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Working paper

Impacts and Potentials of the Ukraine Crisis on Supply Chains Development for the Danube Region

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Impacts and Potentials of the Ukraine Crisis on Supply Chains Development for the Danube Region, Working paper

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0

Executive Summary

This report was produced within the framework of the Danube Alliance, the flagship initiative of Priority Area 8 of the EU Strategy for the Danube Region. The study is part of the Value Chain Resilience working paper edition launched by the Danube Alliance, VDI VDE, and Anteja ECG.

The Ukraine-Russia war has caused oil and gas prices to rise significantly and has impacted supplies of many products. There are considerable challenges present as many supply chains are now broken due to the conflict. This, combined with the trade embargo imposed on Russia, means that European buyers are now struggling to find substitutes for missing import products. The Danube Region has the opportunity to replace the loss of these supply streams and establish new value chain models and partnerships within the region and with companies across Europe. Such potentials for Danube regional actors are not only related to the war in Ukraine. There are other drivers to step into new supply chains, which are currently under development, like the bio-economy.

Against this background, a study was conducted to determine the impacts and potentials of the Ukraine crisis on supply chains development for the Danube Region. The study focused on supply chains in the bioeconomy sector, including agroforestry, agriculture, food, and the wood industry. This work generated some important conclusions.

VALUE CHAINS

- Agroforestry
- Agriculture
- Food
- Wood

OPPORTUNITIES

- Apples
- Wood
- Sunflower seeds / oil

CHALLENGES

- Clusters
- Data
- Value Networks

During the study, it was determined that the products most affected by the conflict were apples, wood, and sunflower seeds and oil. Potential alternative suppliers from the Danube Region might be able to step in to fill at least part of the gap created by Ukrainian shortages and disruptions. There will be no need to build from scratch, as the products needed are already cultivated in the regions. Interviews with the cluster managers already involved in resilience promotion confirmed that demand and supply for three products exist. Also, 45 clusters active in the agri-food and wood domains were identified across Danube regions that can help to identify alternative suppliers and match them with buyers.

Discussions with cluster managers divulged some hurdles and obstacles to this development. Clusters are not adequately prepared for quick changes to new value chains as needed during crises such as the war in Ukraine. Most clusters operate within traditional and well-established value chains, or focus on research and innovation and far less on business matchmaking for commercialisation and business development for members. Also clusters lack specific trade-related information about their members' products needed by the buyers. Interviews with the cluster managers revealed the absence of cross-regional value networks with relevant information at the firm's level required for effective matchmaking and for visibility of companies. Nevertheless, excellent examples in wood and fruit clusters show that clusters can play an important role in support SMEs' inclusion into more sustainable and resilient value chains.

Without support in creating business links, new promising Danube value chains might be taken by some other regions. Consequently, the case has never been stronger for more resilient, circular bioeconomy value chains models and partnerships within the region and with companies across Europe.

OPPORTUNITIES

APPLES	WOOD	SUNFLOWER/OIL SEEDS
• Ukraine was a major supplier of Apples to the EU • Danube export to Russia was significant and is closed now • Apples can be readily found and grown in the	• Ukraine and Danube have the same market / EU • Regulation / Climate change • Component shortage • Circularity	• Alternatives outside Europe are expensive • Oilseed prices have skyrocketed • Urgent need to find replacement for cooking oils
FILLING THE GAPS	**INCREASE MARKET SHARE IN EU MARKETS**	**SUBSTITUTES FOR EU MARKETS**

Recommendation 1:

Increase awareness on the policy and intermediary levels about the importance of supply chain development as a long-term task. About 45 clusters active in the agri-food and wood domains identified are currently not connected, and there is no information flow between them. The integration of Danube clusters in functional networks would increase awareness of the importance of resilience and facilitate creation of concrete business cases.

Recommendation 2:

Strengthening the role of the Danube Alliance as a source of support for supply chain development. The Danube Alliance is still a young initiative, but has already proven its potential to support the private sector to become more fully engaged in new supply chains. This role shall be strengthened. The Danube Alliance can provide analysis and design actions for stimulating the development of supply chains. The Danube Alliance can respond to broken / disrupted supply chains (e. g. through COVID-19 or the war in Ukraine) or support the development of new supply chains with significant bio-economic potential and increasing resilience through new collaboration approaches, capacity building, and new digital solutions. This contains the support of infrastructural elements, like the Value Chain Generator that enables cluster managers to identify opportunities for new value chains partnerships across Europe with the use of AI at the level of products, residuals and side streams. This flagship is constrained by a two year time frame. The partnership and commitments created will be hard to maintain beyond the project end. Turning projects into mid-term programs can significantly improve the situation and allow the consortium to focus on short-term activities and then gradually extend to mid and long-term objectives.

Recommendation 3:

Support PA8 for mainstreaming supply chain resilience. PA8 deals with competitiveness improvements of the private sectors under EUSDR. Due to all the recent supply chain disruptions, the future work of PA8 should include designing a problem-solution plan for resilience and digital infrastructure to provide immediate support and longer-term assistance to Danube clusters and related actors. PA8 can support the efforts of the Danube Alliance from both the policy and macro-regional perspectives.

01

Introduction

Following the outbreak of the war in Ukraine and the consequent disruptions of value chains, a study was conducted to determine the impacts of the conflict and formulate recommendations for their amelioration. The study was focused on supply chains in the bio-economy sector, which includes amongst others agroforestry, agriculture, food, and the wood industry. The survey provided much-needed information for ensuring a timely and effective response. This information provided support for interventions in supply chains disrupted by war and sanctions, and providing new opportunities to suppliers and buyers from the Danube Region. During the study, it was determined that the products most affected by the conflict were apples, wood, and sunflower seeds and oil.

The conflict has caused oil and gas prices to rise significantly and has impacted supplies of many secondary materials needed by the agribusiness sector, such as fertilisers. There are considerable challenges present as many supply chains are now broken due to the conflict and the trade embargo imposed on Russia, and European buyers are struggling to find substitutes for missing import products. However, potential alternative suppliers from the Danube Region might be able to step in to at least partly substitute for Ukrainian and/or Russian exporters and alleviate the effects of the conflict.

The purpose of this research was to study the impacts of the Ukraine crisis on supply chains in the Danube Region. The study consisted of several stages. The first stage was oriented towards determining which elements of the supply chain had been most heavily disrupted by the ongoing conflict, and whether existing buyers could be expected to make a recovery and re-establish the broken supply chain. Secondly, potential alternative suppliers were identified and assessed, noting their capacity, reserves, and timeframes for supplies. Thirdly, it was identified to what extent buyers could be connected to suppliers. Based on these three actions, recommendations were prepared and presented.

The research was conducted through a review and analysis of information retrieved through trade statistics and desk research of relevant documents on bio-based value chains and clusters and through a number of interviews and workshops with clusters, experts and workshops organised by PA8 and the Danube Alliance. About 20 clusters were engage in activities. Discussions were held with several cluster managers, covering over 30 producers of apples and agriculture-related SMEs from Serbia, and 39 agriculture-related SMEs and a few large companies from Hungary. A mixture of quantitative and qualitative data was obtained from them to establish an intelligence picture of their current capacities, identify barriers and assess the extent to which Danube Region suppliers could take the strain of supply chain shortages created by the Ukraine war.

02

Ukraine as a trade actor

Ukraine was 4th largest external food supplier

Prior to the outbreak of the current conflict, Ukraine was the European Union's 4th largest external food supplier, providing 52 % of maize imports, 19 % of soft wheat, and 23 % of vegetable oils[1]. The EU imported half of Ukraine's production of sunflower oil.

The trade relationship between the EU and Ukraine remained asymmetrical up until the beginning of the current conflict. The EU was Ukraine's largest trade partner and accounted for 40 % of its trade, yet by contrast, Ukraine was only the 17th biggest trade partner of the EU, and accounted for just 1.1 % of its total trade[2]. In 2011, the EU had a trade surplus with Ukraine of €6 billion, a surplus remaining throughout the 2011-2021 period until it reached €4 billion in 2021. Both exports to and imports from Ukraine increased between 2011 and 2021. Concerning EU exports to Ukraine, they were at their highest in 2021 at €28 billion and at their lowest in 2015 at just half this figure, with a value of €14 billion. With regards to EU imports from Ukraine, they were highest in 2021, in the value of €24 billion and lowest in 2015, in the value of €13 billion.

The trade relationship between the EU and Ukraine has developed over time and is becoming increasingly close. In 2009, the EU included Ukraine it the "Eastern Partnership" (EaP) aimed at promoting trade, dialogue and eventual integration between the EU and a number of countries in the former Soviet Union. In 2014 the EU Ukraine Association Agreement aimed at regulatory alignment and more generous market access for goods and services was signed. In 2016, Ukraine built upon this with a Deep and Comprehensive Free Trade Agreement (DCFTA) with the EU.

[1] European Parliament, 2022.
[2] Eurostat, 2022.

Danube

Ukraine's trade partners in the EU were mostly countries with which it shares a land border. In terms of which Member State had the highest amount of Ukrainian imports, this depends on whether one means the highest amount in monetary terms, or the highest amount in terms of its share of the total EU imports from Ukraine. In terms of monetary value, Poland was the main importer of Ukrainian goods, with €4.19 billion in imports in 2021. In terms of percentage of the EU total, Hungary was the biggest customer, with 5.7 % of all EU imports from Ukraine going to Hungary. Figure 1 shows Eurostat data on both the monetary value in € millions and % of total imports by Member State[3].

Ukraine's exports were mostly characterised by primary sector extraction such as metals, ores and wood. It was also heavily dominated by agricultural produce. In 2021, the EU had trade surpluses in machinery and vehicles, amounting to €7.4 billion, chemicals at €4.5 billion, energy at €1.7 billion and other goods at €0.3 billion. The EU had trade deficits with Ukraine in food and drink at €0.6 billion, other manufactured goods at €2.5 billion and raw materials at €6.7 billion[4].

[3] Eurostat, 2021.
[4] Eurostat, 2021.

EU imports of goods from Ukraine, 2021

	€ million	% of Ukraine in extra EU imports
Poland	4188	4.3
Italy	3288	1.7
Netherlands	2465	0.7
Germany	2082	0.5
Hungary	1955	5.7
Spain	1528	1.0
Romania	1341	4.9
Czechia	1288	2.7
Austria	874	2.0
Slovakia	868	4.5
Bulgaria	836	5.4
France	725	0.4
Belgium	678	0.4
Lithuania	445	3.6
Portugal	297	1.4
Denmark	258	0.8
Latvia	227	4.1
Greece	198	0.6
Slovenia	125	0.6
Estonia	112	2.0
Sweden	92	0.2
Ireland	66	0.1
Finland	59	0.3
Croatia	44	0.6
Cyprus	21	0.7
Luxembourg	13	0.5
Malta	6	0.2

Figure 1: EU imports of goods from Ukraine by € value and % of EU total
Source: Eurostat (online data code: ext_st_eu27:2020sitc and DS-018995)

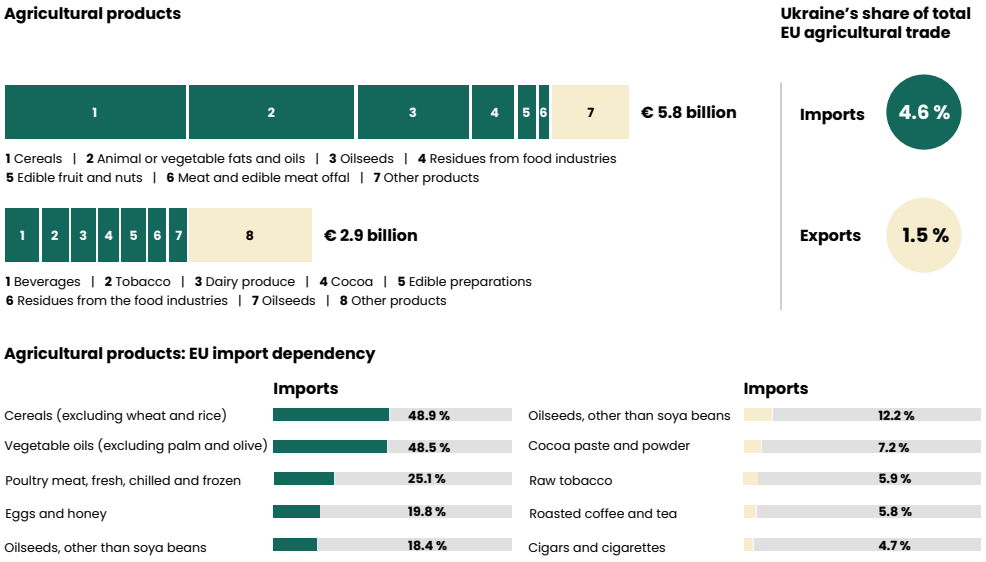

Figure 2: EU trade with Ukraine: agricultural trade by product in 2020
Source: European Parliamentary Research Service[5]

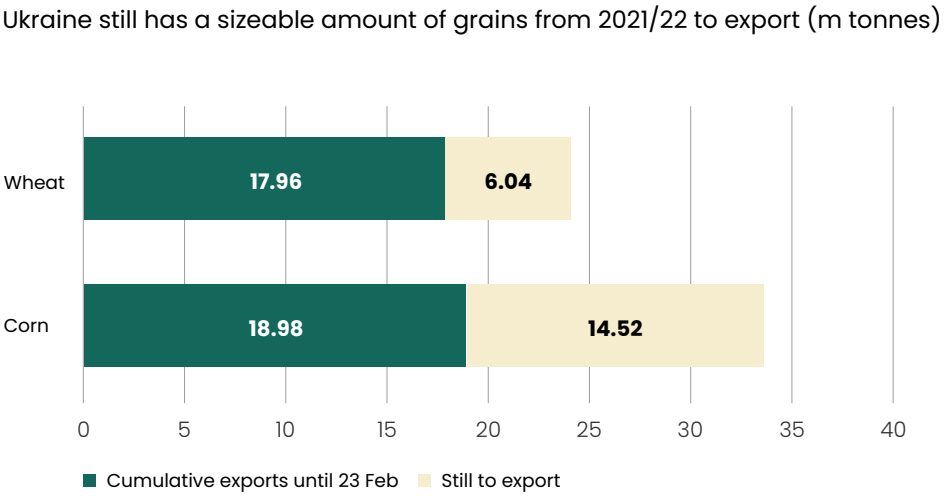

Figure 3: Exported and yet to be exported Ukrainian crops
Source: Ukraine Agriculture Ministry, USDA, ING Research

Cereals and vegetable oils

In terms of the exact products, Ukrainian cereals and vegetable oils were particularly prominent on EU markets. Ukraine supplied almost half of the EU's cereals and vegetable oils, and more than a quarter of its poultry meat.

In early 2022, there was still a significant volume of Ukrainian wheat and corn that had not yet been exported. Figure 3 shows the figures from the 2021/22 harvest and shows what amount has been exported and what amount is still yet to be exported[6].

Both Russia and Ukraine are major suppliers of edible oils on European markets. Shortages from these two places of origin could see more substitution towards soybean oil, which would be positive for soybean crushers and ultimately soybean prices.

[5] European Parliament Research Service, 2022.
[6] ING, 2022.

Ukraine global wheat exporter

Pre-war Ukraine was also a prominent exporter of wheat, and many developing countries rely on Ukraine for a large part of their wheat imports (see figure 3). Ukraine's wheat exports are so significant that in 2020, Ukraine exported more wheat globally than the entire European Union. Statistics show that international trade was equal to 65% of Ukraine's GDP in 2020, totalling to $102.9 billion of goods[7] exchanged with countries around the world. Figure 4 shows the dollar value of exports, and the share of total Ukrainian exports.

According to the Observatory of Economic Complexity (OEC), Ukraine's total exports were $49.5 billion in 2020, and 42 % of this, which amounts to $20.8 billion, could be classified as food. This includes foodstuffs, cereals, vegetables and animal and vegetable by products. Figure 5 showcases food produce exports, which are produced in Ukraine, by their total export value[8].

Ukraine's food exports were predominantly intended for destinations in other European countries. According to the data provided by the Observatory of Economic Complexity, the top five European countries for Ukrainian food exports were Germany, Poland, Italy, the Netherlands and Hungary. Annually Ukraine exports around 55,000 tonnes of fresh, frozen and dried berries in fresh equivalent. Apple exports exceeded 42,000 tonnes in the 2017/18 season despite the fact that the harvest in that season was reduced due to spring frost[9]. In 2018 Ukraine was expected to have had around 120-150,000 tonnes of high-quality apples available for exports. Total apple production stood at 1 million tonnes and is growing rapidly[10].

[7] The Visual Capitalist, 2022.
[8] The Observatory of Economic Complexity, 2020.
[9] Ukrainian Horticultural Association, 2022.
[10] The Observatory of Economic Complexity, 2020.

Goods Exported from Ukraine (2020)	Dollar Value	Share of Exports
Cereals	$9.4B	19,1 %
Iron and steel	$7.7B	15,6 %
Animal or veg. fats, oils, and other products	$5.8B	11,7 %
Ores, slags, and ash	$4.4B	8,9 %
Electrical machinery and equipment	$2.6B	5,2 %
Other goods	$19.4B	39,5 %

Figure 4: Ukrainian exports dollar value and share of exports (2020)
Source: UN Comtrade

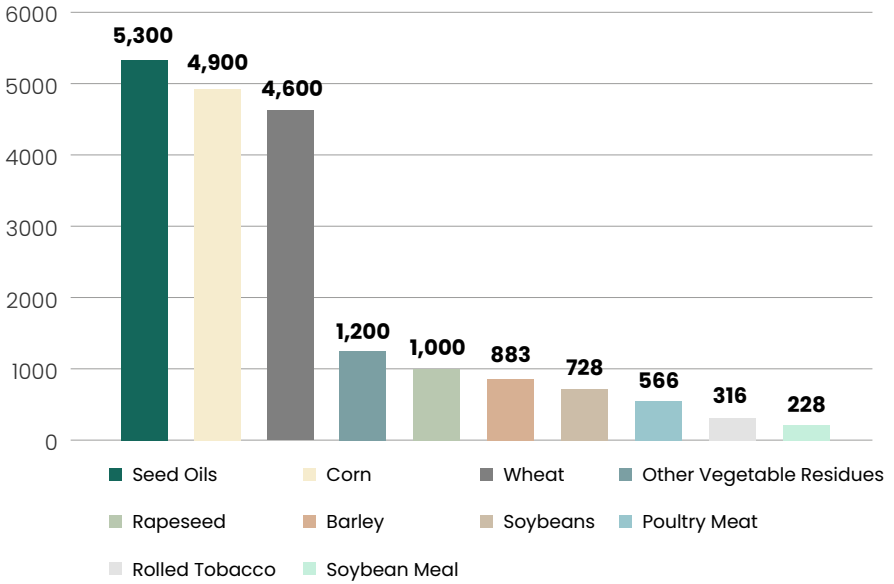

Figure 5: Ukrainian food exports in 2020

03

Ukraine War Challenges

The conflict will create many challenges both regionally and globally. In terms of the impact on global commodities, energy and currency markets, the impact is already beginning to be felt. Assuming this conflict continues for some time, these shocks could be present for some time to come. Several rounds of peace talks have already failed, and this suggests the conflict may rage longer than had been expected as neither party can find grounds for cease fire. The impact is already being particularly harshly felt in commodities and food prices.

Aside from the impact the conflict has on economic production in Ukraine, there are also secondary impacts, with implications for the export of existing and available products. In addition to the rising cost of fuel, routes usually used to transport goods to market are also facing significant challenges due to war and military blockades. This has an impact on Ukraine, Russia, Europe and the wider world. In Ukraine itself, military activity around the coast has effectively blockaded several major ports, making it impossible for goods to arrive or leave by sea. This is significant given that prior to the war, 75 % of Ukrainian exports left by sea[11], with the now heavily blockaded port of Odessa alone handling 65% of that figure.

Whilst there exists an option of transporting goods by rail instead, this is complicated due to the fact that Ukrainian railways use a different railway gauge and rolling stock, and were thus never actively used to transport exports into Europe. It has been necessary to use European hoppers and to reload products for the narrower gauge. In Europe, this practice is not common, and therefore there is a lack of locomotives, rods, and transshipment points with terminals.

[11] The Odessa Journal, 2022.
[12] Flight Global, 2022.

With the blockade of seaports and the incompatibility of railways, another option for freight transport could also have been through air cargo. Globally, 69 million metric tons of freight are transported by air cargo, and since COVID-19 related shutdowns started to be lifted in January 2022, air cargo in Ukraine initially began returning to the normal market growth of 4.9%[12]. However, with the outbreak of hostilities in February 2022, this market figure dropped to zero. Air space closures in both Ukraine and Russia significantly impacted world air cargo routes, volumes and profit margins. EU carriers such as Finnair and Lufthansa have been forced to cancel cargo flights due to Russia banning EU carriers from its territory. Ukraine has an unfortunate history of civilian aircraft being shot down due to military activity, as happened with the Malaysian Airlines flight MH 17 in 2014, the risk of which highly discourages airlines from operating in Ukrainian airspace.

It is also highly likely that the conflict will continue for a considerably longer time. Both Russia and Ukraine have yet to resolve the disputed territories of Donetsk, Luhansk and Crimea. Peace talks were held in the spring of 2022 in Istanbul, but with no substantive resolution. Furthermore, Russia has made indirect threats against countries that it perceives as having interfered in the current conflict. Although the possibility of the conflict expanding to other countries and causing further economic harm is small, it cannot be entirely ruled out.

04

Danube Alternative Supplies

The Ukraine crisis presents a particularly promising opportunity for producers in the Danube Region to fill at least part of the gap created by Ukrainian shortages and disruptions. The Danube Region has producers of some of the products which are now facing disruption. To take the strain, there are perhaps three products that Danube Region producers can best provide alternative supplies to Ukrainian equivalents. They are apples, wood and sunflower seeds/oil.

There will be no need to build from scratch, as the products needed are already cultivated in the region, and in some cases have been for several centuries. This would mean that clusters and experts in the field are on hand and ready to fill supply chain gaps, and in doing so will be able to obtain greater market share for their producers/cluster members. The Danube Region is already fully integrated into the EU Single Market. This means all produce is 100 % tariff free, and has a minimum of customs checks. Whilst the EU-Ukraine Association Agreement provides generous market access to the EU for Ukraine, it still falls short of the advantages of full EU Membership in several key areas[13]. These advantages are enjoyed by EU producers, who can use this decisive edge not just to increase their market share and economic performance. Finally, the experience of COVID-19, with its almost total impact on every aspect of economic, social and personal life, has been a powerful testing ground for how businesses react to global shocks and emergency scenarios. Equipped with this experience of how to handle unexpected emergencies, governments, businesses and consumers can apply lessons learned under the experience of COVID-19 to any Ukraine related issues.

[13] European Policy Centre, 2022.

4.1 Apples

Apples are a product of focus for two main reasons. Firstly, Ukraine was a major supplier of apples to the European market, and therefore any disruption in apple supply from Ukraine creates a quantitative shortage. Secondly, apples can be readily found and grown in the Danube Region, meaning this region has an obvious and immediate potential to fill any gaps and disruptions. Unlike other products with their supply origins in Ukraine, some of which are available in Ukraine but are not available in the Danube, apples can be found in both regions. Therefore, the disruption of Ukrainian supplies of this product is at least nominally not as difficult to find substitutes for as may have been the case for other products. Countries in the Danube Region also used to export a significant portion of their apples to Russia, a market which is now closed, leading them to look for possible alternative destinations for their exports.

The total EU production of apples remains high, close to 12 million tonnes. There has been a noticeable slowdown in exports of fresh apples due to high stocks increasing the share of apples going into processing. The positive consumption effect from the COVID-19 pandemic has declined and this has resulted in lower per capita consumption at 12.1 kg. In 2021/22, EU exports of processed apples could increase by as much as 33 %, driven by difficulties faced by other producing neighbouring countries. This would have the effect of increasing the competitiveness of the EU apple industry by comparison. Similarly, EU imports of processed apples are expected to reach a record low level of 900,000 tonnes[14]. Imports from Ukraine are expected to come to a halt due to the ongoing Russian invasion. For comparison, Ukraine exported 30,000 tonnes to the EU in 2020/21 and between January and September of 2021, Ukraine exported 10,000 tonnes of apples to over 60 countries.

[14] European Commission, 2022.

After two campaigns (2019/20 and 2020/21) with slightly lower than 5-year average production, high prices and sustained demand, the EU's production of apples for the campaign 2021/22 was estimated to be close to 12 million t (+2 % year-on-year and compared to 5-year average). The lower than usual harvesting in France and Italy due to poor weather was compensated by a generous crop in Poland, which was above 4 million t (+13 % year-on-year)[15]. The Polish domestic market is expected to face difficulties due to a reduction in export opportunities as a result of sanctions imposed on Russia.

Production of apples in the Danube Region was previously mainly intended for the Russian market, whereas apples from Ukraine were being largely imported into the EU. Both the export to Russia and the import from Ukraine have now been discontinued. Apples producers have however not yet been directly impacted by the conflict, as last years' harvest predated it, and the next harvest is not due until September. There is an option to establish new market links and divert apple production from the Russian market to the EU market instead, substituting for the loss of Ukrainian imports. It has been noted that safety and quality standards requirements for apples in the Russian market were similar to those in the EU market.

[15] European Commission, 2022.
[16] European Commission, 2022.

x 1000 tons

Country	2012	2013	2014	2015	2016	2017	2018	2019	2020	F2021	(1)	(2)
Austria	157	155	188	177	40	67	184	146	126	115	-9	-24
Belgium	220	220	318	285	234	88	231	242	168	192	14	-10
Croatia	59	96	62	101	35	66	86	60	55	65	18	-3
Czech Rep	118	121	131	156	139	102	145	103	118	126	7	3
Denmark	18	23	26	24	24	19	24	15	24	18	-25	-14
France	1.119	1.576	1.444	1.674	1.514	1.424	1.477	1.651	1.337	1.375	3	-8
Germany	972	804	1.116	973	1.033	597	1.093	991	1.023	1.080	6	4
Greece	242	236	245	242	259	231	301	276	280	203	-28	-29
Hungary	750	585	920	522	498	530	782	452	350	520	49	-2
Italy	1.939	2.122	2.456	2.280	2.272	1.704	2.264	2.096	2.124	2.046	-4	-5
Latvia	9	15	10	8	10	8	14	10	14	12	-14	-5
Lithuania	39	40	27	46	50	48	62	26	60	32	-47	-35
Netherlands	281	314	353	336	317	228	267	272	220	250	14	-1
Poland	2.900	3.170	3.750	3.979	4.035	2.870	4.810	2.910	3.410	4.170	22	12
Portugal	221	284	272	329	263	314	267	354	278	312	12	4
Romania	351	387	382	336	327	230	425	327	389	410	5	8
Slovakia	36	42	46	40	17	15	44	35	30	31	3	-15
Slovenia	45	56	68	71	12	6	72	36	46	19	-59	-63
Spain	391	464	505	482	495	480	476	555	425	543	28	12
Sweden	14	17	16	21	20	18	32	20	32	27	-16	-4
UK	162	204	206	243	239	207	219	205	196	191	-3	-8
Total:	10.045	10.929	12.541	12.326	11.833	9.251	13.275	10.783	10.705	11.735	10	1

(1) Percentage difference between F2021 and 2020
(2) Percentage difference between F2021 and the average of 2020 - 2019 - 2018

Figure 6: Apple production by country in EU27 and United Kingdom[16]
Source: WAPA

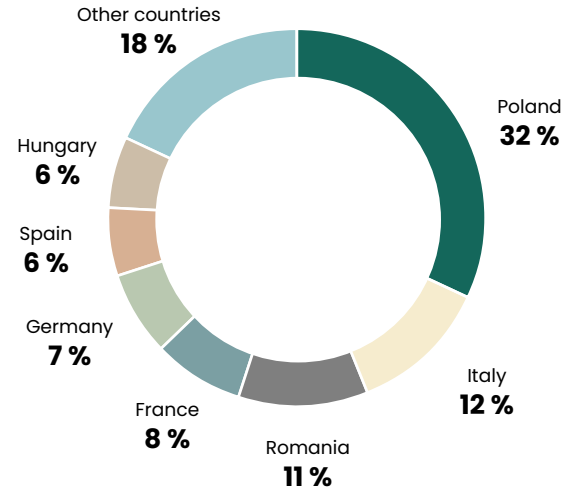

Figure 7: Size of apple growing areas as percentage of share
Source: Eurostat

An interview with the Serbian fruit cluster organisation VOCKO examined the production of plums and apples for the 2022-2023 harvest season. Almost all of their first-class consumable apples up to this year have been exported to Russia. Now, they are looking for new markets. In terms of apples, 3,400 tonnes of apples are foreseen, spread across six different types of apples[17]. Figure 8 shows the breakdown of apples by specific type.

[17] Interviews with cluster managers, 2022.

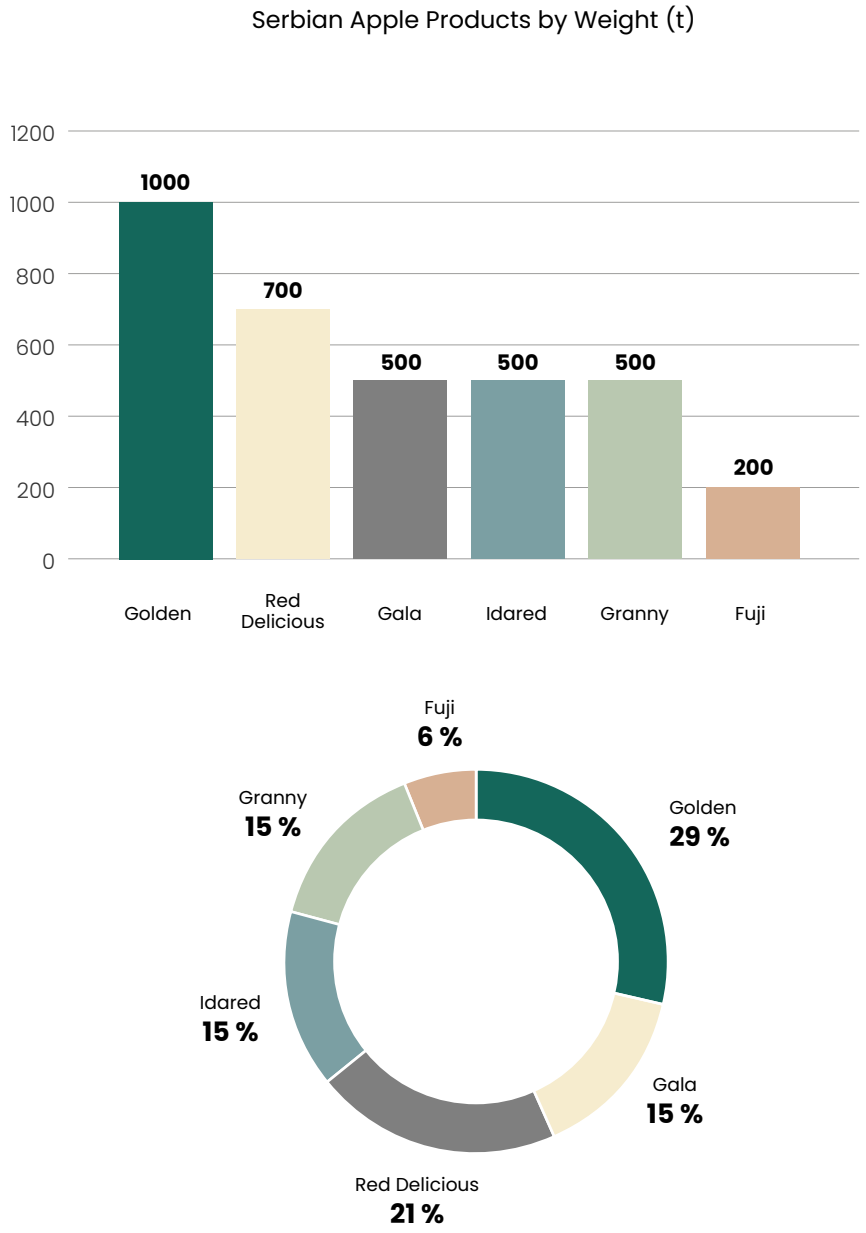

Figure 8: Production of apples in the Balkan region, example from Serbia
Source: WAPA

4.2 Wood

Wood is a focus product for this study. Wood has been a product the EU has expressed an interest in acquiring from Ukraine for some time. In the context of the EU-Ukraine Association talks, the availability of Ukrainian wood for export to the European market was a product involved in the negotiations. Trade and economic links between the EU and Ukraine were growing more cordial and intertwined, accelerated by the EU's desire to economically support and integrate Ukraine following the 2014 conflict. This was further accelerated by the outbreak of the much more damaging war in 2022. Wood export potential has been seriously undermined by the war, potentially opening the door to Danube Region wood producers to fill this gap, which the EU and Ukraine had planned to be filled by Ukrainian exports until the outbreak of war changed the situation[18].

Wood is also another product where Danube Region suppliers can step in and fill at least part of the lost supply from Ukraine. Building with wood has a favourable CO_2 balance and therefore has a strong sustainability angle to play. Even if the EU were to build 30 % of its new homes with wood, in the equivalent to 300,000 dwellings per year, this would mean an extra demand of only 15 million m^3 of sawn wood[19]. But the wood market is more than the actual stock and supply. It is important to stress that the current price increase has nothing to do with the bioenergy market, because these are completely different types of wood and qualities.

Producers of wood mentioned that due to war damage, it would take several years for trees to recover. Even if the war was to end tomorrow, it can take between 5-10 years for trees damaged

[18] Conclusions of the Competent Authorities for the implementation of the European Timber Regulation (EUTR) on the application of Articles 4(2) and 6 of the EUTR to timber imports from Ukraine, 2020.
[19] Interviews with cluster managers, 2022.

during military activity to recover. Another issue that was identified in workshops was that of component shortages. Whilst wood is not necessarily hard to obtain, components sourced from China have been delayed due to global supply chain shortages. This has been exacerbated by Chinese authorities deliberately delaying exports and imposing new lockdowns in Chinese provinces.

Regulatory challenges were also identified in the workshop sessions. The state company of Croatia called Hrvatske Šume, said that they manage 80% of forest resources in Croatia, and there is a problem due to climate change regulations and policies. There were concerns that EU Commission goals to achieve sustainability were being executed without companies in the sector being given adequate time to adapt.

Issues of circularity were also raised. There is a lack of alternatives in Europe to boost the supply of forestry resources. Companies will need to start thinking in terms of sustainable practices and circularity. To come up with new ideas the innovation investments are needed. It is not complicated to create a new product from a new piece of wood, but it is a challenge to come up with an upcycled, reused product solution.

In Croatia there is a programme with €400 million of funds to be distributed by 2027 from the Ministry of Regional Development, under the name Industrial Transition to Support Innovation Clusters. Companies that sign a contract to commit to the development of an innovative product are usually accepted on the programme. There was a feeling some organisations calling themselves clusters were not clusters in the truest sense of the term due to a brief time in existence, experience and connections. Whilst funding is available, the distribution of this funding will play an important role for the effectiveness of any transitions. On the European level a better plan should also be established concerning the speed of fund distribution. The initiative Bauchaus has been discussed for two years, but it is very slow.

[20] Eurostat, 2021.

Roundwood production, 2020

	Roundwood production		
	Total	Fuelwood	Industrial roundwood
	(1000m³ under bark)		
EU (¹)	488 603	113 760	374 843
Belgium	5 351	1 237	4 115
Bulgaria	5 404	2 332	3 072
Czechia (²)	32 586	5 922	26 664
Denmark	:	:	:
Germany	84 051	22 261	61 790
Estonia	10 638	4 136	6 502
Ireland	:	:	:
Greece	:	:	:
Spain	15 496	1 615	13 881
France	47 703	23 444	24 259
Croatia	5 234	2 207	3 027
Italy	8 923	3 921	5 002
Cyprus	9	6	2
Latvia	15 347	2 620	12 727
Lithuania	6 366	1 994	4 372
Luxembourg	350	59	291
Hungary	4 972	2 516	2 457
Malta (²)	0	0	0
Netherlands	2 966	2 304	662
Austria	16 790	5 327	11 462
Poland	40 593	4 713	35 879
Portugal	13 422	1 618	11 803
Romania	18 049	6 420	11 629
Slovenia	3 891	1 074	2 817
Slovakia	7 448	524	6 924
Finland	60 233	8 937	51 296
Sweden	74 400	5 400	69 000
Liechtenstein	7	2	5
Norway	11 750	1 508	10 242
Switzerland	4 577	1 770	2 807
United Kingdom (²)	10 786	2 478	8 308

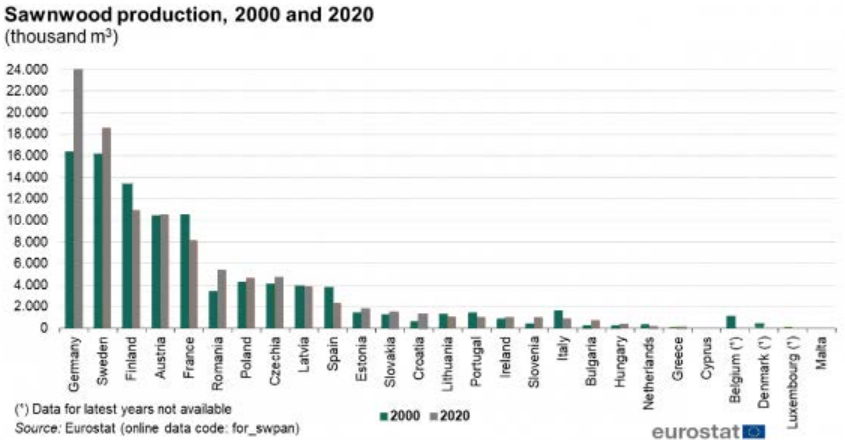

Figure 9: Roundwood and sawnwood production in EU/EEA 2020[20]
Source: Eurostat

4.3

Sunflower Oil/Seeds

Seed oils are a product of focus as Ukraine was one of the world's top suppliers of seed oils prior to the conflict, and therefore, there is now an urgent need to find a substitute source of these products. This disruption has already created problems, with alternative products being imported onto the European market. However, products such as palm oil are expensive to import across long supply chains, exacerbated by rising global energy prices and ongoing supply chain disruption. As a result, palm oil does not arrive on the market in good time and is too expensive to be viable for many consumers. Consequently, the need to substitute the lost Ukrainian cooking oil with oils closer to home has become more urgent. The Danube Region, given its proximity to the rest of the European market, could be the ideal region to provide that substitution potential.

The potential to support seed oils in the current project is extremely high and potentially successful. There are several reasons, which suggest that this could be an excellent product to support given several factors that have aligned in favour of its increased cultivation and production support. The EU remains in a strong position to support farmers in the wake of the Ukraine conflict. Thanks to the proposed measures to increase EU arable crops production, aimed at allowing farmers to increase their sowing area for maize, sunflowers and protein crops the 2022 EU harvest may be a very good one for cereals and for oilseeds. Lower feed demand due to lower pig meat production and the reduced used of cereals used in biofuels, EU exports of grains could be as much as 30 % higher and imports 42 % lower than the five-year average[21].

[21] European Commission, 2022.

Gross production of sunflower seeds in Danube region countries (in 1000 tonnes)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020e	2021f
Totals	**4048**	**4090**	**5003**	**4473**	**5941**	**6145**	**5322**	**6133**	**7356**	**7166**	**7458**	**5897**	**7156**
Sunflower seed	4048	4090	5003	4473	5941	6145	5322	6133	7356	7166	7458	5897	7156

Figure 10: Oilseed production for EU states in Danube Region[23]
Source: Eurostat

This suggests that the optimum time for seed oil crop support has coincided with the greatest disruption in modern history.

EU oilseed prices have skyrocketed since the invasion of Ukraine by Russia, with rapeseed and sunflower seed prices exceeding €1000/t. Production levels are not a concern as EU oilseed production was 6.5 % higher in 2021/22 than in 2020/21 at 30.2 million tonnes[22] . This includes 10.5 million tonnes of sunflower seeds, and EU oilseed areas are expected to be 4.8 % higher in 2022/23 compared to the 2021/22 projections. EU total oilseed production in 2022/23 could increase by 6.4 % year-on-year to reach 32.2 million t for the first time since 2017. Such high production level should allow to compensate for the EU loss of supplies from Ukraine.

[22] European Commission, 2022.
[23] European Commission, 2022.

05

Clusters Covering Related Products

The previous chapter drew attention to products like apples, wood, sunflower seeds, and oil as they most impacted by the crisis. For all three products it is highly likely that potential alternative suppliers from the Danube Region might be able to step in to at least partly substitute for Ukrainian and Russian exporters, and alleviate the effects of the conflict. As part of preparations for the workshops and interviews with cluster managers in relevant fields of production and supply, cluster identification and analysis were performed. We have identified 45 clusters active in the agri-food and wood domains across 11 Danube countries: Germany, Czech Republic, Hungary, Slovakia, Slovenia, Croatia, Serbia, Bosnia and Herzegovina, Romania, Bulgaria, and Moldova. The majority of clusters identified are agri-food producers and agri-food businesses, in the second place were wood clusters, and in addition to those, there were also some development centres and business associations.

Cluster managers from the list were contacted and invited to participate in the planned workshops. Mainly clusters already active in resilience and new value chains responded and participated in interviews and workshops. They confirmed that demand and supply for three products exist.

5.1 General Remarks

Cluster managers have noted that in addition to losing large export markets in Ukraine and Russia, farmers have experienced a lack of, and high cost of fertilisers, fuel and other supplies and materials needed. Even so, farmers fear a loss in income, as the rise of prices of their products might not be sufficient to account for the higher costs of supplies and living expenditures. Furthermore, it has been pointed out that there is a disruption present across most logistics routes, and that there is a need to establish new routes and logistics hubs. Eastward European transit corridors are no longer functional. Even if the conflict subsides, these effects may persist for some time afterwards. Cluster managers have also indicated concerns about the lack of a skilled labour force in the Danube region, as many workers migrate to Western Europe where wages are higher. Immigrants and refugees coming from Ukraine are able to make up some of this shortfall in the workforce, but most Ukrainians are also ultimately aiming to migrate to Western European countries. The inflow of people and companies from both Ukraine and Russia has also led to an increase in real-estate prices in the Danube region, causing economic difficulties for the producers.

5.2 Product Related Concerns

With regards to wood, cluster managers expressed concerns over regulations, particularly related to those aimed at tackling climate change. This could suggest that firms are not interpreting climate regulations correctly and thus find them overly onerous. Perhaps this suggests that governments must provide more guidance concerning how regulations are to be interpreted and enforced rather than allowing firms to attempt to figure this out themselves. An alternative is that the regulations genuinely are very onerous, and perhaps other measures are needed to help assist them with compliance. Some cluster managers in the wood sector suggested that clusters are not experienced or well-connected enough, which suggests clusters are immature and must be supported.

When discussing issues with cluster managers and organisations in the apples sector, managers felt that the shocks from Ukraine-Russia have not impacted them as seriously. This is due to the timing of harvests relative to the outbreak of the conflict. Producers noticed that export requirements for the Russia market were similar to the EU market, so the regulatory and administrative costs of redirecting exports would be minimal. In Serbia, a non-EU member which exported to Russia, they are now seeking new export markets in Europe, and the regulatory congruence makes this a good option.

Seed oils largely depends on Ukraine and there is an urgent need to substitute this product. Palm oils, coconut and others are far too expensive and also not viable for many consumers. The Danube Region, given its proximity to the rest of the European market, could be the ideal region to provide that substitution potential. Through clusters, networks could plan how to do this more efficiently.

5.3

Clusters Role in Resilience

Interviews have also shown, that in line with their mandate, most clusters operate within traditional and well-established value chains or research and innovation. As such, they are not adequately prepared for a large-scale market change, as has happened with the Ukraine conflict. The majority of clusters are operating within Smart Specialization Strategies and generally focus on innovation projects, engage in high-level road maps, and far less on commercialisation and business development for their members. They lack direct specific information about the products of suppliers they work with (e.g. quantity, quality, certifications, storage capacities), needed by the buyers. In particular, it was identified that cluster managers have a need for a systemic method for obtaining specific information about the produce available, such as the quantity, quality, certifications, seasonality etc. of the produce, so that they may easily and rapidly put forth discussions with alternative buyers.

One striking finding was that despite massive covid related movement to online interactions, data analytics support by digital tools, majority of cluster managers still mostly operate through interpersonal relations with the representatives of the companies in their cluster. They usually speak with the representatives individually and directly, with limited use of modern IT tools.

Similar to the challenges faced by cluster managers, it has also been noted that companies and clusters sometimes lacked exact knowledge of what their needs are and how they could improve their operations and exports. For example, information about specific certifications needed for exports to the European Union is not commonly known, but was also not expressed as a need.

06

Conclusions and Way Forward

The EUSDR PA8 flagship Danube Alliance has introduced some proactive activities to stimulate value chains with significant bioeconomic potential and increase resilience through new collaboration approaches. This study identified apples, wood, and sunflower seeds/oil products that the Danube Region producers could best provide alternative supplies to Ukrainian equivalents and address some of the challenges that new partnerships and value chains will be created.

The short-term lack of capacity at SMEs, clusters, and intermediaries levels detected in the study and possible lack of understanding about the resilience, circularity, and Green Deal targets can be partially overcome by increasing awareness about the importance of supply chain development as a long-term task. Danube Alliance can intensify support to clusters and SMEs by embedding them in more resilient and circular value chains through smart solutions. This contains the support of infrastructural elements, like the Value Chain Generator that enables cluster managers to identify opportunities for new value chain partnerships across Europe using AI at the level of products, residuals, and side streams. PA8 deals with competitiveness improvements of the private sectors under EUSDR. The future work should emphasize the importance of problem-solution programs and initiatives for resilience and digital infrastructure to provide immediate support and longer-term assistance to Danube clusters and related actors. As an interlocutor, PA8 can support the efforts of the Danube Alliance from both the policy and macro-regional perspectives.

07

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