
3. Relevance of quality infrastructure (QI) to exploit the market potential
4. Other framework conditions

5.4.1 Children Furniture (no HS code)

RATING 1			
Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)			
1. Market potential of the products (demand side)	2. Potential of the companies producing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework conditions
3.4	3.6	3.2	3.6

Market potential of the products (demand side)

The demand for children furniture in the Ukrainian market is relatively high at present since the Ukrainian school reform includes new types of furniture for primary schools [148]. Moreover, the European children furniture market has been steadily growing in recent years [149].

Potential of the companies producing the products (supply side)

An estimated twenty-four Ukrainian companies engaged in the sector of school furniture achieve a decent level of quality on both, the production procedures and the final products. Some of these companies are already exporting a small part of their production and benefit from their competitiveness, also due to the devaluation of the Ukrainian national currency. At the same time, traditional Western European producers lost competitiveness, resulting in a shift to Eastern European producers. Children furniture include high value-added products and therefore are good for job creation and GDP growth.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for children furniture are stricter than for most other furniture segments due to a higher risk of accidents in this user group. Therefore, the demand

of European importers to meet the product standards is substantially higher than for other furniture segments, too. Hence, the benefits of a well-developed national QI system for exporting children furniture would be substantial.

Moreover, in general, any testing facilities for children furniture can also be used for other furniture categories. So, fulfilling high quality standards for children furniture will also be beneficial for other furniture segments and allow test laboratories to serve a broader set of clients.

Other framework conditions

Children furniture, as part of the furniture segment, is considered by the #TenderTogether [150] grant project as well as the Canadian-Ukrainian CUTIS project [130]. Hence, there are potential synergies supporting the development of the sector.

5.4.2 Wooden windows (HS 441810)

RATING 2

Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)

1. Market potential of the products (demand side)	2. Potential of the companies pro-ducing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework conditions
2.9	3.5	3.3	3.4

Market potential of the products (demand side)

The demand for wooden windows on the domestic market is limited. However, the European wood construction and housing sector is booming due to substantial technological advancements in wooden house (pre-)fabrication and increased environmental awareness of the consumers regarding renewable resources, carbon sequestration, and thermal insulation. Consequently, also the demand for high quality wooden windows will be supported by this development for years to come.

Potential of the companies producing the products (supply side)

A total of approximately 30 Ukrainian companies can be considered to have medium quality level in both, production procedures and final products, respectively. These companies are already exporting most of their production and benefit from their high international competitiveness due to the devaluation of the Ukrainian national currency. At the same time, traditional Western European producers lost competitiveness, resulting in a shift to Eastern European producers and those specializing in special application niches. Wooden windows are high value-added products and therefore this sector promotes job creation and GDP growth.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for wooden windows are crucial for exports to the EU as they are considered in the EU Construction Products Regulation [143], [144]. Therefore, the demands in respect to quality, accreditation, and certification of European importers to meet the products' standards are high. Hence, the benefits of a well-developed national QI system for exporting wooden windows will be substantial.

Moreover, in general, any testing facilities for wooden windows can also be used for windows from numerous other materials as well as for exterior doors. So, being able to meet high quality standards for wooden windows will also be beneficial for other window segments such as plastic polymer, metal, or aluminium that could use the same testing laboratories to include a substantially broader set of clients.

Other framework conditions

The German IPD import promotion program (IPD) [125] considers wooden windows and window scantlings. Hence, potential synergies supporting the future sector development exist.

5.4.3 Glued laminated timber Glulam (no HS code)

RATING 3

Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)

1. Market potential of the products (demand side)	2. Potential of the companies pro-ducing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework conditions
2.7	3.0	3.7	3.4

Market potential of the products (demand side)

The European wood construction and housing sector is booming due to substantial technological developments in wooden house (pre-) fabrication and increased environmental awareness of the consumers when it comes to renewable resources, carbon sequestration and thermal insulation. Consequently, also the demand for glulam beams is benefiting from development for years to come. Today, the demand for Glulam in the Ukrainian domestic market is limited. However, in the middle and long term, the global boom in wood construction will most likely also arrive in Ukraine, thus increasing sales opportunities in the domestic market.

Potential of the companies producing the products (supply side)

The number of Ukrainian glulam producers remains difficult to assess, because several wooden house producers also produce glulam for their internal consumption. Glulam beams are high value-added products and therefore this sector is likely to create job and to achieve GDP growth.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for glulam are crucial for exports to the EU as they constitute structural elements and thus are considered in the EU Construction Products Regulation [143], [144]. Therefore, the demand of European importers to meet the product standards is very high. Hence, the benefits of a well-developed national QI system for exporting glulam are substantial.

Moreover, in general, any testing facilities for glulam beams can also be used for other types of beams or selected construction components. Thus, meeting quality standards for glulam testing will also be beneficial for other types of beams such a reinforced concrete or steel beams, thus allowing test laboratories to include a substantially broader set of clients.

Other framework conditions

The German IPD import promotion program (IPD) [125] considers glulam beams. Hence, this increases potential synergies supporting the future sector development.

5.4.4 Furniture (HS 94)

RATING 4

Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)

1. Market potential of the products (demand side)	2. Potential of the companies pro-ducing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework conditions
2.8	3.6	2.7	3.9

Market potential of the products (demand side)

The demand for furniture in the Ukrainian domestic market is moderate today. However, given the low Ukrainian per capita consumption of furniture compared to worldwide furniture consumption, it is likely that growing Ukrainian middle class will also lead to increases in furniture spending. Also, the European furniture market has been steadily growing in recent years [149], opening opportunities for exports.

Potential of the companies producing the products (supply side)

The total of about 1,300 Ukrainian companies have substantially increased the total turnover in the last 5 years (see chapter 4.3). Most of the companies focus on the medium quality segment of final products. They're already exporting a small part of their production and benefit from their high competitiveness due to the devaluation of the Ukrainian national currency. At the same time, traditional Western European producers lost competitiveness, resulting in a shift to Eastern European producers. Furniture includes high value-added products and therefore will help in job creation and GDP growth.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for furniture are one of the elements facilitating exports although the main priorities of importers are EUTR compliance and sustainability certificates of the products (e.g., FSC). However, a focus on the QI development for the furniture sector would benefit an industry containing more than a thousand Ukrainian furniture companies.

Other framework conditions

Furniture is considered by the #TenderTogether grant project [150] as well as the Canadian-Ukrainian Construction Products project (CUTIS, [130]). Hence, this increases potential synergies supporting the future sector development.

5.4.5 Interior doors (no HS code)

RATING 5

Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)

1. Market potential of the products (demand side)	2. Potential of the companies pro-ducing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework conditions
3.1	3.2	3.2	3.2

Market potential of the products (demand side)

The demand for interior doors in the domestic market is estimated to remain rather constant in the future, because of substantial construction and retrofitting activities in Ukraine. In addition, the European market demand is also estimated to be constantly high.

Potential of the companies producing the products (supply side)

The more than 30 Ukrainian companies producing interior doors achieve medium quality levels in both, production procedures and final products. The support organizations are well organized and motivated to increase exports. The comparative advantage of Ukrainian companies for such products with medium added value will most likely be beneficial for increased export opportunities. However, there is high competition from other countries such as Poland and China.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for interior doors are one of the elements facilitating exports although the main priorities of importers are EUTR compliance and sustainability certificates of the products (e.g., FSC). However, because of the large quantities produced, interior doors might create substantial added value when export is facilitated through better QI.

Other framework conditions

The German IPD import promotion program (IPD) [125] considers interior doors. Hence, this increases potential synergies supporting the future sector development.

5.4.6 Wooden builders' joinery and carpentry (HS 4418)

RATING 6

Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)

1. Market potential of the products (demand side)	2. Potential of the companies producing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework conditions
3.4	3.2	3.0	3.0

Market potential of the products (demand side)

Wooden builders' joinery and carpentry is an over category of several other products presented in this section. The domestic market is estimated to remain rather constant in the future, mainly because of substantial construction and retrofitting activities in Ukraine. Overall demand on the European market is also estimated to be high for the years to come.

Potential of the companies producing the products (supply side)

Many of the existing Ukrainian companies are already exporting and benefit from their good competitiveness due to the devaluation of the Ukrainian national currency.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for wooden builders' joinery and carpentry vary a lot depending on the products. Some are semi-finished products; some are considered in the EU Construction Products Regulation [143], [144]. Hence, this large variety increases complexity in terms of QI demand and consequently lowers efficiency of improvement measures.

Other framework conditions

The German IPD import promotion program (IPD) [125] considers a large set of wooden builders' joinery and carpentry products. Hence, this offers potential synergies supporting the future sector development.

5.4.7 CLT Cross Laminated Timber (no HS code)

RATING 7

Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)

1. Market potential of the products (demand side)	2. Potential of the companies producing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework conditions
2.3	3.0	3.7	3.0

Market potential of the products (demand side)

The demand for CLT on the domestic market is limited in the short- and medium-term because CLT-based wood construction in Ukraine is still in its early stage. However, in the long run, the domestic demand will likely increase substantially. Due to the booming wood construction and housing sector demand for CLT in Europe, North American, as well as other markets, CLT is forecasted to be in high demand [151].

Potential of the companies producing the products (supply side)

Just as the domestic market, domestic production is currently limited to only one CLT producer in Ukraine, supported by foreign investments and scheduled to launch production in 2020 [152]. CLT is a high value-added product and therefore this sector offers good job creation and GDP growth potential. However, due to the limited Ukrainian production, export channels are yet to be established.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for CLT are crucial for exports to the EU as they constitute structural elements and thus are considered in the EU Construction Products Regulation [143], [144]. Therefore, the demand of European importers to meet the applicable product standards is high. Hence, the benefits of a well-developed national QI system for exporting Glulam would be substantial.

Other framework conditions

The German IPD import promotion program (IPD) [125] might consider CLT. Hence, this increases potential synergies supporting the future sector development.

5.4.8 Wooden doors (HS 441820)

RATING 8			
Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)			
1. Market potential of the products (demand side)	2. Potential of the companies pro-ducing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework condi-tions
2.8	3.2	3.0	3.2

Market potential of the products (demand side)

The demand for wooden doors on the domestic market is estimated to remain rather constant in the future, mainly because of substantial construction and remodelling activities in Ukraine. However, in general, the Ukrainian residential customers prefer metal doors. Wooden doors may be preferred in the Hotel-Restaurant-Café (HoReCa) segment. In addition, the European market demand is also estimated to be constantly high.

Potential of the companies producing the products (supply side)

The more than 30 Ukrainian companies reach a decent level of quality in respect to product quality and production process quality. Two companies dominate in respect to production and 4 companies dominate the export volumes. The support organizations are well organized and motivated to increase exports. The comparative advantage of Ukrainian companies for such products with medium added value will most likely be beneficial for increased export opportunities. However, there is high competition from other countries such as Poland and mass-produced doors from China.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for wooden doors vary depending on door type. For interior doors, one requirement facilitating are EUTR compliance and sustainability certificates of the products used (e.g., FSC). Exterior doors, however, are considered in the EU Construction Products Regulation [143], [144]. Therefore, the demand of European importers to fulfil the product standards is high. Both types might create substantial added value when export is facilitated through better QI.

Other framework conditions

The German IPD import promotion program (IPD) [125] considers interior doors. Hence, this increases potential synergies supporting the future sector development.

5.4.9 Exterior doors (no HS code)

RATING 9			
Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)			
1. Market potential of the products (demand side)	2. Potential of the companies pro-ducing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework conditions
3.1	3.0	3.1	2.5

Market potential of the products (demand side)

The demand for exterior doors in the domestic market is estimated to remain rather constant in the future, because of substantial construction and remodelling activities in Ukraine. In addition, the European market demand is also expected to be constantly high.

Potential of the companies producing the products (supply side)

The more than 30 Ukrainian companies producing exterior doors reach medium quality level in both, production procedures and final products. The industry's support organizations are well organized and motivated to increase exports. The comparative advantage of Ukrainian companies for such products with medium added value is likely to be beneficial for increased export opportunities. However, there is a high level of competition with other countries such as Poland and mass-produced doors from China.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for exterior doors are considered in the EU Construction Products Regulation [143], [144]. Therefore, the demand of European importers to fulfil the product standards is high. Exterior doors might create substantial added value when export is facilitated through better QI.

Other framework conditions

The German IPD import promotion program (IPD) [125] considers interior doors. Hence, this increases potential synergies supporting the future sector development.

5.4.10 Multilayer wood flooring (HS 441875)

RATING 10

Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)

1. Market potential of the products (demand side)	2. Potential of the companies pro-ducing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework conditions
3.6	2.3	2.4	2.7

Market potential of the products (demand side)

The demand for multilayer wood flooring on the domestic market is average to high because of global trends towards more wooden flooring and substantial construction and remodelling activities in Ukraine. The same can be said for the European and North American market.

Potential of the companies producing the products (supply side)

The Ukrainian companies producing multilayer wood flooring reach a decent level of quality in both, production procedures and final products. They are already exporting a substantial part of their production and benefit from the high Ukrainian competitiveness due to the devaluation of the national currency.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for multilayer wood flooring are crucial for export to the EU and the demand of European importers to fulfil the product standards is high. However, the benefits of a well-developed national QI system for exporting multilayer wood flooring are limited, because to a large extend these export-oriented companies already fulfil the standards relying on existing European QI.

Other framework conditions

The German IPD import promotion program (IPD) [125] considers multilayer wood flooring. Hence, this increases potential synergies supporting the future sector development.

5.4.11 Solid wood flooring (HS 441879)

RATING 11

Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)

1. Market potential of the products (demand side)	2. Potential of the companies pro-ducing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework conditions
3.1	2.5	2.5	2.7

Market potential of the products (demand side)

The demand for solid wood flooring on the domestic market is average, because of global trends to multilayer flooring. However, the demand of the European market is estimated to be high for the years to come.

Potential of the companies producing the products (supply side)

The existing Ukrainian companies reach a decent level of quality in both, production procedures and final products. These companies are already exporting a substantial part of

their production and benefit from the high competitiveness due to the devaluation of the Ukrainian national currency.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for solid wood flooring are one of the elements facilitating exports although the main priorities of European importers are EUTR compliance and sustainability certificates of the products (e.g., FSC). Hence, the effects of a strengthened national QI system for exporting solid wood flooring is limited, as the quality of solid wood floorings does not require a large amount of testing.

Other framework conditions

The German IPD import promotion program (IPD) [125] considers solid wood flooring. Hence, this increases potential synergies supporting the future sector development.

5.4.12 Toys & Gadgets (no HS code)

RATING 12

Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)

1. Market potential of the products (demand side)	2. Potential of the companies pro-ducing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework conditions
2.6	2.6	2.7	2.3

Market potential of the products (demand side)

The demand for wooden toys and gadgets on the domestic market is limited. With increasing number of middle-income families, the demand will most likely increase in the future. The demand on the European market is medium at best, too. Wooden toy demand is generally limited to high quality toys (e.g., upper price segment).

Potential of the companies producing the products (supply side)

Among a total of approximately 30 Ukrainian companies making wooden toys, only a few bigger companies exist of which some are already successfully exporting to the EU and beyond. However, most companies are rather on an “artisan” level of production.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for wooden toys and gadgets are crucial for export to the EU, because of child safety issues. However, the benefits of a well-developed national QI system for exporting wooden toys and gadgets would be limited.

Other framework conditions

Wooden toys and gadgets are not considered by foreign import promotion programs.

5.4.13 Wooden tools, tool bodies (HS 441700)

RATING 13

Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)

1. Market potential of the products (demand side)	2. Potential of the companies pro-ducing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework conditions
3.0	2.3	2.4	2.8

Market potential of the products (demand side)

The demand for wooden tools and wooden tool bodies on the domestic market is limited. However, the demand in the European market is quite high.

Potential of the companies producing the products (supply side)

Mostly smaller companies reach a decent level of quality in both, final products and processing. Some of these existing companies are already exporting.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for wooden tools and wooden tool bodies are one of the elements facilitating exports, although the main priorities of importers are EUTR compliance and sustainability certificates of the products (e.g., FSC). Moreover, in general, any testing facilities for exterior doors can also be used for doors from numerous other materials as well as for windows.

Other framework conditions

The German IPD import promotion program (IPD) [125] considers wooden tools and wooden tool bodies. Hence, this increases potential synergies supporting the future sector development.

5.4.14 Exterior wood flooring (no HS code)

RATING 14			
Potential for QI development: none (0), very small (1), small (2), medium (3), big (4), very big (5)			
1. Market potential of the products (demand side)	2. Potential of the companies pro-ducing the products (supply side)	3. Relevance of QI for exploiting the market potential	4. Other framework condi-tions
2.6	2.3	2.7	2.5

Market potential of the products (demand side)

The demand for exterior wood flooring is estimated to remain on an average level for the years to come, both in the domestic and the EU market.

Potential of the companies producing the products (supply side)

Mostly smaller companies reach a convenient quality level of final products and some are exporting.

Relevance of Quality Infrastructure for exploiting the market potential

Standards requirements for exterior wood flooring are one of the elements facilitating exports although the main priorities of importers are EUTR compliance and sustainability certificates of the products (e.g., FSC).

Other framework conditions

The German import promotion program (IPD) [125] considers wooden exterior wood. Hence, this increases potential synergies supporting the future sector development.

5.5 List of selected wood products for the in-depth study

Based on the assessment above and the resulting ranking, the following two products were selected for an in-depth study:

» Children Furniture (no HS code)

» Wooden windows (HS 441810)

5.6 Dialogue with stakeholders on the process of the selection of the products

During the process of the selection of the products for the in-depth study, three missions of BFH-staff were conducted, as indicated in Figure 1 on page 16. All meetings, workshops and visits were pre-organized by UNIDO.

5.6.1 Kick-off meeting – December 2019

A first kick-off meeting was held on December 17, 2019 in Kyiv with representatives of the main counterparts of the project as named in the project document of UNIDO [1]. Additionally, meetings, discussions and visits with other stakeholders were organized.

5.6.2 First stakeholder validation workshop – January 2020

A stakeholder meeting - validation workshop was held on January 29, 2020 also in Kyiv with representatives from different stakeholder groups of the QI sector related to wood and wood products including representatives of SECO. The presentation of the intermediate results of the value chain analysis by BFH and FORZA consultants was followed by an animated discussion. The participants finally confirmed the criteria for the selection of the products for the in depth-study mentioned in Chapter 5.3 and they also identified Europe as the key export market.

5.6.3 Second and final stakeholder validation workshop – March 2020

The second and final validation workshop was held on March 5, 2020 in Kyiv with about 25 participants from different stakeholder groups of the wood processing sector, the QI sector. The presentation of the key findings on the demand side (global market) and the supply side (Ukrainian wood sector) by BFH and FORZA consultants was followed by an animated discussion. The participants finally confirmed the priority wood products mentioned in Chapter 5.5 and they also identified Western Europe as the key export market. Apart from the confirmation of the priority products, the participants also assigned the consultants the task to carry out a more detailed analysis of the two selected products groups with a focus on quality-related “gaps” along the value chains, which continue to hamper the smooth flow of wooden products to the European market.

6

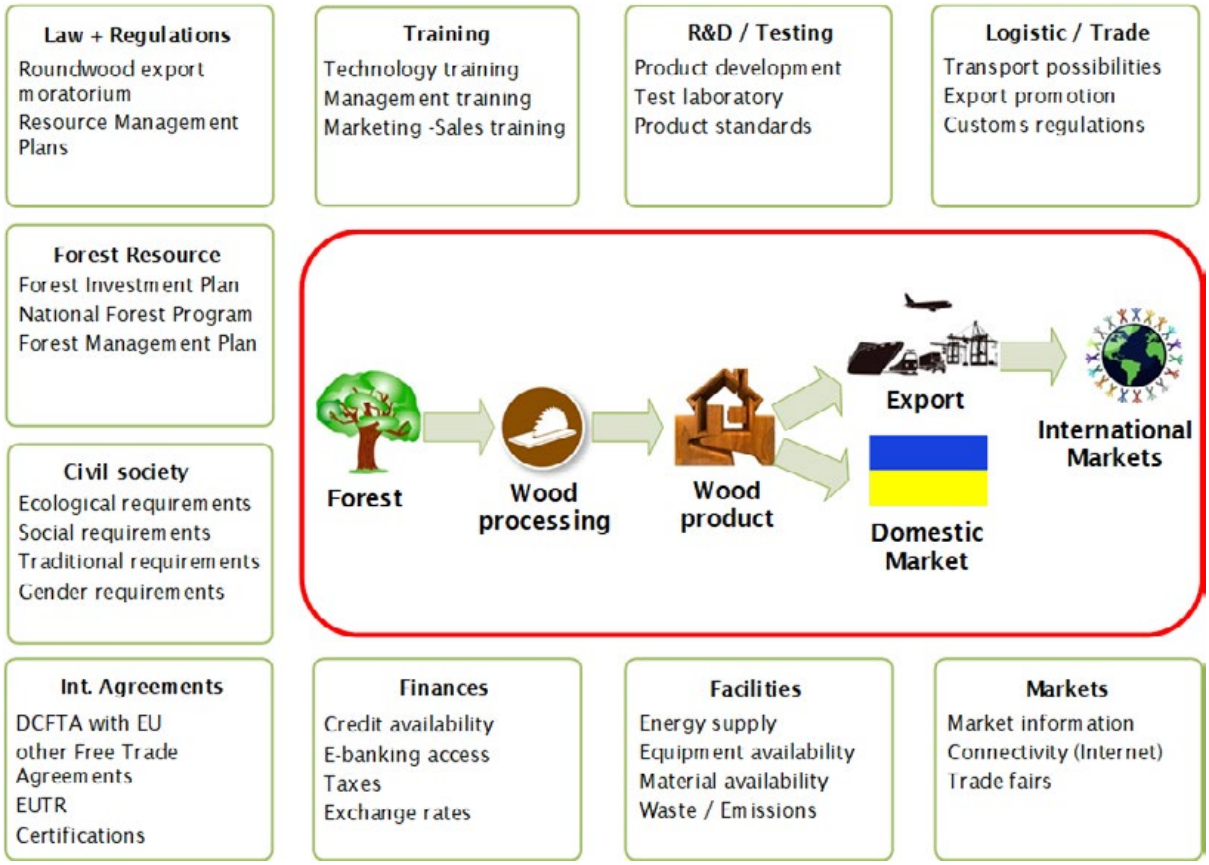
IN DEPTH STUDY OF PRIORITY WOOD PRODUCTS UNDER A QI PERSPECTIVE

In the previous chapter children furniture and wooden windows were evaluated as two promising products for the Ukrainian wood industry. The following chapter includes an in-depth study of the value chains of the selected wood products (priority products). The main gaps along the value chains are identified and appropriate recommendations for their improvement provided, with a focus on the quality aspects.

6.1 Factors influencing the value chains of the priority wood products

The following figure provides an overview of the different factors influencing the value chain of the priority wood products.

FIGURE 52: MAIN FACTORS INFLUENCING THE UKRAINIAN WOOD VALUE CHAIN



6.2 Children Furniture (no HS code)

6.2.1 SWOT-Analysis Children Furniture (no HS code)

Note: Please refer section 1.12 'SWOT analysis of the Ukrainian wood value chain' for more QI related issues.

	Strengths	Weaknesses
INTERNAL	» Local availability of high-quality hardwood timber » Fairly skilled human resources » Established professional associations and cluster organisations » A set of well innovative companies leading the sector » Highly competitive through comparably low labour costs (furniture production with high share of labour)	» Limited processing efficiency » Limited product quality due to outdated machinery and poor processing quality » Limited local availability of quality key components (fittings, surface treatment products) » Unawareness of the European General Product Safety Directive » Limited availability of local quality infrastructure (testing facilities) » Lack of accredited testing facilities in Ukraine » Lack of knowledge about applicable EN-standards and safety regulations » Dependence on expensive non-Ukrainian testing facilities
	Opportunities	**Threats**
EXTERNAL	» Entering niche markets with outstanding product quality and product design » Competitive due to low labour costs » Collaboration with reliable dealers in targeted market » QI infrastructure and testing knowledge for children furniture can also be used for other furniture. So, fulfilling high quality standards for children furniture will also be beneficial for other furniture segments and allow test laboratories to include a broader set of clients.	» Highly competitive and price-sensitive EU-market due to cheap furniture import from all over the globe » Additional expensive certification necessary due to some countries' strong private quality labels (e.g. GS in Germany) » Access to market only through distributor and dealers » Design of Ukrainian furniture not taste of target markets » Children are high risk group in terms of product safety, access to market without test certificate high entrepreneurial risk » Low reputation of Ukrainian products » Collaboration with reliable partner in targeted market not available

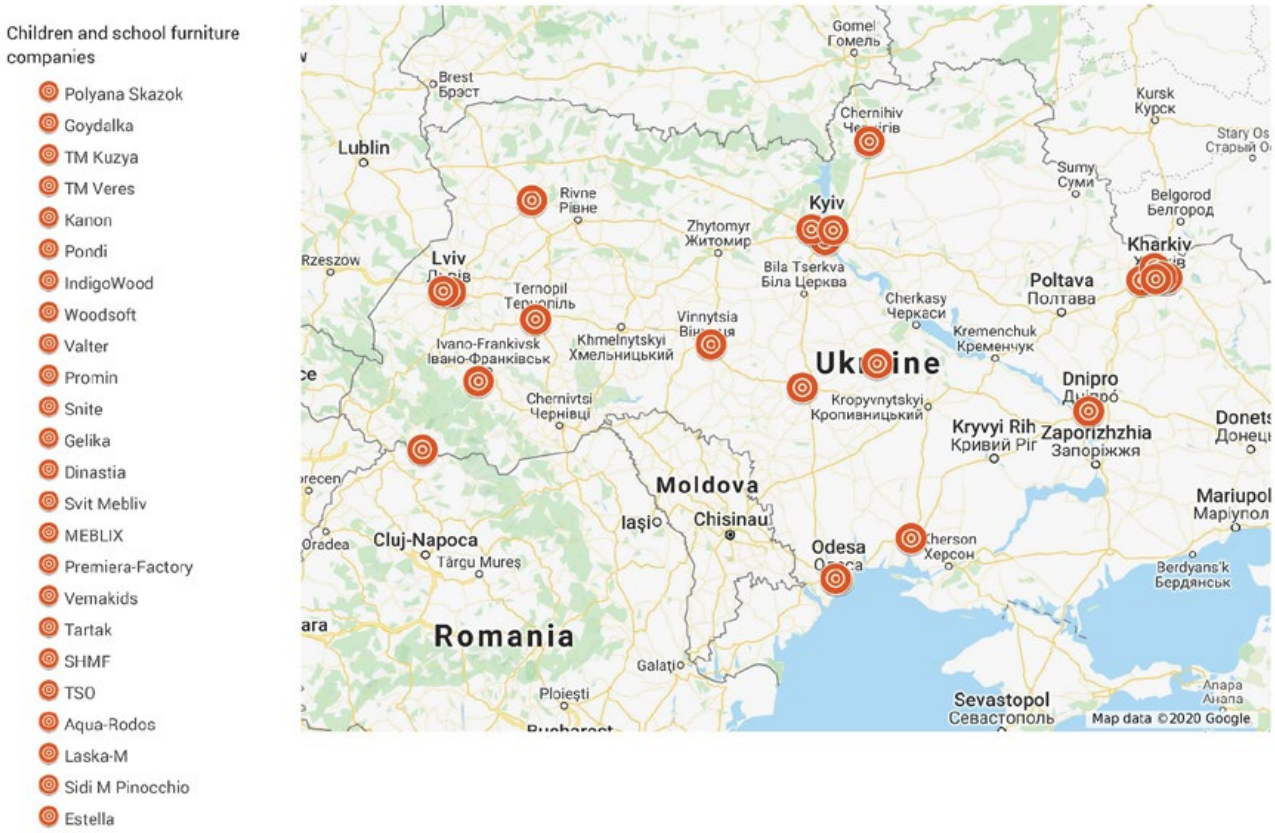
6.2.2 Companies producing children furniture and school furniture

The following table shows key companies in Ukraine producing children furniture and school furniture.

Name	Website	Town (oblast)
Polyana Skazok	https://polyana-skazok.com.ua	Kyiv
Goydalka	https://goydalka.com	Ivano-Frankivsk
TM Kuzya	http://kuzya-mebli.com.ua	Drahanivka (Ternopilska)
TM Veres	https://veres.net.ua	Chernihiv
Kanon	http://www.babykanon.com.ua	Odessa
Pondi	https://pondi.ua/contakt.php	Odessa

IndigoWood	https://indigowood.com.ua	Kyiv
Woodsoft	https://woodsoft.com.ua/ua/contact	Kyiv
Valter	https://valter.ua	Nikolaev
Promin	https://promin-osvita.com.ua	Kyiv
Feniks	http://feniks-mebelv.pl.ua	Poltava
Snite	https://snite.com.ua	Kyiv
Gelika	http://www.anshar.com.ua/uk	Vinnytsya
Dinastia	https://dinastia.in.ua/	Tyachiv (Zakarpatka)
Svit Mebliv	https://www.svit-mebliv.ua	Palanka (Cherkaska)
Meblix	https://meblix.net	Lyubotyn (Kharkivska)
Premiera-Factory	https://premiera-factory.com	Derhachi (Kharkivska)
Vemakids	https://vemakids.com.ua/	Kyiv
Tartak	http://tartak.net.ua/uk/mebli/	Kivertsi (Volynska)
SHMF	http://shmf.com.ua	Shpola (Cherkaska)
TSO	https://tso.com.ua	Kharkiv
Aqua Rodos	https://aquarodos.ua/about/	Kyiv
Laska-M	http://krovatka.in.ua	Kharkiv
Sidi M Pinocchio	https://sidim.com.ua/detskaya-mebel/krovatka-transformer	Kharkiv
Estella	https://estella.ua/availability/?city=&id=288782	Lviv
Drimka	http://drimka.com/ru/68-koliski	Lviv
AMF - Art Metal Furniture	https://amf.com.ua/mebel_dlja_shkoly-complect/	Dnipro
Mebel Technostyl	https://mebel-ts.com.ua/nova-ukrainska-shkola	Kharkiv
Nowvy Styl	http://www.nowystyl.ua/products/furniture-for-school-ua	Kharkiv
Bereginya	http://bereginya.zp.ua/kontakti	Zaporizhzhya
BRW Ukraine	www.brwukraine.com	Novovolynsk (Volynska)
VMVHOLDING	http://www.vmvholding.com.ua/	Ostrov (Lvivska)
Gerbor	https://gerbor.com.ua	Volodymyr-volynsky (Volynskao
Kidigo	kidigo.com.ua	Kyiv
Komod	https://komod-Kyiv.com	Kyiv
Krona-Mebli	https://kronamebli.com	Kamjanets-Podilsky (Khmelnytska)
Children's furniture studio "Atelier Lilu"	https://atelierlilu.ua	Kyiv
Mayak	http://mebli-mayak.km.ua	Polonne (hmelnytska)
Romanna Mebli	https://www.facebook.com/RomannaMebli	Uzhhorod
Sigma	https://www.sigma.lviv.ua/	Lviv
BTS Mebel	https://btsmebel.com	Shkarivks (Kyivska)
Domani-Studio	http://www.domani-studio.com.ua	Odessa
Fenix (Alliance LS)	http://www.f-mebel.ua/catalogue/	Kryvyy Rih (Dnipropetrovska)
Impuls	http://impuls-mebel.com/contacts	Chernivtsy
New Vitality	http://new-vitality.com.ua/	Kharkiv

FIGURE 53: MANUFACTURERS OF CHILDREN UND SCHOOL FURNITURE.



6.2.3 Performance of the related processing industry

The Ukrainian furniture industry is mainly focused on the domestic market. However, few exports are realized. The manufacturing of furniture in Ukraine is only partly based on up to date technology, which is a base for a sound product quality. The productivity in the processing plants is significantly lower in comparison with similar competitors in the EU. This fact partially relativizes the labour cost advantages.

The awareness for product safety requirements is little developed. Safety is a key issue when dealing with products for children. This fact is even more important if the furniture is delivered to public spaces like schools, playschools, playgrounds. In the EU applies the General product safety directive which takes dealer and manufacturer into responsibility in case of failure of their product. This directive is generally unknown in the Ukrainian furniture industry.

6.2.4 Role of Quality Infrastructure for furniture

A testing body for furniture in Ukraine may have different tasks and possibilities to support the industry:

- Carrying out accredited product testing
- Increase of product quality through tests during product development process
- Pre-tests for products being later tested and certified
- Support to companies through consulting and knowledge transfer regarding standards, requirements and labels in the different targeted countries
- Facilitate entering the market through recognized tests and certification
- Participation in R&D projects
- Participation in national and international committees for standardisation

Additionally, certification and surveillance bodies are necessary for certain issues like the conformity oft the use of chemical substances.

6.2.5 Standards for children's and school furniture

Basically, a dealer/manufacturer has to assure that the furniture is save for the user during its life span. In the most countries t is not compulsory by law to have a furniture tested. However, in case of failure the product safety directive refers to the state of the art which is represented by existing standards. The standards for furniture are grouped in different categories.

Children's furniture standards comprise a wide range of issues by defining safety requirements, test methods and classifications. An important topic are the used materials with their substances and their impact on the health of children. (Please refer to Appendices A-1.10 for information on those norms and standards that are adapted or in place in Ukraine).

TABLE 31: STANDARDS FOR CHILDREN'S AND SCHOOL FURNITURE

Standard	Title	Version
EN 716-1+AC	Furniture - Children's cots and folding cots for domestic use - Part 1: Safety requirements	2019
EN 716-2	Furniture - Children's cots and folding cots for domestic use - Part 2: Test methods	2019
EN 1130	Children's furniture - Cribs - Safety requirements and test methods	2020
EN 1729-1	Furniture - Chairs and tables for educational institutions - Part 1: Functional dimensions	2016
EN 1729-2+A1	Furniture - Chairs and tables for educational institutions - Part 2: Safety requirements and test methods	2016
EN 1930	Child use and care articles - Safety barriers - Safety requirements and test methods	2012
EN 12221-1+A1	Child use and care articles - Changing units for domestic use - Part 1	2013
EN 12221-2+A1	Child use and care articles - Changing units for domestic use - Part 2	2013
EN 12227	Playpens for domestic use - Safety requirements and test methods	2010
EN 14434	Writing boards for educational institutions - Ergonomic, technical and safety requirements and their test methods	2010
EN 14988	Children's highchairs - Requirements and test methods	2017
EN 17191/draft	Children's furniture - Seating for children - Safety requirements and test methods	2019
EN 71-1	Safety of toys - Part 1: Mechanical and physical properties	2018
EN 71-2	Safety of toys - Part 2: Flammability	2014
EN 71-3	Safety of toys - Part 3: Migration of certain elements	2019
EN 71-6	Safety of toys - Part 6: Graphical symbol for age warning labelling	1995
EN 71-8	Safety of toys - Part 8: Activity toys for domestic use	2018
EN 71-9	Safety of toys - Part 9: Organic chemical compounds - Requirements	2007
EN 71-10	Safety of toys - Part 10: Organic chemical compounds - Sample preparation and extraction	2006
EN 71-11	Safety of toys - Part 11: Organic chemical compounds - Methods of analysis	2006
EN 71-12	Safety of toys - Part 12: N-Nitrosamines and N-nitrosatable substances	2017
EN 1176-1	Playground equipment and surfacing - Part 1: General safety requirements and test methods	2017
EN 1176-2	Playground equipment and surfacing - Part 2: Additional specific safety requirements and test methods for swings	2020
EN 1176-3	Playground equipment and surfacing - Part 3: Additional specific safety requirements and test methods for slides	2017
EN 1176-4	Playground equipment and surfacing - Part 4: Additional specific safety requirements and test methods for cableways	2019
EN 1176-5	Playground equipment and surfacing - Part 5: Additional specific safety requirements and test methods for carousels	2019
EN 1176-6	Playground equipment and surfacing - Part 6: Additional specific safety requirements and test methods for rocking equipment	2019
EN 1176-7	Playground equipment and surfacing - Part 7: Guidance on installation, inspection, maintenance and operation	2008

EN 1176-10	Playground equipment and surfacing - Part 10: Additional specific safety requirements and test methods for fully enclosed play equipment	2008
EN 1176-11	Playground equipment and surfacing - Part 11: Additional specific safety requirements and test methods for spatial network	2014
DIN-Fachbericht CEN/TR 13387	Child use and care articles - Safety guidelines	2005
CEN ISO/TR 8124-8; DIN SPEC 31011	Safety of toys - Part 8: Age determination guidelines (ISO/TR 8124-8:2016)	2016

6.2.6 Existing Quality Infrastructure for furniture

There are several accredited testing institute and certification bodies in Ukraine which may play a role in the development of the furniture industry. For certain issues, e.g. substances with health impact, surveillance and certification QI is necessary. However, the testing and certification landscape is fragmented, and it is not yet clear if there are reliable institutions to cover all the necessary standard tests and certificates. The following table shows the testing bodies for children's and school furniture in Ukraine with a valid accreditation according to ISO/IEC 17025 [153].

TABLE 32: ACCREDITED INSTITUTES FURNITURE PRODUCTS TESTING

Name	Address	Accreditation valid in 2020	General scope
Testing Center of the State Enterprise "Vinnytsia Scientific and Production Center of Standardization, Metrology and Certification"	21011, Vinnytsia, Vatutina Street, 23/2 (0432) 32-38-34	Yes	Testing of wood and wood products
Testing laboratory of Zhytomyr regional state laboratory of the state service of Ukraine on food safety and consumer protection	10007, Zhytomir, Korostyshivska Street, 54 (0412) 42-70-04, (067) 410-94-71	Yes	Testing of including children's assortment and products in contact with food products (plastic products and utensils, porcelain and ceramic products, glass, paper, cardboard, wood products, textiles), products and structures used in the construction and production of furniture, textiles, wood and wood products
Furniture testing centre "Ukrainian Institute of Furniture" LLC	03056, Kyiv, Poliova Street, 21 (044) 457-16-97, 457-16-83	No	Tests of furniture, wooden wares and wood materials
Testing laboratory of the State Enterprise "Rivne Scientific and Production Center of Standardization, Metrology and Certification"	33028, Rivne, Zamkova Street, 31	Yes	Tests of furniture, wood products, wood; furniture
Testing laboratory of State Enterprise "Sumy regional laboratory center of the ministry of health of Ukraine"	40022, Sumy, Privokzalnaya street, 31; 40022, Sumy, Supruna street, 32; (0542) 65-78-86	yes	Organoleptical, physico-chemical, sanitary-chemical, medico-biological, microbiological, toxicological, radiological tests of wood and its products Physico-chemical, microbiological, parasitological, molecular-genetic, chromatographic, radiological tests of wood and products thereof, measurement of physical environmental factors and samples for testing.

Testing Center of Vinnytsia Regional Laboratory Center of the Ministry of Health of Ukraine	21100, Vinnytsia, Malinovskoho Street, 11 (0432) 32-56-18, 32-51-17	Yes	Physico-chemical, organoleptic, microbiological, toxicological, radiological tests of wood and wood products
Testing laboratory of "Radioecological Monitoring Center" LLC	52201, Dnipropetrovsk region, Zhovty Vody, Gagarin str., 40, building 4	yes	Radiometric, radiochemical, gamma spectrometry, dosimetry, physical, physical-chemical tests of wood, wood products
Testing laboratory of the State Agency "Ternopil Regional Laboratory Center of the Ministry of Health of Ukraine"	46008, Ternopil, Fedkovycha Street, 13; 46001, Ternopil, King Ostrozkyi Street, 21 a (0352) 52-14-25, 43-42-32	yes	Determination and identification of genetically modified organisms and other tests in paper and cardboard, wood and wood products
Testing Center of the State Agency "Zhytomyr Regional Laboratory Center of the Ministry of Health of Ukraine"	10002, Zhytomyr, Berdychevska Str., 64 (0412)340-408	yes	Organoleptic, physico-chemical, spectrometric, chromatographic, radiological studies of products and constructions used in the construction and manufacture of furniture, textiles, wood and products from it
Testing laboratory of the Center for preventive medicine at the State Administration of Affairs	03143, Kyiv, Academician Zabolotnyi Street, 15 (044) 526-51-11, (044) 526-50-06	yes	Spectrometric tests of wood and wood products, paper-cardboard products, building materials
Testing center of "Scientific Production Company "Zond" LLC	76002, Ivano-Frankivsk, Mykytynetska Street, 5 A (0342) 50-55-52	Yes	Testing of machines and mechanisms (including metal and woodworking equipment), wood and timber products

Table 33 shows the certification bodies for children's and school furniture and substances used in furniture in Ukraine with a valid accreditation according to ISO/IEC 17025 [153].

TABLE 33: ACCREDITED INSTITUTES FOR FURNITURE PRODUCTS CERTIFICATION IN UKRAINE [153].

Name	Address	Accreditation valid in 2020	General scope
Private Enterprise "Etalon"	49100, Dnipro, Mandrykivska Street, 336, apt. 2	Yes	Furniture; metalworking and woodworking equipment
Product certification body of the State Enterprise "Scientific and technical center of conformity assessment in construction „BudCenter"	02660, Kyiv-125, Vitalii Shymanovskyi Street, 2/1 (044) 543-63-15, 531-93-13	No	Woodworking industry
Certification body of "State Enterprise "Zhytomyrstandart", LLC	10003, Zhytomyr, Peremogy Street, 13; CAB location: 01042, Kyiv, Druzhby Narodiv Blvd, 13, office 64	Yes	Furniture; metalworking and woodworking equipment

6.3.1 SWOT-Analysis wooden windows (HS 441810)

Note: Please refer section 1.12 'SWOT analysis of the Ukrainian wood value chain' for more QI related issues.

	Strengths	Weaknesses
Internal	» Local availability of high quality semi-finished profiles for windows » Fairly skilled human resources » Established professional associations and cluster organisations » A set of well innovative companies leading the sector » Competitiveness through comparably low labour costs	» Limited processing efficiency » Limited product quality due to outdated machinery and poor processing quality » Limited local availability of quality key components for windows (fittings, high performance insulation glass, surface treatment products) » Limited cost advantage due to high material cost share » Limited knowledge of country-specific constructional requirements for windows » Dependence on non-Ukrainian notified testing facilities for compliance with EU CPR (Ukraine not part of CPR area)
	Opportunities	**Threats**
External	» Ukrainian window systems adaptable to some common systems in EU-countries » Entering niche markets with outstanding product quality and product design » Competitive due to low labour costs » Collaboration with reliable regional partner in targeted market » Collaboration with QI for product development » QI for windows is in major parts identical with QI for doors. » QI suitable for all material types for windows, not just wood	» Different window systems in the EU countries, concentration on specific markets/countries necessary » Highly competitive and price-sensitive EU-market for standard windows » Windows are individually tailormade products due to requirements of each particular building => production batch size 1 » country- and regional specific legal constructional requirements (e.g. noise/thermal protection) requires individual setup of each window delivery » EU building construction sector works just-in-time. Accurate on-time delivery from UA difficult » Generally low reputation of wooden windows in some European countries » Low reputation of Ukrainian products » Collaboration with reliable partner in targeted market not available

6.3.2 Window systems

The housing industry in Europe differs from country to country and region to region mainly for traditional reasons. It results in a large variety of construction methods and requirements for each construction product. This also affects the window market and leads to a significant number of different window designs with different installation methods in the wall.

The standard design of Ukrainian built wooden windows is very similar to those in some major markets in the neighbouring EU countries. With some constructive adjustments and increased product quality it gives the opportunity for exports provided that the manufacturers have a sound knowledge of the targeted market. A collaboration with local sales partners may support in technical questions and boost sales.

Ukrainian products in general have a rather weak reputation and the international market for wooden windows is highly competitive and price sensitive. Nevertheless, Ukrainian manufacturers with comparingly low labour costs may have an advantage in this respect.

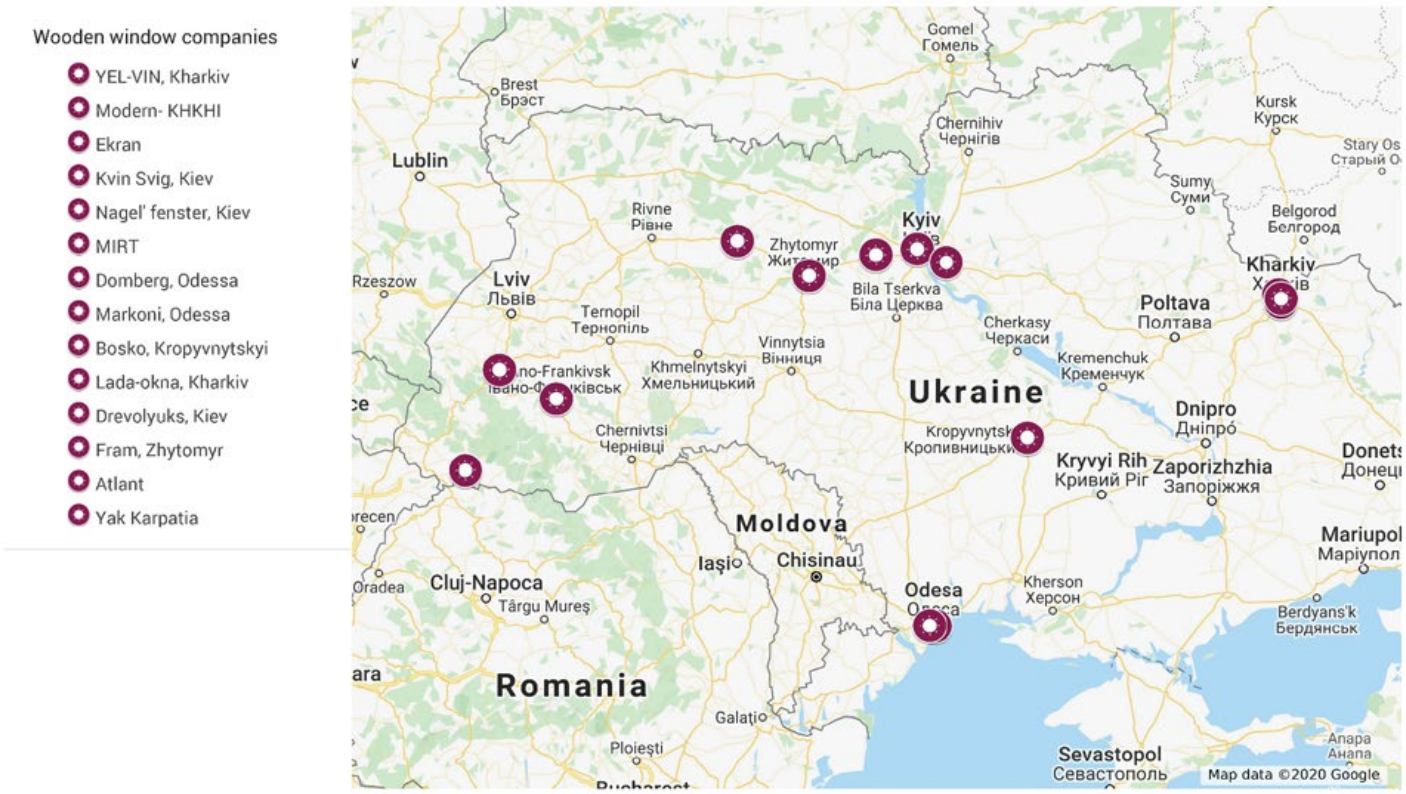
6.3.3 Companies producing wooden windows in Ukraine

Table 34: lists key companies in Ukraine producing wooden windows.

TABLE 34: COMPANIES PRODUCING WOODEN WINDOWS IN UKRAINE

Name	Website	Town (oblast)
EL-VIN	http://www.el-win.com	Kharkiv
Modern-XXI	https://www.okna-modern.com.ua/ru/	Kharkiv
Ekran (Karpatskiye Okna)	https://ekranvk.com.ua/uk	Stryy (Lvivska)
Kvin Svig	https://kwinswig.com.ua	Kyiv
Nagel fenster	https://nagel-fenster.com.ua	Boryspil (Kyivska)
Mirt	https://mirt.ua/	Novohrad-Volynsky (Zhytomyrska)
Domberg	https://domberg.ua	Odessa
Markoni	https://marconi.ua/	Odessa
Bosko	https://www.bosco.ua	Kropyvnytskyi (Kirovohradska)
Lada, Kharkiv	https://lada-okna.org.ua	Kharkiv
Drevolyuks, Kyiv	http://drevolux.ua/	Kyiv
Fram, Zhytomyr	http://okna-fram.com.ua/	Zhytomyr
Atlant	http://www.atlant.khust.com/features.html	Khust, Zakarpatska
Yak-Carpatia	https://carpatiia.ua/derevyani-vikna/	Ivano-Frankivsk

FIGURE 54: LOCATIONS OF COMPANIES PRODUCING WOODEN WINDOWS.



6.3.4 Performance of the related processing industry

The Ukrainian window industry is yet focused on the domestic market. Only few exports are realized. The manufacturing of wooden windows in Ukraine is only partly based on up to date technology which is a base for a sound product quality. The productivity in the processing plants is significantly lower in comparison with similar competitors in the EU. This fact partially relativizes the labour cost advantages.

6.3.5 Role of Quality Infrastructure for wooden windows

A testing laboratory for windows in Ukraine may have different tasks and possibilities to support the industry:

- Increase of product quality through tests during product development process
- Pre-tests for products being later tested and certified at a recognized notified body
- Support to companies through consulting and knowledge transfer regarding standards, requirements and labels in the different targeted countries
- Facilitate entering the market through recognized tests and certification
- Participation in R&D projects
- Participation in national and international committees for standardisation

Some institutes are able to test certain properties of windows, but so far, a reliable and adequately equipped test institute fulfilling the main EU requirements and standards is not yet available in Ukraine.

In the European Union the CPR together with the harmonized product standard EN 14351-1 regulate the testing, supervising and certifying procedures for windows. Due to this standard the attestation of conformity (AoC) for most of the characteristics for windows must be performed according to the system 3 [143] [144] [154]. Windows with fire protection characteristics are set in system 1.

System 3 requires initial type tests (ITT) by a registered Notified Body (NB) in accordance to the CPR. System 1 requires additionally regularly surveillance and certification by a notified body.

Since Ukraine is not under the rule of the CPR test institutes and certification bodies in Ukraine cannot be registered. Hence, test reports and certificates of Ukrainian bodies are not recognized on the European market.

The standardization of windows is strongly linked to the one of doors. Test infrastructure and test procedures are in major parts identical which gives the opportunity to offer services to the door industry too.

A possibility to perform recognized tests in Ukraine may also be an alliance with a recognized accredited and notified body from a CEN-country under the condition that the Ukrainian institute has a valid accreditation according to ISO 17025.

6.3.6 Standards for windows

All windows being installed within the common European market have to fulfil the European Construction Product Regulation CPR. The harmonized product standard EN 14351-1 indicates the test and classification standards for each property and the CE mark is mandatory for windows put into market.

In the following table a list of the valid European standards for windows is shown. The scope of all standards applies to all frame materials used in the window industry (wood, plastic polymer, aluminium, steel). Further additional standards for components of windows (e.g. insulation glass units, fittings, etc.) are to be followed. This influences the supply chain significantly as some of the component's performance must be traceable (e.g. insulation glass units). (Please refer to the Appendix A-1-10 for information on those norms and standards that are adapted or in place in Ukraine).

The requirements of several performances differ between the countries due to their individual regulations in the building sector.

Important country-specific regulations may be expected for:

- Thermal performance
- Sound insulation
- Air permeability, water tightness, wind load
- Fire resistance and smoke protection

For instance, the maximum energy consumption of a building is set by laws and regulations of each country or even regionally. This affects the thermal insulating performance of windows significantly.

Hence, it makes it necessary for exporting companies to build up specific knowledge in different fields for each targeted country and adjust the performance of their product accordingly.

TABLE 35: EN STANDARDS FOR WINDOWS.

Standard	Title	Version
EN 14351-1	Windows and doors - Product standard, performance characteristics - Part 1: Windows and external pedestrian doorsets	2016
EN 1026	Windows and doors - Air permeability - Test method	2016
EN 12207	Windows and doors - Air permeability - Classification	2017
EN 1027	Windows and doors - Water tightness - Test method	2016
EN 12208	Windows and doors – Water tightness - Classification	2000
EN 12211	Windows and doors - Resistance to wind load - Test method	2016
EN 12210	Windows and doors - Resistance to wind load - Classification	2016
EN 1191	Windows and doors - Resistance to repeated opening and closing - Test method	2013
EN 12400	Windows and pedestrian doors - Mechanical durability - Requirements and classification	2003
EN ISO 717-1	Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation	2013
EN ISO 10140-1	Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products	2016
EN 14608	Windows - Determination of the resistance to racking	2004
EN 14609	Windows - Determination of the resistance to static torsion	2004
EN 12046-1	Operating forces - Test method - Part 1: Windows	2004
EN 13115	Windows - Classification of mechanical properties - Racking, torsion and operating forces	2001
EN 13049	Windows - Soft and heavy body impact - Test method, safety requirements and classification	2003
EN 13420	Windows - Behaviour between different climates - Test method	2011
EN ISO 10077-1	Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 1: General	2018
EN ISO 10077-2	Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 2: Numerical method for frames	2018
EN 12412-2	Thermal performance of windows, doors and shutters - Determination of thermal transmittance by hot box method - Part 2: Frames	2003
EN ISO 12567-1	Thermal performance of windows and doors - Determination of thermal transmittance by the hot-box method - Part 1: Complete windows and doors	2010
EN 1522	Windows, doors, shutters and blinds - Bullet resistance - Requirements and classification	1999
EN 1523	Windows, doors, shutters and blinds - Bullet resistance - Test method	1999
EN 1627	Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Requirements and classification	2011
EN 1628	Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance under static loading	2016
EN 1629	Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance under dynamic loading	2016
EN 1630	Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance to manual burglary attempts	2016
EN 1634-1+A1	Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware. Fire resistance test for door and shutter assemblies and openable windows	2018
EN 13501-1	Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests	2019

6.3.7 Existing quality infrastructure in Ukraine

The following table shows the testing bodies for windows in Ukraine with a valid accreditation according to ISO/IEC 17025 [153].

TABLE 36: ACCREDITED TESTING LABORATORIES IN UKRAINE.

Name	Address	Accreditation valid in 2020	General scope
Testing laboratory of "Construction laboratory" LLC	54029, Mykolayiv, Robocha Street, 2 (0512) 56-54-99	Yes	Testing of doors and windows; glass and double-glazed windows; wooden constructions, products and materials; modular buildings
Scientific and technical testing laboratory of building protective construction and materials of the State enterprise "Ukrmetrteststandart"	03143, Kyiv, Metrologichna Street, 4 (044) 526-52-29, 526-20-63	No	Tests of window and door blocks (made of polyvinyl chloride, wood and aluminum alloys)
Testing laboratory of food and industrial products of the State Enterprise "Zhytomyr Scientific and Production Center of Standardization, Metrology and Certification"	10003, Zhytomyr, Novosinna Street, 24 (0412) 26-09-83, 25-44-23	Yes	Testing of paper and cardboard and articles thereof, joinery, double-glazed units, wood-working and metal-working equipment, wood, paper products on quality and safety indicators
Testing center «BM-TEST» of «Regional testing center «BM-TEST» LLC	33018, Rivne, Kurchatova Stret, 18i (0362) 23-52-98, 63-66-14	Yes	Tests of products made of paper, cardboard, wood, metal, polymeric materials, window and door blocks
Scientific testing center «EUROSTANDART» of «Scientific testing center «EUROSTANDART», LLC.	81554, Lviv region, Gorodotskyi district, Cherliany, Poliova Street, 99 A (032) 247-1-247, (067) 236-89-85	No	Test of construction beams and structures; wooden materials, products and structures for the building; windows

7

LEVERAGE POINTS AND RECOMMENDATIONS RELATED TO THE PRIORITY PRODUCTS

The stakeholder workshop in Kyiv on March 5, 2020 confirmed children furniture and wooden windows as priority wood products that proved to be most suitable to focus on for reaching the abovementioned objectives of the UNIDO GQSP project "Realizing export potential of the wood and processed wood value chain in Ukraine by strengthening related quality infrastructure". The reasons for this prioritization are described in detail in Chapters 5 and 6.

The following section deals with identified leverage points and recommendations considered decisive for the abovementioned project. On the one hand, leverage points in a system may concern key obstructions or "gaps" that prevent the system from functioning in a coherent way (i.e. issues that hamper the smooth flow of the priority products along the value chain from Ukraine to the EU). On the other hand, leverage points may concern actions within a system that have substantially more beneficial effect for the system than other actions (i.e. more value for money).

The recommendations are given in the form of main activities and indicate which stakeholder group should take the lead (L) and which stakeholder groups should be involved in the process. The expected outcome of such actions is also described. The gaps have been listed below in terms of priority, the most important appearing first. The priority takes into account two main factors: first is the practicability or the chance of a successful implementation. The second factor is the expected output (rewards) in comparison to the input (investment of time and money).

7.1 LEVERAGE POINT 1: Lack of trust of EU importers in the reliability of Ukrainian test certificates

» **Cooperation with an internationally recognized testing body.**

Description:	For both priority wood products, children furniture and wooden windows, standard compliance for export to the EU market is of above average importance: In the first case, due to the user group children, special safety issues must be considered. In the second case, the product category windows requires correspondence to the European construction products regulation. Hence, in contrast to other products (e.g. domestic furniture), the importers of the priority wood products pay special attention to standard compliance and would not buy or put them into market without test certificate. In addition, many importers would not accept test certificates of testing bodies without international reputation, because this reduces their risk of claims for damages in case of incidents related to the product quality. Besides, the marketing opportunities are significantly higher with certificates of well-known test institute brands. However, on an international level, the reputation of Ukrainian testing bodies is rather low and consequently their certificates are often not recognized. Hence, even if a given Ukrainian testing body operated on very high international level with accreditation, they would still lack the trust of the importers. This lack of trust is one of the major drawbacks of the Ukrainian QI system when it comes to export to the EU market.
Recommendations in general:	Establishing trust among the importers of the priority products will most likely be successful if an internationally recognized testing body started cooperating with chosen Ukrainian testing bodies. This would assure the actual testing of the priority products on a high international level and acceptance of the Ukrainian producers and EU importers. Such a buy-in could be facilitated and promoted in the framework of the UNIDO GQSP project supporting the QI development for the priority products. Moreover, this setting could be used as a showcase for leapfrogging a system on a high functional level in relatively short time when compared to any other gradual measures aiming for trust establishment.

Recommendations for the special case wooden windows:	As explained in detail in section 6, wooden windows must fulfil the European construction products regulation. Among other things, this means that the testing must be done by a notified testing body. However, Ukrainian testing bodies cannot be notified. Consequently, for wooden windows, a buy-in of an internationally recognized and notified testing body is a necessity for product certification of windows for the EU market. Such cooperation is common practice in other countries (e.g. Turkey) and generally means that all preliminary testing and product development can be done by the local testing body. Only the testing for certification will be done through staff of the notified testing body in the premises of the local testing body. Hence, close formal cooperation and trust between the two institutions is a prerequisite for successful implementation.
Expected outcome:	Ukrainian priority wood products gain easier access to the EU markets. Consequently, the Ukrainian producers increase sales and hence added value.
Involved actors:	» Ministry for Development of Economy, Trade and Agriculture of Ukraine (MDETA) » Ukraine Standardization Agency (UAS) » National Accreditation Agency of Ukraine (NAAU) » Ukrmetrteststandard as potential facilitator » Independent Ukrainian testing bodies to be identified » Internationally recognised partner institution for product testing » Private sector representatives of the priority products in order to come up with demand-oriented solutions » Ukrainian export promotion office and import promotion Agencies (e.g. IPD, SIPPO) for unlocking further synergies
Priority:	High

7.2 LEVERAGE POINT 2: Lack of cooperation (and trust) between business sector (associations and companies) and Ukrainian QI institutions

» **Creation of mirror committees.**

Description:	In theory, product standards as well as test and classification standards necessary to comply with for accessing international markets can be bought and applied to the products in detail by every company. Furthermore, they could do preliminary product tests in the company or on test facilities in appropriate testing laboratories and finally tests for product certification in an accredited testing body to fully comply with the required standards. However, in reality, there is a multitude of obstacles to do so in a coherent way. On the one hand, the companies have difficulties to find out what standards are relevant and how to apply them. Besides, the European standards are only partly available in Ukrainian language which makes it even more difficult. Moreover, their networks may not provide enough information about latest developments that permit to anticipate changes. On the other hand, the Ukrainian QI institutions do not provide services that are linked to the mentioned needs of the companies. This accounts also for the services of testing bodies that are generally limited to testing only. This situation is partly a result of very limited dialogue and information flow between the QI institutions and the business sector, because these two counterparts do not cooperate in a coherent way. Moreover, in the wood sector, the product specific technical committees have little support from both sides. Hence, due to this missing link through cooperation the QI system cannot be needs oriented, which leads to an inefficient allocation of resources.
Recommendations	Establishment of regular cooperation and exchange between QI institutions, national standardisation bodies and the business sector through building up mirror committees to the related CEN Technical Committee TC33 (Doors, windows, shutters, building hardware and curtain walling) and TC207 (Furniture). Organized and facilitated by UAS, the Ukrainian mirror committees should consist of technical experts out of the industry, associations, testing laboratories and UAS. Hence the Ukrainian Association of Windows Systems and the Ukrainian Association of Furniture Manufacturers could play a key role here. Support of successful product development by provision of QI and experts as part in the development process.
Expected outcome:	Ukrainian producers of priority wood products know the relevant standards, how to apply them and are informed about the latest developments. They know about the value of QI in the frame of product development. As a result, they gain easier access to the EU markets and are able to increase sales and hence added value.
Involved actors:	» Ministry for Development of Economy, Trade and Agriculture of Ukraine (MDETA) » Ukraine Standardization Agency (UAS) » National Accreditation Agency of Ukraine (NAAU) » Ukrmetrteststandard as potential facilitator » Independent Ukrainian testing bodies to be identified » Private sector representatives of the priority products » Ukrainian Association of Windows Systems » Ukrainian Association of Furniture Manufacturers
Priority:	High

7.3 LEVERAGE POINT 3: Limited availability of EU standards in the Ukrainian language

» **Translation of the relevant EN standards into Ukrainian.**

Description:	As mentioned under leverage point 2 here above, the Ukrainian companies face a multitude of obstacles when it comes to standard compliance. One decisive factor is the fact, that the relevant standards are often not available in Ukrainian language. The Ukrainian QI institutions are working on this issue, but the standards to be translated are numerous, the procedure until final validation long and the resources limited.
Recommendations	Supporting the translation of the most relevant EN standards for the priority products in Ukrainian language to help penetrate the industry sectors. Moreover, together with the relevant QI institutions, it should be evaluated to what degree the entire procedure of standard translation could be facilitated and accelerated.
Expected outcome:	Ukrainian producers of priority wood products have access to the relevant standards in Ukrainian language. This would help them to comply with the standards and as a result help them to gain easier access to the EU markets, to increase sales and hence added value.
Involved actors:	Ministry for Development of Economy, Trade and Agriculture of Ukraine (MDETA) Ukraine Standardization Agency (UAS) Technical committees of the priority products
Priority:	High

7.4 LEVERAGE POINT 4: Limited competencies of testing body staff for conducting tests according to EU requirements and standards

» **Offer of training courses for testing body staff for the priority products.**

Description:	Product testing according to international standards requires a well-organized working environment, systemic approaches and rigorous practical implementation. However, when shifting from a long-established system of standards (e.g. GOST standards) to a different one (e.g. EU standards), this necessary rigorous correspondence to a standard system may turn into a dilemma, because the staff of the testing bodies has to quit the mandatory routine and start flexible switching between two systems that are partly opposite.
Recommendations	Establishment of regular training courses for testing body staff through experienced testing laboratories with their experts to increase and deepen knowledge about EU requirements, standards, product construction, etc. for the priority products. Such training courses should include a lot of practical training. In the framework of these trainings it is also recommended to present to company staff, responsible for the development and production of the priority products in their companies, how the required properties of their products are tested according to EU standards. In this way, testing bodies and companies could also establish a closer collaboration for product development.

Expected outcome:	Ukrainian testing bodies improve the competencies and motivation of their staff, thus increase the quality of their work. Moreover, this opportunity incites testing bodies and companies to closer cooperation. As a result, the Ukrainian companies gain easier access to the EU markets and are able to increase sales and hence added value.
Involved actors:	» Ministry for Development of Economy, Trade and Agriculture of Ukraine (MDETA) » Ukraine Standardization Agency (UAS) » Independent Ukrainian testing bodies to be identified » Private sector representatives of the priority products » Ukrainian Association of Windows Systems » Ukrainian Association of Furniture Manufacturers
Priority:	High

7.5 LEVERAGE POINT 5: Inappropriate testing infrastructure of testing bodies

» **Infrastructure development of Ukrainian testing bodies for the priority wood products.**

Description:	As mentioned under leverage point 4, the Ukrainian testing bodies are in a process of shifting from a long-established system of standards (e.g. GOST standards) to a different one (e.g. EU standards). Moreover, they are suffering from the lack of trust and cooperation for product development mentioned under leverage points 1 and 2. Hence, in such a setting, an appropriate technical infrastructure corresponding to EU requirements and standards is a key requirement for re-establishing trust and improving the collaboration with companies.

Recommendations	» Identification of testing bodies disposed to testing the priority wood products.
	» Assessment of the needs in testing infrastructure improvements through an independent body.
	» Installation of the new infrastructure coupled with
	  » cooperation with an internationally recognized testing body (leverage point 1);
	  » staff training (leverage point 4);
	  » the development and implementation of a coherent quality management system;
	  » the development and implementation of a business model with the objective to increase business sector demand for testing and cooperation for product development (leverage point 7).

Expected outcome:	Ukrainian testing bodies are able to conduct high quality testing according to EU requirements and standards. As a result, the Ukrainian companies gain easier access to the EU markets and are able to increase sales and hence added value.

Involved actors:	» Ministry for Development of Economy, Trade and Agriculture of Ukraine (MDETA) » Ukraine Standardization Agency (UAS) » National Accreditation Agency of Ukraine (NAAU) » Ukrmetrteststandard » Independent testing bodies to be identified » Private sector representatives of the priority products » Ukrainian Association of Windows Systems » Ukrainian Association of Furniture Manufacturers
Priority:	High

7.6 LEVERAGE POINT 6: Limited awareness of the companies for quality and standard compliance

» **Offer of training courses to companies on product development, quality, and safety.**

Description:	Many Ukrainian companies producing the priority products pay little attention product development, quality and safety in accordance with international regulations and standards. However, these issues are key for successful sales (especially export) and company development. If the companies addressed these issues in a more coherent manner by considering them right from the product idea to the finished product, this framework would help them to increase product quality and their overall efficiency by saving working time because of reduced product readjustments and complaints from clients.
Recommendations	Offering training courses to the companies on product development under consideration of quality and safety issues according to international standards. Special focus should be on: » Product development and innovation (also in cooperation with testing bodies) » Product fitness for purpose » Product application safety » Product testing (in house, in testing body, for certification) » Client requirements (national and international) » Required standards and certificates (national and international) » Legal issues and regulations (trade compliance, placing on the market, national and international)
Expected outcome:	Ukrainian companies are able to develop their products under consideration of the required standards. As a result, the Ukrainian companies gain easier access to the EU markets and are able to increase sales and hence added value.
Involved actors:	» Private sector representatives of the priority products » Ukrainian Association of Windows Systems » Ukrainian Association of Furniture Manufacturers » Independent testing bodies to be identified
Priority:	High

7.7 LEVERAGE POINT 7: Limited close partnerships with foreign QI institutions

» **Establishment of close partnerships with foreign QI institutions including offer of training courses.**

Description:	Just like product testing (cf. leverage point 4), the main QI institutions (Ukrainian Standardization Agency (UAS), National Accreditation Agency of Ukraine (NAAU), other Ukrainian testing bodies focusing on the priority products) are switching from a long-established system of standards (e.g. GOST standards) to a different one (e.g. EU standards). Moreover, they are in the transition to a more demand oriented and collaborative QI system that requires new ways of thinking and acting together with the business sector. Consequently, there is a strong need for inspiration and exchange with their equivalent institutions in other countries that operate already within a demand-oriented QI system focusing on EU requirements and standards.
Recommendations	Establishment of needs oriented regular exchange and training courses for QI institutions staff through experienced foreign QI institutions with their experts to increase and deepen knowledge about EU requirements, standards, product construction, etc. for the priority products. In this context, it is recommended to consider the specific situation and the needs of the Ukrainian companies. In the framework of these trainings, the staff of each institution should hold workshops with the objective to map their current business model (for instance based on the business model canvas approach) in order to raise awareness among the staff and directory board about how they operate. In a second step, the findings should be used to develop a more demand-oriented approach that is based on close cooperation with all QI stakeholders. Such training should be provided by an independent service provider.
Expected outcome:	Ukrainian QI institutions improve the competencies and motivation of their staff, thus facilitate the internal change management and increase the quality of their work. Moreover, this opportunity incites the QI institutions and companies to closer cooperation. As a result, the QI system becomes more demand oriented and the Ukrainian companies gain easier access to the EU markets and are able to increase sales and hence added value.
Involved actors:	» Ministry for Development of Economy, Trade and Agriculture of Ukraine (MDETA) » Ukraine Standardization Agency (UAS) » National Accreditation Agency of Ukraine (NAAU) » Ukrmetrteststandard as potential facilitator » Independent Ukrainian testing bodies to be identified » Private sector representatives of the priority products » Ukrainian Association of Windows Systems » Ukrainian Association of Furniture Manufacturers
Priority:	Medium

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APPENDICES

A-1.1 PRODUCT SELECTION BY CRITERIA RANKING

TABLE 1: Product selection by criteria ranking

Nr.	Criteria	Sub-criteria Rating of potential for QI development none (0) very small (1) small (2)	Weighting	Furniture (HS 94)	Children Furniture (no HS code)	Toys & Gadgets (no HS code)	Multilayer wood flooring (HS 441875)	Solid wood flooring (HS 441879)	Exterior wood flooring (no HS code)	Wooden doors (HS 441820)	Interior doors (no HS code)	Exterior doors (no HS code)	Wooden windows (HS 441810)	Wooden builders' joinery and carpentry (HS 4	Glulam (no HS code)	CLT (no HS code)	Wooden tools, tool bodies (HS 441700)
1		**Market (Demand side)**	25%														
1.1		Demand for the product on the domestic Market	6%														
1.1.1		short term	2%	2	4	2	3	3	3	2	3	3	2	3	3	1	2
1.1.2		middle term	3%	4	3	3	4	3	3	2	3	3	2	4	4	2	2
1.1.3		long term	1%	3	3	2	3	3	3	2	3	3	2	4	5	4	2
1.2		Demand for the product on the European Market	6%	3	4	3	4	4	3	4	4	4	4	5	3	4	4
1.3		Demand for the product in the GUS-States	3%	2	4	2	3	2	2	2	3	2	2	3	2	1	2
1.4		Demand for the product on the world markets	3%	2	3	2	3	3	3	2	2	3	3	3	2	4	4
1.5		Existing export channels	7%	3	3	3	4	3	2	3	3	3	3	2	2	1	3
		Total rating indicator p. 1.		0.7	0.86	0.66	0.91	0.78	0.65	0.69	0.78	0.78	0.72	0.84	0.67	0.58	0.75
2		**Companies / Product (Supply side)**	25%														
2.1		Number of producers in the sector	1%	4	4	2	2	3	2	3	3	2	3	4	3	2	4
2.2		Key figures of average producers of the sector	4%														
2.2.1		Employees	2%	3	3	2	2	3	2	3	3	2	3	3	2	1	2
2.2.2		Annual Turnover	1%	3	3	2	2	2	2	2	2	2	2	2	2	1	2
2.2.3		Productivity	1%	2	3	2	2	2	2	2	2	2	2	2	3	1	2
2.4		Proportion of SME's in the sector	1%	4	4	3	2	4	3	3	3	4	3	3	3	4	2
2.5		Proportion of companies owned to at least 51% by Ukrainain nationals	1%	4	2	4	2	2	4	4	2	4	2	2	3	4	2
2.6		Potential for innovation in the sector	1%	3	4	4	3	2	2	3	3	3	3	5	4	4	2
2.7		Potential upstream/downstream processing in the specific sector	2%	2	3	4	2	3	3	2	2	2	3	3	3	4	2
2.8		Potential to create jobs in the sector	5%	4	4	4	3	2	3	3	3	3	3	5	4	4	3
2.9		Competitive advantage against sub-regional competitors (not Ukraine)	1%	3	3	2	2	2	2	3	3	3	2	3	3	3	3
2.10		General motivation of potential beneficiaries to participate in the project	2%	4	2	1	1	2	1	3	3	3	4	2	2	2	1
2.11		Willingness to financially conrtibute for product testing	2%	2	2	1	1	2	1	3	3	3	5	2	2	2	1
2.12		Availability of skilled workforce in the sector	1%	4	4	2	3	3	3	4	4	3	3	3	3	3	3
2.13		Potential for increased export orientation in the future	2%	5	5	2	4	4	3	4	4	3	5	4	4	5	4
2.14		Availability of product-related promotion organizations	2%	5	5	1	1	2	1	5	5	5	5	1	1	1	1
		Total rating indicator p. 2.		0.89	0.87	0.63	0.55	0.62	0.57	0.79	0.77	0.74	0.85	0.79	0.72	0.72	0.57
3		**Ouality Infrastructure**	35%														
3.1		General potential for QI-Development in the sector	5%	3	4	2	3	2	3	4	4	4	4	3	5	4	1
3.2		International demand for test certificates in the sector	4%	2	4	4	3	2	2	4	4	4	4	3	5	5	1
3.3		Condition of existing QI in Ukraine	4%	2	2	2	3	2	3	2	3	3	3	3	2	3	3
3.4		Cost-benefit grade for infrastructure development	2%	2	3	1	2	2	2	3	3	2	3	3	5	4	1
3.5		Availability of skilled workforce for testing activities (academic level) in the	2%	3	3	3	3	3	3	3	3	3	3	3	3	3	3
3.6		Funding for QI through services for alternative sectors	2%														
3.6.1		other products - same sector	1%	4	4	1	2	1	2	3	4	4	4	3	4	3	2
3.6.2		other products - other sector	1%	4	4	4	2	3	2	3	3	3	4	3	4	4	2
3.7		Potential for involvement of main counterparts	6%														
3.7.1		MEDT	1%	3	3	3	2	3	3	3	3	3	3	3	3	3	3
3.7.2		UAS	2%	3	3	3	2	3	3	3	3	3	3	3	3	3	3
3.7.3		NAAU	1%	3	3	3	2	3	3	3	3	3	3	3	3	3	3
3.7.4		UMTS	2%	3	3	3	2	3	3	3	3	3	3	3	3	3	3
3.8		Readiness of main counterparts	6%														
3.8.1		MEDT	1%	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3.8.2		UAS	2%	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3.8.3		NAAU	1%	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3.8.4		UMTS	2%	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3.9		International competition for testing facilities is low (=higher rating 1-5)	4%	3	3	3	1	3	3	2	2	2	3	3	4	5	4
		Total rating indicator p. 3.		0.91	1.06	0.89	0.81	0.82	0.91	1	1.05	1.03	1.1	0.99	1.23	1.23	0.79
4		**Other**	15%														
4.1		Synergies with other programs	6%														
4.1.1		IPD	1%	3	3	1	5	5	5	5	5	5	5	5	5	5	5
4.1.2		Other SECO projects	1%	4	4	1	1	2	1	2	2	2	3	1	1	1	1
4.1.3		Other UNIDO projects	1%	2	2	1	1	1	1	1	1	1	1	1	1	1	1
4.1.4		EBRD project	1%	2	2	1	2	2	1	1	1	1	1	1	1	1	1
4.1.5		CUTIS project	1%	5	5	1	1	1	1	1	1	1	1	1	1	1	1
4.2		Gender equality in the sector	1%	4	4	2	2	2	2	3	3	2	3	2	2	2	2
4.3		Impact of corruption in the sector is low (=higher rating 1-5)	2%	3	3	4	3	1	3	3	3	2	4	3	3	3	2
4.4		International sanctions or trade restrictions in the sector (=lower rating 1-5)	2%	5	3	4	3	4	4	3	3	2	3	3	3	3	5
4.5		General regional potential of the sector	5%	4	4	2	3	3	2	4	4	3	4	4	5	4	3
		Total rating indicator p. 4.		0.56	0.52	0.33	0.39	0.38	0.35	0.45	0.45	0.35	0.48	0.43	0.48	0.43	0.4
		Total rating indicator 1-4		3.06	3.31	2.51	2.66	2.60	2.48	2.93	3.05	2.90	3.15	3.05	3.10	2.96	2.51

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