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Report

Employment in the EU Fish Processing Industry based on Norwegian Seafood Export

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Foto: Kristin Holseth / SINTEF

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2024-08-15

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REPORT NO.	PROJECT NO.	VERSION	DATE
2024:00898	302008449	final	2024-08-15

KEYWORDS:
EU
Seafood processing
Export from Norway
Employment

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CLIENT(S)
FHF – Norwegian Seafood Research Fund

CLIENT'S REF.	NUMBER OF PAGES/APPENDICES:
901971	22 + Appendix

CLASSIFICATION	CLASSIFICATION THIS PAGE	ISBN
Open	Open	978-82-14-07001-9

ABSTRACT

Strong interdependency between Norwegian export of raw fish and the resources base to the European fish processing industry

This analysis is an update of an analysis performed in 2014 and 2021. The main objective has been to analyse how many fish processing jobs in the EU are based on import of unprocessed Norwegian fish. This is important information for several stakeholders, because it shows to what extent unprocessed fish is exported to the EU market, and indirectly will show how many jobs that are related to processing Norwegian fish in the EU. Of the raw fish imports to the fish processing industry in the EU in 2022, 21% is based on Norwegian fish raw materials. Thus, it makes Norway to be the main trading partner of raw fish to the EU, as it has been for several years.

The imported volumes from Norway to the EU increased from less than 1 million tonnes in the start of 2000s to more than 1,3 million tonnes in 2012, and further to almost 1,9 million tonnes in 2019. Considering the total resource base in the EU fish processing industry, the Norwegian share has increased from 14% in 2015 to 19% in 2022. Of the 102,000 full-time employees (man-years) in the EU fish processing industry in 2022, 19 000 man-years are directly related to imports of Norwegian raw fish. This an increase from 13 000 man-years in 2015 and about twice as many as in the Norwegian seafood processing industry in 2022.

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Document History

VERSION	DATE	VERSION DESCRIPTION
1	2024-08-15	Final version

SINTEF

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Sammendrag
I denne rapporten har vi analysert EUs foredlingsindustri innenfor fiskeforedling for å estimere andel årsverk som baserer seg på norsk fiskeråstoff til humant konsum. Rapporten baserer seg på en metode som ble benyttet i tilsvarende analyse i 2014 og 2021, og er i så måte en oppdatering av dette arbeidet. Eneste endringen i år er at norsk handelsdata benyttet i denne rapporten ekskluderer volum til 'non-food-use' (fiskemel, fiskeolje til fôrproduksjon), i motsetning til i de foregående hvor dette har vært inkludert. Grunnen til dette er at majoriteten av EU-tall benyttet i arbeidet, som norske tall settes opp mot, i hovedsak ekskluderer slik data og vi mener det derfor gir en mer rett analyse. Dette gjør derimot at norske tall blir noe lavere sammenlignet med tidligere, men utviklingen harmonerer. Som for tidligere analyser settes søkelyset på råstoff som sendes direkte til EU, og ikke det som måtte sendes til andre destinasjoner for så å gå inn i EU igjen for videre prosessering.

Tall fra 2022 viser at omtrent 21 % av volum sjømat importert til foredlingsindustrien i EU hadde norsk opprinnelse. Norge har hatt en betydelig vekst i sjømatprodukter eksportert til EU på kort tid, fra i underkant av 1 million tonn på starten av 2000-tallet til ca. 1,7 millioner tonn i 2015, og videre til i underkant av 2 millioner tonn de siste årene. Dette har bidratt til at EUs import av norsk sjømat har økt sin andel fra 20 % i 2015 til 21/22% de siste årene, noe som gjør Norge til EUs viktigste enkeltleverandør. Sett opp mot det totalet ressursgrunnlaget av sjømat til EU (inkludert EUs produksjon og eksport), så lå den norske andelen på 19 % i perioden 2020-2022. Dette er en betydelig vekst fra 2015 da tilsvarende tall ble estimert til 14 %.

Av 102 000 heltidsårsverk innen fiskeforedling i EU i 2022 kan man derfor estimere at tilnærmet 19 000 årsverk var direkte knyttet til import av norske råvarer, sammenlignet med ca. 13 000 årsverk i 2015.

Hovedgrunnen til utviklingen som viser at norsk fiskeråstoff blir stadig viktigere for EUs foredlingsindustri kan forklares som følger:

- Økt markedsandel for norsk sjømat i den totale importen av sjømat til EU
- Nedgang i EUs egenfangst/selvproduksjon
- De to ovennevnte punktene fører til en betydelig økning i norsk andel i EUs totale ressursbase for humant konsum av sjømat
- Noe av økningen i antall årsverk i EUs prosessering av sjømat kan tilskrives mindre import av sjømat fra Kina noe som fører til mer egenprosessering
- Mellom 80-85 % av norsk eksport av sjømat behøver (i høy eller lav grad) videre prosessering

Legger man i tillegg til at foredlingsindustrien i EU skaper ringvirkninger til annet næringsliv i EU, har man en forventet tilleggseffekt på 14 800 årsverk til øvrig industri i EU. I sum kan man derfor si at norsk fiskeråstoff i 2022 stod for ca. nesten 34 000 årsverk i EU.

1 Preface

The European Union (EU) is the most important market area for Norwegian seafood export. At the same time Norway is among the most important providers of consistent and sustainable supply of raw materials to the EU seafood industry for processing of value-added products to consumer level within EU local markets. In seafood trade there is clearly an interdependence between Norway and EU, therefore it is of great interest for industry players to evaluate trade balance and economic effects thereof, not at least the fact Norway being a non-EU member. Trade between the parties is regulated within the framework of EEA; European Economic Area Agreement, where custom levels and other trade regulating mechanisms is negotiated and implemented. Although, most industry players agree that EEA working well between the two parties, there is also a balance of contradictory interest of industries, i.e. between highly regulated agriculture sector with protective measures, and seafood industry wanting liberal trade and low custom levels - including value-added products.

Facts stating a high proportion seafood from both fisheries and aquaculture production is exported to EU market as "raw material" - i.e. low value-added grade. Hence, there is a common interest in evaluating these facts, The Norwegian Seafood Federation took initiative back in 2014 to estimate the effect of employment effects in the EU fish processing industry based on imports of seafood from Norway (Richardsen and Henriksen, 2014)[1]. An update was made in 2021 (Johansen *et al*., 2021)[2].

Again, initiated and funded by The Norwegian Seafood Research Fund (FHF), the present report aims to present another update based on the latest possible statistical data. The estimate will include employment effects based on export of both Norwegian farmed salmon/trout, as well as wild-capture species and products.

[1] https://www.fhf.no/prosjekter/prosjektbasen/901027/

[2] https://www.fhf.no/prosjekter/prosjektbasen/901703/

2 Methodology

To estimate employment effects within the EU we are using a simple Resource Base Model (as illustrated in Figure 1). The scope of the work has made no room for primary data investigations going into specific product categories and market areas. Rather more useful for the main objective of this report is to look at the aggregated volumes and values for the EU seafood industry. When knowing the total employment numbers of the EU seafood industry, we can calculate the effect of supply from Norway by calculating the resource base fraction from Norway, using the same fraction of EU's total number of employments, measured as Full Time Equivalent (FTE). Thus, we assume import from Norway is generating approximately the same employment effects as any seafood import to the EU.

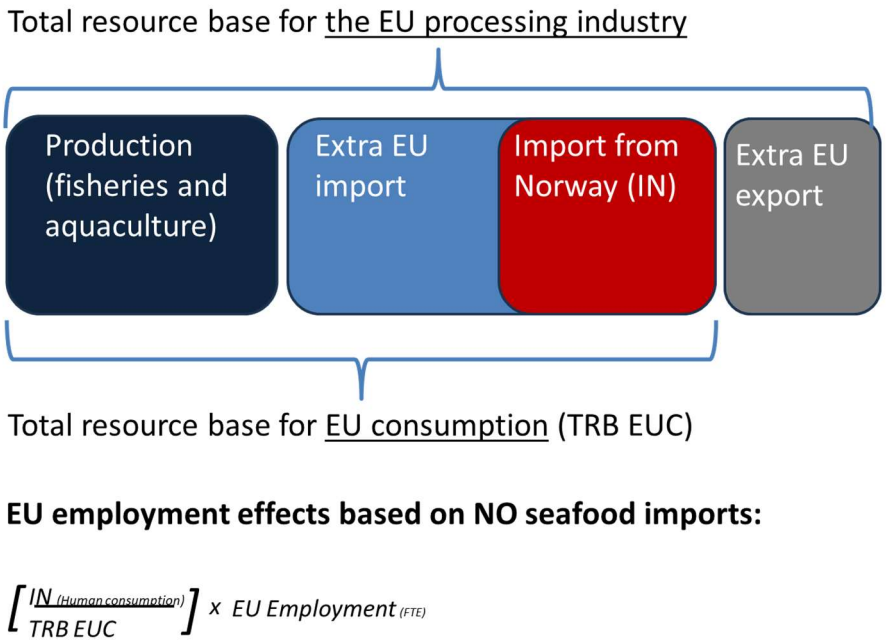


Figure 1: A resource base approach to evaluate employment effects of Norwegian seafood

In this report, only *direct* export/import from Norway to any EU member state is accounted for. It could be argued that some volumes of raw material go to non-EU markets for primary processing,[3] ending up in the EU for secondary processing (value adding), thus giving additional economic effects in the EU. However, it would be comprehensive technical and methodical problems associated with estimating valid data for such global trade in seafood. Therefore, such side-effects of global seafood trade via third countries have not been included. This means that all import to the EU used in this report is defined as extra-EU imports, which means that the origin of the volumes imported are from non-EU member states.

[3] A few years back it was well known that export of H/G groundfish species from North Atlantic fisheries to China was partly re-exported to EU markets as fillets or blocks for further value adding processing to wholesale and retail. However, identifying "Norwegian raw material" from other North Atlantic suppliers to China, is hard due to lack of traceability of reprocessed products. After Covid restriction this trade are significantly reduced due to logistic problems and surging cost.

2.1 Data sources

Figure 2 illustrates a typical value chain for seafood, including *scope of work* and primary data sources for the calculations to be used.

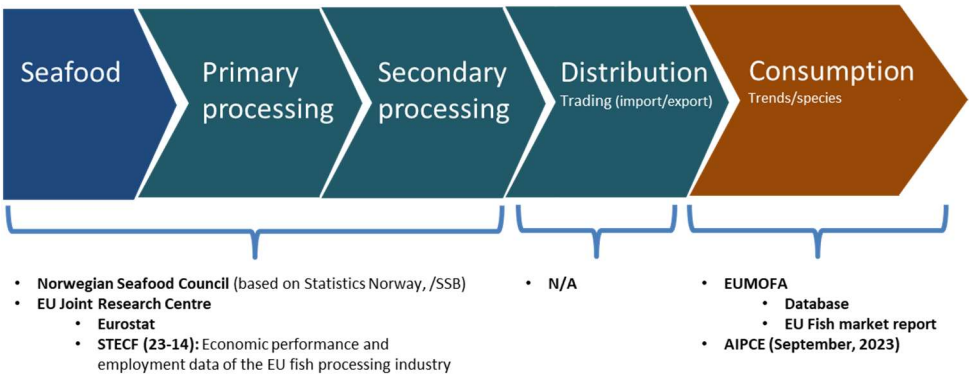


Figure 2: Illustration of the EU seafood value chain, with applied sources of data

Like previously we have based our estimates on employment based on EU imports of Norwegian seafood on data published by the European Fish Processors and Traders Association (AIPCE). This due to the fact that their publication ***The Finfish Study 2023*** *(*Turenhout *et.al*., 2023) gives a comprehensive and detailed description of production and trade volumes of seafood in the EU market. Data published are based on Eurostat, and converted to whole fish equivalent (WFE), which is "consistent with quota and allocation data we believe is the fairest means of comparison" (AIPCE, 2023).

Meanwhile, AIPCE do not publish a detailed overview of the development throughout the years and has a lack of info on the valuation of the EU seafood imports and exports per partner country, including Norway and per species. Therefore, to show the development in the last years in terms of such parameters we have used the EUMOFA database (EUMOFA, 2024), based on elaboration of Eurostat data. This data gives info on historical data, for both volume and value, however in product weight. Therefore, such data is different to data presented by AIPCE in WFE but will show the same trend. Where necessary, also Norwegian export and import data collected through the Norwegian Seafood Council are used to support the analysis. This data is also given in product weight.

Data for the economic capacities, including total employment figures for the EU fish processing sector, is based on the latest report from the Scientific, Technical and Economic Committee for Fisheries (STECF). In their report ***Economic Report on the EU fish processing industry*** **(2023)** data of employment and economic performance for the EU fish processing industry are investigated. The data relates to enterprises whose main activity is defined according to the Eurostat definition under NACE Code 10.20: 'Processing and preserving of fish and fish products'.[4)] This should cover all the primary and secondary processing units in the EU relevant for this study.

The analysis of the economic performance of the fish processing sector in the EU is based on national statistics and data for the fish processing industry collected under the Data Collection Framework of the EU (DCF/EUMAP MS's). The latest report (STECF 23-14) was published by the end of 2023, containing data for the fish processing sector for the years 2013 – 2021. Based on this we use the data for 2021 as a baseline for measuring the employment effect of Norwegian seafood supply to EU. Post 2021-data are not currently

[4] The NACE Code 10.20 class includes:
Preparation and preservation of fish, crustaceans, and mollusks: freezing, deep-freezing, drying, smoking, salting, immersing in brine, canning, etc. Production of fish, crustacean, and mollusk products: cooked fish, fish fillets, roes, caviar, caviar substitutes, etc. Production of prepared fish dishes. Production of fishmeal for animal feed.

available for the economic activities in the processing sector, but development trends can be discussed based on trends in the EU resource base of seafood, i.e., own production and import figures.

3 The EU Seafood Market

The EU is a major consumption market of seafood with an apparent human consumption of 10,1 million tonnes (WFE) in 2023. Although the European Union represents a wide variety of socioeconomic status and consumer patterns, the EU in total represents a world leading purchasing power for seafood of all kinds. Therefore, buyers within the EU attract interest and supply of raw material for domestic production and value-added processing from all over the world. Thus, Norway as a leading producer, proximity and a low population are very well positioned to serve the EU market. This has been the case for centuries and leading to steadily increased mutual dependence in seafood business, which will be elaborated further in more detail (Chapter 4).

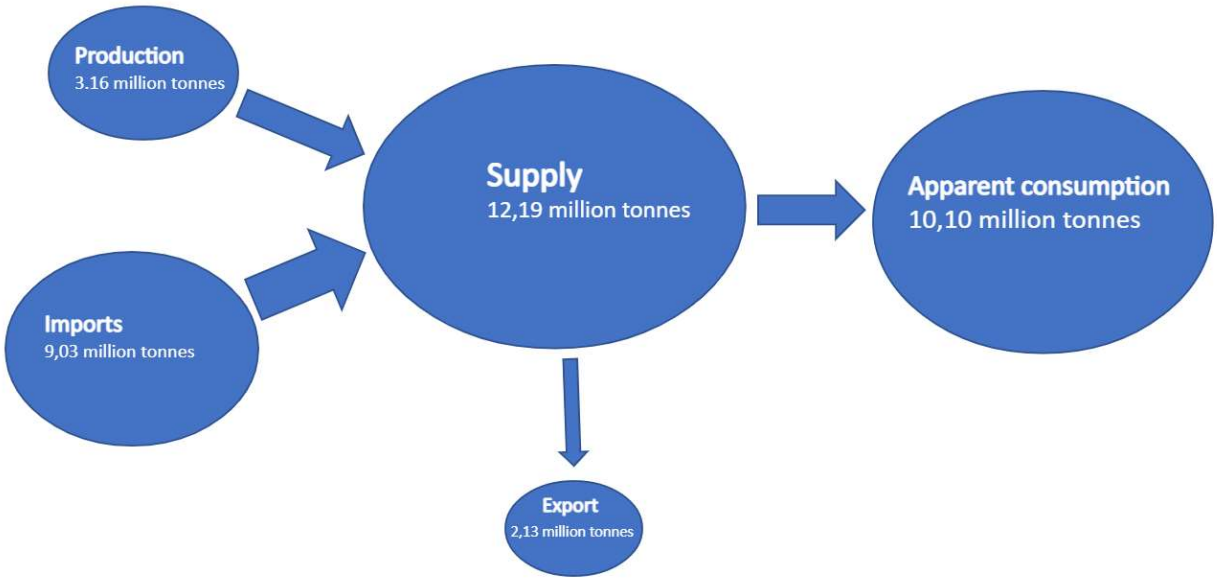


Figure 3: Supply balance of seafood to EU-27 - 2023 (WFE)
Source: AIPCE (2023)

Figure 3 above gives an example of the proportion between each element of the total value chain within the EU seafood sector.

EU domestic supply (production) consists of EU landings (wild fisheries) and aquaculture production. In 2023, about 75% of this supply originated from EU landings (about 2,8 million tonnes) whereas aquaculture production accounted for about 25 % or 974 000 tonnes. Part of EU landings are intended for non-food uses (fishmeal, fish oil; 652 000 tonnes), which make the total EU domestic supply for food uses 3,2 million tonnes in 2023.

The production is however insufficient to cover the domestic market demand for seafood, in terms of volume and product diversity and the EU is therefore highly dependent on imports. Low domestic supply also implies the need and necessity for import to secure raw material for a rather large industry sector serving the national consumer market of value-added seafood products.

EU import volumes of seafood were about 9 million tonnes in 2023, which was almost three times as high as the EU domestic supply. After the UK withdrawal from the EU, accounting for a significant proportion of the EU allocated quota available for the fishing fleet, EU has become increasingly more dependent on import of seafood for human consumption. In 2022, the dependency on imported seafood was 67,2 %. This correlates well with the EU **self- sufficiency ratio**, which has seen a decline from about 46% in 2014 to about **30 %** in the last years in the EU (AIPCE, 2023).

Low (and declining) self-sufficiency underlines the fact that the EU market is very much dependent on imported goods to fulfill the demand for varied seafood for their population. This also goes for the fish processing sector, which is vital for employment, often located in rural areas. The high import dependency, as well as EU exports of fisheries and aquaculture products makes the EU the second largest trader of seafood products, only surpassed by China. While the EU was the largest trader during the start of COVID in 2020, the roles were reversed back again in 2021 and 2022.

3.1 EU imports of seafood - historically

As shown below (Figure 4) the EU imports of seafood reached a record of **30,7 billion** EUR in 2022**, easing down to 28,78 billion EUR in 2023.** While the volumes of imported goods have been remarkable stable in the previous years, the value of imported seafood has increased substantially after a dip in midst COVID pandemic in 2020. The significant dip in value, and a smaller dip in volume in 2020 can mostly be explained by two factors: Firstly, UK leaving the EU by the end of January the same year, accounting for about 2-3% of the total EU-28 import volume and about 6-7% of the import value (more details in Chapter 4). Secondly, lockdown and severe restrictions of movements of people and goods during peak COVID period 2020-2021 hampered international trade severely. In particular global trade using reefer cargo was influenced negatively, as is the case of international seafood trade.

However, already in 2021 imported volumes increased to more ‘normal' levels while cost of goods 'exploded' in this year and in 2022 as a post-COVID effect. Although 2023 brought some vital cost elements 'back to normal', we still have a remaining inflation effect of high cost/high price to most seafood products and trade.

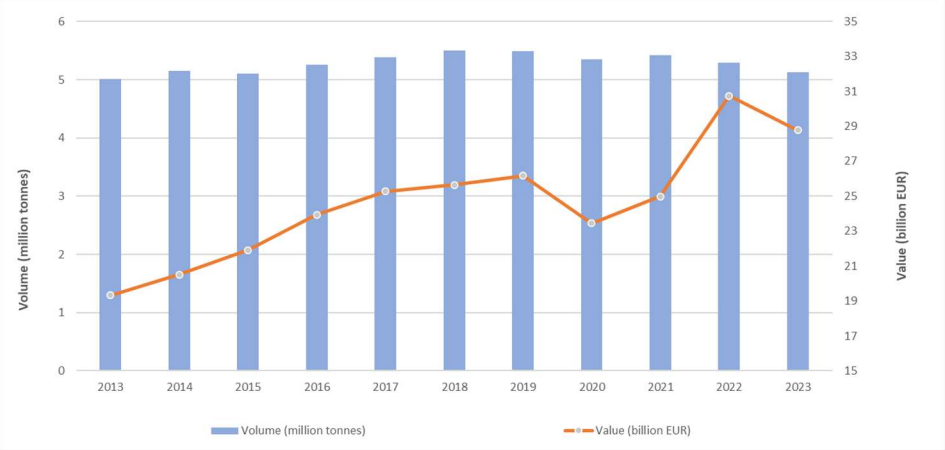


Figure 4: EU import of seafood for human consumption, 2013 – 2023 (product weight, nominal values)
Source: EUMOFA (2024)

3.2 Norway – The main supplier of seafood to EU

Norway and China are the main EU suppliers of seafood. While imports from Norway increased significantly from well below 1 million tonnes (product weight) in the start of 2000, to almost 1,2 million tonnes in 2012, there has been a stabilization around **1,3 to 1,4 million tonnes** from 2018 to 2023 (exluding products for non-food-use).

Norway accounted for about 21% of EU import volume of seafood in 2012 while this was at around 25% in 2023. This means, as Figure 5 illustrates, Norway is by far the main supplier of seafood to the EU, both in volume and not at least in value, accounting for about 30%, up from 15% in 2012. China, Ecuador, UK, and Morocco, next in line as suppliers, are all in the range of 5 to 7% of total supply volume to the EU (EUMOFA, 2024).

The main reason for Norway's dominant position is farmed Atlantic salmon, which is the most consumed seafood product/species in the EU[5]. From all salmon species, farmed Atlantic salmon is the most important one and the bulk of supplies originates in Norway (between 81-84% from 2019 to 2023).

Salmon imports from all suppliers accounted for approximately 19% of total imported volumes of fisheries and aquaculture products for consumption to the EU in 2023, and about 29% of the total in value. In 2023, salmon imports reached a record high value at EUR 8,4 billion. This implies a **28% increase in value in just two years**, from 2021 to 2023. We can argue the price hike comes as an effect of continuing rise in market demand, while little or no growth in supply from Norway and other producing countries has seen prices rise to record levels. However, an additional effect of the pandemics regulations made production cost surge and steep increase of cost per unit produced.

While EU import volumes in 2023 reached a lower quantity than the two previous years, there has been a surge in value the latest two years. EUMOFA (2023) explain the decrease in import of salmon to be related to the 31% increase in the average unit price for imported farmed salmon. This could very much indicate consumers negative reactions to such price hikes and are therefore preferring cheaper (protein) alternatives. The same negative volume trend can also be recorded for cod products to the EU, likely to be explained in a similar fashion as to salmon products with prices increasing over a short period of time making it unaffordable for large consumer groups in Europe. More details will be given in chapter 4.

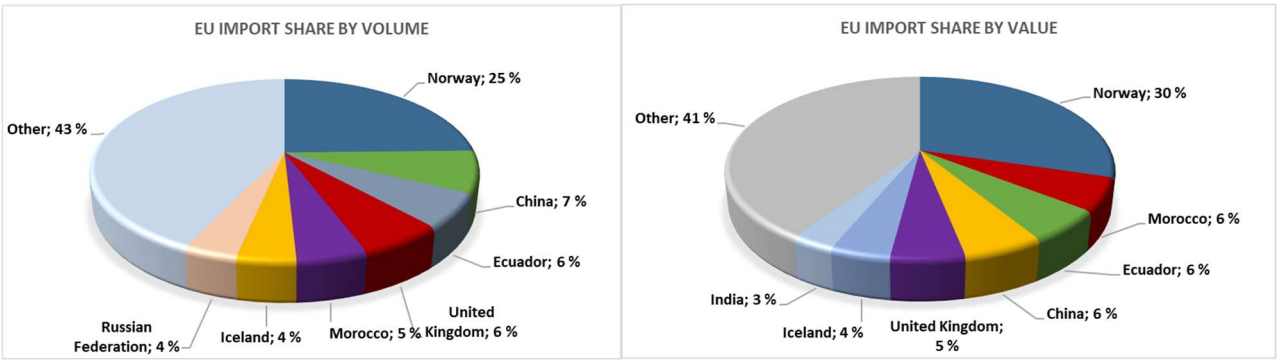


Figure 5: EU import by volume and value in 2023 (product weight)
Source: EUMOFA (2024)

Previously, over a longer period, China was known as "the processing hub" for 'white fish' species (Alaska pollock, cod, haddock, saithe, hake, hoki, etc.). However, this situation has been gradually changing in the last years. Europe, including Iceland, Faroe Island and Norway has been investing in technology to be able to

[5] Canned Tuna products have the highest per capita consumption 2,86 kg, and salmon 2,6 kg per capita. But Canned tuna is a product group consisting of many different species, while the Salmon product group consist of about 99% farmed Atlantic salmon.

move away from manual labour, and introduce more automatic operations for filleting, deboning and portioning, which compensate cost disadvantages, compared to Southeast Asia. The effect can probably be supported by the fact that fish processing industry both in the EU, Norway and Iceland have been stable or slightly growing in number of employees the latest years. Another point related to more reprocessing in Europe has aroused as effect of the COVID-pandemic. Sharp increase in the freight rates in shipping goods between Europe and Asia will further be a competitive advantage for processing activities within Europe.

In spite these arguments, still in 2023, China had approximately the same relative position as a seafood supplier as five years ago. The main item is VAP-processing of Alaska Pollock, with the majority bought from Russia and USA as frozen whole/gutted fish. In 2023, China shipped 146 000 tonnes (WFE) of VAP Alaska Pollock products to the EU (AIPCE, 2023). Also, frozen fillets of cod (mostly Pacific cod), redfish, saithe, tuna and salmon fillets are shipped into the EU marked.

Concerning other major suppliers of fish and shellfish, **Marocco** are exporting large volumes of sardines, anchovies and cephalopods/squids to EU. **The UK**, now as an external supplier after January 2020 has good market relations to importers in Europe and exports significant volumes of cod and other white fish species, as well as farmed salmon from Scottland. **Iceland** supplies similar species as Norway; whitefish products (i.e. cod, saithe, haddock), pelagic species (i.e. herring and mackerel) and fresh/frozen farmed Atlantic salmon. In many products categories, Iceland is reckoned as the major competitor to Norwegian exports, in particular for white fish products with the export volumes of farmed Atlantic salmon being significantly smaller.

3.3 Lower self-sufficiency after UK withdrawal

Per capita consumption, estimated at 22,5 kg (WFE) of mostly wild caught products, signalled that in 2023 EU citizens consumed, on average, 900 grams less fisheries and aquaculture products than in 2020 (AIPCE, 2023). Figures presented by EUMOFA (2023) show a rather stable consumption level over a long period (2012- 2021), with the consumption varying around 23 to 25 kg per capita (WFE). However, from 2018 there has been a decreasing tendency. Consumption declined for two out of the three most consumed species, namely tuna and cod in this period, while salmon increased

Seafood consumption varies a lot from one member state to the other. Northern EU Member States are more focused on processed fish while Member States in the southern parts of the EU (still) favor fresh products and devote a larger part of household expenditures to fish. Central and Eastern European countries are below the EU average but has registered a small increase in consumption over the last years.

Table 1: Self-sufficiency rates of most consumed seafood products in the EU (2021)
Source: EUMOFA (2023)

Seafood with LOW self-sufficiency rates			Seafood with HIGH self-sufficiency rates		
Specie	Pr. capita/yr	Low	Specie	Pr. capita/yr	High
Alaska pollock	1,7	0 %	Mackerel	0,5	96 %
Salmon	2,6	1 %	Trout (Freshwater)	0,5	88 %
Cod	1,8	5 %	Mussel	1,3	80 %
Shrimps	1,6	10 %	Sardine	0,5	74 %
Squid	0,7	12 %	Herring	1,0	72 %
Saithe/=Coalfish	0,4	12 %	Clam	0,4	62 %
Tuna (# species)	2,9	31 %			
Hake	1,0	43 %			

The EU can only maintain a high level of fish and seafood consumption, by sourcing it from other regions of the world through imports. Self-sufficiency, which is the capacity of EU Member States to meet demand from their own production, can be calculated as the ratio of domestic production over domestic consumption. The top five species consumed per capita in the EU in 2021 were tuna, salmon, cod, Alaska pollock and shrimps. In average, EU saw an average self-sufficiency rate for each at 9%, while the same number was 14% in 2018, explaining the large share of such species in the EU imports of seafood. One of the main reasons for the drop since 2018 is the UK leaving the EU in 2020, contributing to a higher EU-self-sufficiency based on fisheries, and also aquaculture production of salmon as previously mentioned.

Almost 63% of total consumption of both captured and farmed products was covered by only 10 species, whose calculated consumption is illustrated in Table 1 (EUMOFA, 2023). It can be noted that two of the top three most consumed species within the EU includes salmon and cod where Norway act as a major supplier.

4 Norwegian Seafood Export to the EU

The European Union has become increasingly important as a market for Norwegian seafood the last 10 years. While volume of seafood exported to EU constituted to around 50% of total export from Norway in the period 2010 – 2013, this increased to around 60 % in the years after (see Table 2), mainly driven by the Russian trade ban in the later stages of 2014. The record level of Norwegian seafood exports to the EU market occurred in the COVID year of 2020 where the EU and UK in sum absorbed 64% of total Norwegian exports[6]. Norwegian export statistics shows that the average aggregated market share for the EU and UK market absorbed **about 62% in the period 2015-2023** (Norwegian Seafood Council, 2024).

In value terms the growth has been significant, more than doubled from 2015 (49,7 billion NOK) to 108 billion NOK in 2023 (nominal values). The increase in value is both due to the increase in export of farmed salmon and other high priced 'white fish' species (cod, haddock, etc.), but also the strengthening of the EUR vs. NOK. The significant growth of value compared to volume indicate the strong importance of Europe as the most attractive market area for seafood suppliers – like Norway. The purchasing power in Europe can largely pay for high-cost food items, with the right precepted quality. So far Norway has been able to fill such requirements and underline the importance of EU as most valuable, important market area.

Table 2: Norwegian seafood export for human consumption to the EU in the period 2015 – 2023 (product weight, nominal values)
Source: Norwegian Seafood Council (2024)

	Total export	Export to EU 28 (2015-2020) / Export to EU 27 (2020-2023)		NOR export to EU (% of total)	
	Volume (million MT)	Volume (million MT)	Value (billion NOK)	Volume	
2015	2,6	1,68	49,7	64 %	
2016	2,5	1,54	61,2	63 %	
2017	2,6	1,57	60,9	60 %	
2018	2,7	1,70	65,9	62 %	
2019	2,7	1,61	68,3	60 %	
2020*	2,7	1,58	63,0	58 %	EU - 27 (ex. UK)
2021	3,1	1,70	69,3	55 %	
2022	2,9	1,61	87,2	55 %	
2023	2,9	1,56	100,1	55 %	

*) UK leaves the EU 31st of January 2020.

[6] It is reasonable to explain the record volume levels to EU-28 as a main market for Norwegian seafood export in 2020 due to the overall problems facing global trade – in particular restricted capacity and cost of logistic operations. EU can be reached by "door to door" trucking, while Asia and America are dependant of airfreight or reefer cargo ships.

As seen from Table 2, the UK is an important market for seafood from Norway, although in volume terms not as significant as many would expect[7]. The quantity of exported seafood to EU-27 declined just 2% in 2020, the first 'year' (eleven months) after UK withdrawal. However, in 2021 volumes exported to EU-27 was back to similar level as previous years, but the "market share" of the EU relative to total Norwegian seafood export was down to 55% of total. Evaluating the data in Table 2 indicate stable volumes supplied to the EU, hence increased volumes from both fisheries as well as aquaculture in Norway made the percentage of total export to EU-27 easing a few percentage points.

Another interesting observation analysing Norwegian export to the EU is to see the rather surprising stability in volumes of seafood each year – here measured from 2015 to 2023. Average for the whole period is about 1,64 million tonnes (product weight), and from Table 2 we can observe the variance from the mean is rather small. This could indicate Norwegian exporters pushing as much volume as they can to the EU market, and when landings are above average, products must find alternative market areas, as has been the case in recent years. The actual numbers of the amount of seafood to the EU (and rest of Europe), underline the importance of Europe as a market for seafood from Norway based on very stable relationship between the trading partners.

As a fact, Europe is by far the most important global market for Norwegian seafood. In 2020, export to Europe accounted for almost 70% of the total with the EU receiving the majority. Updated statistics show the same numbers, with Europe in total being the most vital destination for export of Norwegian seafood, accumulating between 68 to 69% of volume in 2021 to 2023. The significance of EU and Europe can be illustrated by the second most important market area Asia, including huge seafood consumption parts of the world like Japan, South Korea, China and Taiwan, only accounting for about 18% of Norwegian export (Norwegian Seafood Council, 2024).

In addition to being a main supplier, Norway also acts as an important market for seafood exported from the EU. In 2023, Norway was the sixth largest receiving country according to EUMOFA (2024), accounting for about 5% of the exported volume, one percentage point above the level in 2019 and 2015. If one includes non-food-use products, such as fishmeal and fish oil, Norway would be the largest EU export market, with significant volumes ending up at Norwegian feed producers for production of aquaculture (mainly salmon) feed.

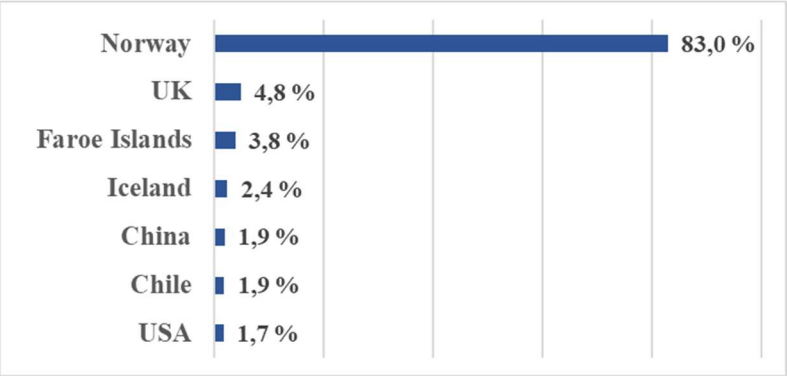
4.1 Salmon and cod driving value to record figures

As previously mentioned, salmon, the main species imported to the EU, accounted for 19% of the total EU import volume of fishery and aquaculture products (excluding non-food-use) in 2023, and approximately 29% of the total in value.

In 2023, EU imports of salmon reached a lower quantity than the three previous years, totaling 0,99 million tonnes (product weight) which was 4-6% less than 2022-2021. The decrease in imports may have been related to the 37% increase in the average unit price since 2021, which reached 8,4 EUR/kg in 2023 The total value in 2023 increased by 28% from 2021, equivalent to approximately EUR 8,4 billion (EUMOFA, 2024).

[7] For more specific data and discussion of UK's position as a market for Norwegian seafood, see Chapter 4.3

Figure 6: EU import volumes for salmon in 2023 (in percentage of total import, product weight)
Source: EUMOFA (2024)



From Figure 6 we can see the dominance of Norwegian supply of fresh and frozen salmon to the EU. Low duty levels for less prepared fresh or frozen fish, supplied every day, year around, makes this product one of the major items for reprocessing in local industries within the EU market. The importance of (less prepared) salmon and trout are particularly stressed by AIPCE (2023) in their yearly update. Note that some of the numbers in the following quotation from AIPCE refer to WFE and not product weight, creating a slight difference to previous numbers presented in the text.

An increasing amount of salmon is imported as raw material for processing in the EU-27. Most of the raw materials come from EFTA Member states, like Norway, Iceland and Faroe Islands. Especially imports from Norway are of high importance, accounting for 79% of total salmon supply in 2022 (and 88% of the total whole fresh salmon supply in 2022). Norwegian salmon creates more jobs in the EU than it does in Norway. The import of 1,081 tonnes of Norwegian salmon to the EU-27 generates thousands of direct jobs for the EU seafood processing industry.
Source: citation from AIPCE (2023, p. 35)

Export of salmon to the EU is also very important to Norway as most of the EU can be served by fresh/cooled fish export (by road), making a "door to door" logistic system benefitting both parties. EU fish processing units can receive fresh raw material for further processing and still have good quality products for the retail markets within EU without extra cost of storing facilities or other quality measures.

Norway is also a leading export country of cod to a large market for white fish products. This includes cod, haddock, saithe, Alaska pollock, hake and a few more species. AIPCE also confirms the importance of such products for the EU consumer market and the processing industry.

Whitefish species are well established in the EU and consumers are familiar with them. Continued access to global whitefish fisheries without unnecessary barriers is essential if processing industry is to be viable and in turn maintaining that viability is key to be able to offer long term opportunity to the EU catching sector. Whitefish species are of great importance in the supply of the EU market, due to the scale of the tonnages involved, and also the high level of added value provided by the processing of these species by the EU processing industry
Source: citation from AIPCE (2023, p. 19)

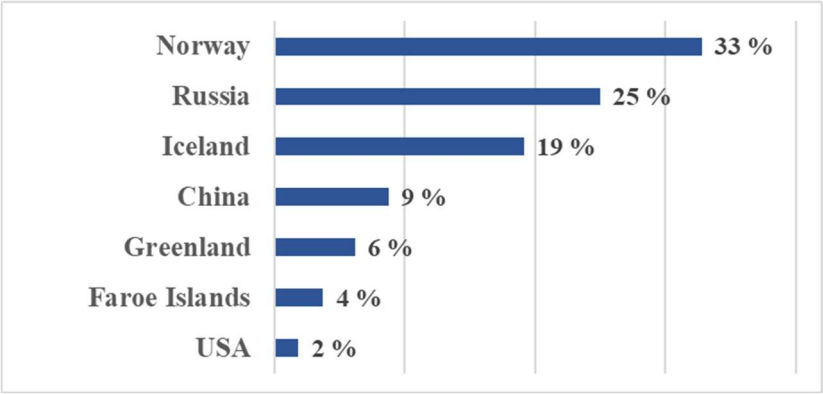


Figure 7: EU import volumes for cod in 2023 (percentage of total import, product weight)
Source: EUMOFA 2024

In 2023, EU imports of white fish[8] totalled 1,06 million tonnes (product weight) with a value of EUR 4,78 billion. Cod and Alaska pollock, by far the main species imported within this category, are also two of the EU's most imported fishery and aquaculture products overall.

EU imports of cod reached a decade low of about 354 000 tonnes in 2023. This decline was in line with the trend over the last five years (2019–2023), which has seen cod imports decrease by an average of 8% per year. This, on the other hand, has led to increased average unit prices for cod, which saw the total import value increase compared to 2021 and 2020. From 2021 to 2022, the average unit price increased from EUR 5,05 to EUR 6,53. In 2023, the total value declined 3,5% over 2022, but with increased average unit prices (+2,7%) over 2022.

Among cod imports, **33% of the volume originated from Norway**, 25% from Russia, 19% from Iceland, and 9% from China (see Figure 7). Volumes from Norway and Iceland are more diversified, comprising similar shares of fresh, frozen and salted products, while imports from Russia and China largely include frozen products.

Cod imports from Norway declined by 11% in 2023 compared to 2022, while the total value decreased by 7%. However, as for the overall imports of cod, while the import volume also declined over 2021 and 2020, the import value in 2023 increased by 8% and 7% over 2021 and 2020, respectively.

The largest decline in imports from Norway among EU Member States from 2021 to 2023 were Sweden and Denmark. The overall decline could be related to higher average prices in 2022 and 2023, where the average import price of cod from Norway rose from 5,45 EUR/kg to 7,41 EUR/kg from 2021 to 2022, and ended at EUR 7,20 in 2023. A similar development was seen for Iceland, with import volumes declining by 9% and 10 % in 2022 and 2023, while the import value increasing by 8% in 2022 and declining by 5% in 2023.

Imports from Russia, on the other hand, recorded a decrease in volume by 4% in 2023, However, this was still at an average level compared to previous years. The decrease was primarily driven by Poland, which imported 32% less cod from Russia than in 2022. Overall, the value of these imports saw a 4% decrease in 2023, however, the average unit price ended at EUR 5,51, in line with 2022 but an impressive 41% and 27% increase over 2021 and 2020, respectively. EU imports from China followed the trend and decreased in volumes from 2022 to 2023 (-7%), while the average unit price increased to EUR 5,76, up by 39% and 25% over 2021 and 2020, respectively. The imported volume of cod from China was still vastly lower than pre-COVID, with 30% less in 2023 than 2019 (EUMOFA, 2024).

[8] Cod, saithe, haddock, Alaska pollock, ling, hake

4.2 Norway provides raw material for processing

Norway is mainly a **'raw material provider'** of seafood to the EU. The data given in Table 3 documents the share of product types exported to the EU. In 2019, about 75% of the export was fresh or frozen head on/head off fish, with the majority of processing taking place within EU markets. In 2023, the two product categories decreased slightly by a couple of percentage points to 73%, while fish fillets, fresh or frozen increased a couple of percentage points. Fillets, nearly 14% of export from Norway, often need some further processing before entering retail or catering sector. Salmon fillets to some degrees are prepared to smoked products within the EU. The most obvious explanation for the fact is a) the profile of custom duty between Norway and the EU[9], and b) high cost of labour in Norway makes value added production less competitive to most of the EU-countries.

Table 3: Norwegian export of seafood to the EU by product category and Harmonized System (HS) codes (2019, 2021 and 2023, percentage of total export, product weight).
Source: Norwegian Seafood Council (2024)

HS4	HS6 -Product Category	Prod. categories of NOR export (UK included) 2019	2021	2023
0302	Fish, fresh/refrigerated	69 %	67 %	67 %
0303	Fish, frozen (ex. Fillets)	12 %	12 %	12 %
0304	Fish fillets, fresh/frozen	12 %	14 %	15 %
0305	Dried, salted, smoked	4 %	4 %	4 %
0306	Crustaceans (shrimps, etc.)	<1%	<1%	<1%
0307	Molluscs, shellfish	<1%	<1%	<1%
0308	Invertebrates (urchins, etc)	<1%	<1%	<1%
1604	Fish prepared, caviar subst.	1 %	1 %	1 %
1605	Crustaceans, shellfish prepared	1 %	1 %	1 %

EU imports of salmon mainly consist of fresh whole products originating from Norway, amounting to 737 000 tonnes worth EUR 5,9 billion in 2023, with neighbouring Sweden as the first point of entry. Since 2015, fresh whole salmon imports from Norway grew at a yearly average of 1,8% in volume and 7,8% in value (EUMOFA, 2024).

4.3 The UK – implications of *Brexit*?

The UK has been – and still are – an important seafood market for Norway. Although salmon is the top species imported, also white fish species like cod and haddock are important for the UK consumer, commonly to produce "fish and chips". In the last years, the UK share of EU total imports from Norway has been about 9 % in volume, making it a significant market. See Table 4.

However, like the majority of seafood products heading to the EU, a large share of the products exported from Norway to the UK market is less prepared, like salmon (92 %), haddock (91 %) and cod (70 %), creating significant ripple effects in the UK processing industry.

[9] 'Raw material' goods => low custom duty. Value Added Products (VAP) => High custom duty

Table 4: Norwegian seafood export to the EU and the UK (2015 -2023, product weight, nominal values)

Source: Norwegian Sefood Council (2024)

	EU	UK		UK fraction of EU import
	Volume (million MT)	Volume (million MT)	Value (billion NOK)	Volume
2015	1,68	0,14	5,08	8 %
2016	1,54	0,15	5,66	9 %
2017	1,57	0,13	5,27	8 %
2018	1,70	0,15	6,25	9 %
2019	1,60	0,16	6,42	10 %
2020*	1,58	0,15	6,16	9 %
2021	1,70	0,14	6,09	8 %
2022	1,62	0,15	7,74	9 %
2023	1,56	0,14	8,56	9 %

*UK leaving the EU in January 2020

Based on these figures we can conclude that **UK constituted some 8 to 9% of the total EU marked for seafood import from Norway.** This will be a point of further discussions when concluding the employment effects and spin-off hereof in the final chapter.

We cannot find a significant change in the product mix before and after Brexit, which leads to the conclusion it has not been a particularly negative (or positive) effect so far. However, the EU market is reduced nearly 9% in volume terms based on Norwegian exports.

Seen from a macro-economic perspective, it does not seem to be a significant shift in seafood trade related to Brexit. However, the UK now being a third-party in the trade gives some practical implication related to previous seamless export from Norway, with a significant share being reprocessed in one EU country before being re-exported to the retail market in the UK. This is an issue in particular for cod, or other whitefish species, where the UK is a major consumer market. The new status means the need for custom clearance and veterinary certificates increases both length of shipping procedures and cost compared to the previous situation. In particular for typical re-processing industries in Denmark and Polen. Indirectly, this could also potentially give negative effect back to exporters in Norway.

Even more worrisome related to the UK is that raw material supplied by third countries, reprocessed within EU and further exported as value added-/retail product cannot be drawn from ATQs (EU-quota for zero or reduced custom duty earmarked for specific species and products). EU regulation issued to restrict free trade from Russia makes this relevant as new regulative measure complicating what previous was a smooth and cost-effective system.

5 Employment and Economic Performance of the EU fish processing Industry[10]

Information under this chapter is based on data sampled by fisheries economists from Joint Research Centre (JRC) and specialists under the Scientific, Technical and Economic Committee for Fisheries (STECF). The report, *Economic Report on the EU Fish processing industry* is an annual report (from 2010) that provides a comprehensive overview of the latest information available on the structure, social, economic, and competitive performance of the fish processing industry at the member state and EU level (STECF, 2023)[11].

According to Member States DCF[12] data submissions, the total number of enterprises in the European fish processing industry sector in 2021 were around 3 200 firms. The industry generated a turnover of EUR 29,4 billion and employed more than 111 000 (corresponding to **102 000 full time equivalent** (FTE)) the same year, which was the highest level over the period 2013-2021.

Like number of employees, number of firms occupied in seafood product processing have been rather stable throughout the recorded period. However, we can see a possible trend of a small increase in number of firms engaged in business from 2018, correlating with the same trend for total employees within the industry. We do not have valid information explaining this, but it could be related to less import of reprocessed products from China and other third-party suppliers, thus more activity to the EU industry.

Table 5: Sector overview of the European fish processing industry (2013-2021)
Source: STECF (2023, p.16)

Variable	2013	2014	2015	2016	2017	2018	2019	2020	2021
Structure (number)									
*Total enterprises **	3.413	3.255	3.417	3.405	3.218	3.119	3.049	3.203	3.219
≤10 employees	2.072	1.959	2.110	2.025	1.919	1.868	1.720	1.856	1.869
11-49 employees	930	884	896	938	886	832	885	918	913
50-249 employees	350	353	352	383	357	359	381	366	371
≥250 employees	61	59	59	59	56	60	63	63	66
Employment (number)									
Total employees	100.066	101.185	101.275	105.397	102.965	105.227	109.754	109.107	111.604
FTE	89.318	91.231	91.442	95.561	93.343	95.946	99.408	97.769	101.968
Indicators									
Turnover (million €)	22.391	22.408	23.448	25.242	26.458	26.963	28.411	28.087	29.359
FTE per enterprise	26,2	28,0	26,8	28,1	29,0	30,8	32,6	30,5	31,7
Average wage (thousand €)	26,4	26,3	26,3	27,2	28,4	23,0	30,2	31,2	31,2
Value of unpaid work (% on total)**	2,2%	2,9%	1,6%	1,7%	1,5%	2,0%	1,4%	1,3%	2,8%
*Enterprises doing fish processing not as main activity**									
Number of entreprises	635	654	679	687	664	662	628	737	765
Turnover attributed to fish processing (mill	841	964	985	997	1.035	988	1.034	1.374	1.298

In 2021, Spain was the leading country with 18% of firms and 26% of the total EU turnover. Italy was ranked second, in terms of number of active firms (14%), while France was ranked second in terms of turnover produced by the sector (17%). When looking at the employment generated by the sector, Spain was still the top country (27%) followed by Poland that, due to the large size of its relatively low number (4%) of processing plants, covers 20% of the overall EU employment in the sector.

[10] All data presented in Chapter 5 relates to EU-27 i.e. the UK data are taken out, including statistics before Brexit date.

[11] STECF data are not updated to the same degree as EUMOFA data on import, own catch, etc. The latest detailed data from seafood industry is 2021. Updated figures from 2022 will not be available until December 2024 (personal communication to STECF). However, continuous data from 2013 – 2021 gives a fair ground for extrapolation and reasonable conclusion of status for 2021 -2024.

[12] DCF = Data Collection Framework; Common EU data quality assurance requirements set forth by a series of Council Regulations

At EU level, the average, size of the fish processing enterprises is around 30 employees. In comparison, Spain with the highest share of firms averaged 43 employees, while Poland averaged at about 123 employees.

Although there was a general increase in production costs, the increase in sales value was even higher resulting in a Gross Value Added (GVA), equal to EUR 5,7 billion in 2021. This was an increase of 8% since 2019, but a decrease of 6% compared to 2020. Overall, the economic performance indicators reveal an upward economic trend in the sector over the period 2013 to 2021 (see Table 6). This shows the importance of the EU fish processing industry in relation to the capture fisheries sector in Europe, seeing that the GVA produced by the EU fishing fleet amounted to EUR 3,2 billion in 2021 (STECF, 2023).

Based on a rather limited data set representative for the whole industry, data from eight countries indicate that the most important species used for processing in the fish processing industry were 1) salmon, 2) Alaska pollock and 3) herring, representing 15,8%, 14,6% and 7,3% respectively of total raw materials used. From other sources (AIPCE, 2023) it's known that **cod** (fresh/frozen and salted) also is a very important raw material for the processing industry, especially in Portugal and Spain.

Salmon is primarily imported from Norway, but also the UK and Faroe Islands. **Alaska pollock** is primarily imported as fillets from China, followed by Russia since 2022. Pre 2022, USA was ranked second, but due to the US ban on Russian seafood in March 2022, volume from Russia seem to have shifted to the EU market, while imports from USA has decreased. **Herring** is originating from fisheries in the North Atlantic and is imported from Norway or landed by EU countries operating in the North Atlantic. Norway is also main provider of **cod** raw material (35%) additional to supplies from Iceland and Russia.

Socio-economic data submitted by the EU Member States also reveals the importance of female labour in the fish processing industry, covering 56% on average in EU. Therefore, as in Norway, the seafood processing industry is a vital factor for employment of women, often in rural areas without too many job alternatives. Contrary to Norway, the vast majority (87%) of people employed in the sector are EU nationals of their own country. In comparison, Nofima (2017) concluded that the share of foreign nationals employed in the Norwegian fish processing industry account for as much as 50%.

Table 6: Economic performance of the EU fish processing industry (2013-2021)
Source: STECF (2023, p. 27)

Variable	2013	2014	2015	2016	2017	2018	2019	2020	2021
Income, expenditure and investments (million €)									
Turnover	22.391,4	22.407,7	23.448,1	25.242,3	26.457,7	26.962,8	28.411,1	28.087,0	29.359,2
Total Income	22.560,0	22.639,9	23.774,6	26.323,9	27.627,7	27.875,8	29.443,1	29.119,0	30.605,0
Total purchase of goods and services	10.503,1	10.615,2	11.733,7	13.407,3	13.396,0	14.013,0	14.494,9	13.267,3	14.607,1
of which: energy costs	*466,2*	*454,5*	*455,6*	*500,8*	*416,9*	*422,5*	*457,7*	*421,4*	*472,6*
Personnel costs	2.357,6	2.401,5	2.404,5	2.597,1	2.648,5	2.208,4	3.005,3	3.054,9	3.181,1
Net Investments	408,7	543,5	463,9	479,9	540,6	566,2	583,1	732,8	691,7
Economic performance (million €)									
Gross Value Added	4.188,1	4.241,0	4.004,3	3.939,0	4.842,4	4.299,8	5.283,3	6.109,7	5.720,1
Operating Cash Flow	1.882,7	1.880,5	1.653,7	1.378,4	2.234,8	2.142,4	2.319,9	3.106,7	2.678,5
Productivity and performance Indicators									
Labour productivity (thousand €)	46,9	46,5	43,8	41,2	51,9	44,8	53,1	62,5	56,1

In the previous analysis (SINTEF, 2021) we found a significant difference in economic indicators between EU industry and the similar fish processing industry in Norway. Focusing on most used performance indicators like *EBIT margin* and Net Profit Margin, these indicators were showing significant better results for the EU firms:

- The estimated average EBIT margin for the EU seafood industry was **7%** in the years 2015-2017 (SINTEF, 2021, table 6)
- Looking at similar data for the Norwegian seafood industry[13] in the same period, it was **only 1,3 %.**
- Even more striking is the numbers for **net profit**: While the EU industry had an average net profit margin of **6,9%** in the period 2015-2017, the Norwegian seafood industry commenced only a mere **0.4%** in average.

Looking into the facts of economic performance indicators comparing the data from EU industry to the Norwegian the latest years, we find similar results. Norwegian fish processing industry (in average) obtain a much lower economic results from their activity than the same industry sector within the EU. In Figure 8 we illustrate two important variables, namely GVA[14] margins and EBIT margins historically. In both variables we can see a significant difference between Norway and the EU industry, in favor of the EU. While the EU industry in average has a GVA-margin of 18,4% for the entire period (2013-2021), increasing somewhat to 19,4% the latest four years, the result for the Norwegian industry is only 13,9%, and lower or flat the last four years. The difference in favor of the EU industry is 6,4 percentages points in the years 2017 to 2021.

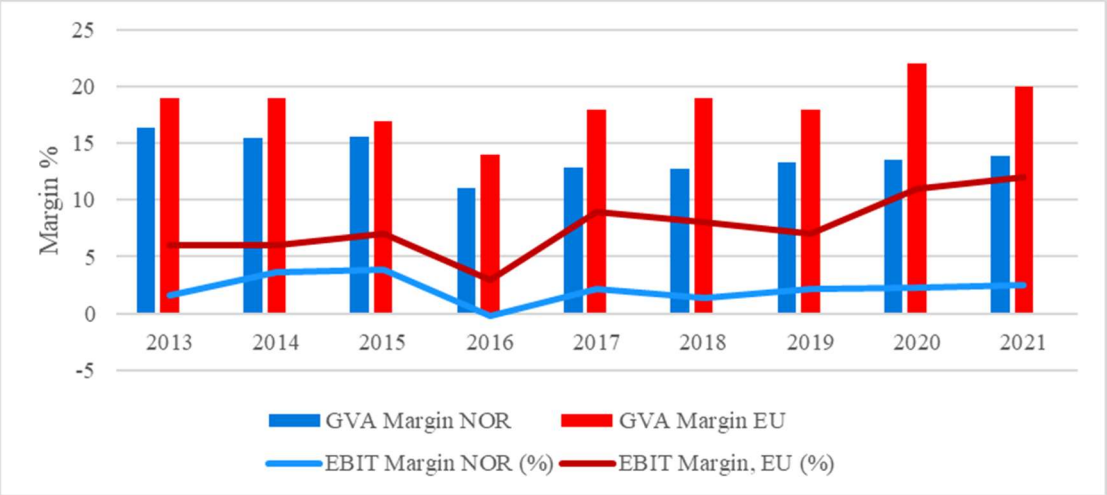


Figure 8: Comparison of GVA margins (bars) and EBIT margins (line) for the EU and Norwegian fish processing industry

Source: SINTEF elaboration of data from Nofima (2023a) and STECF (2023)

[13] Economic performance indicators for the Norwegian industry contains data separated for a) "consumer products" and b) meal and oil industry. Indicators presented here are for "seafood industry" exclusive fish meal and oil. See https://nofima.no/prosjekt/driftsundersokelsen-i-fiskeindustrien/

[14] Gross Value Added measures the contribution of the sector to the economy. Norsk: Bruttoprodukt.
GVA = Turnover + Other Income – Energy costs – Purchase of fish and other raw material for production - Other Operational costs.
GVA margin or GVA to Revenues:
Gross value added to revenue ratio - indicates the share of revenue that contributes to the economy through factors of production (returns to labour and returns to capital). Indicator is calculated as the ratio between gross value added and revenue (the sum of Turnover and Other Income). Expressed as a percentage.

The difference is even bigger when comparing the EBIT margin. The Norwegian numbers for the last five years recorded gives an average EBIT margin of "tiny" 2,1% in average. In contrast, the EU fish processing industry has a significantly higher margin at 7,7% for the whole period and 9,4% in the five latest years recorded. These figures sum up to a surprisingly high and significant difference in vital economic parameters comparing the two parties. Another way of illustrating the significance of the difference; From 2017 to 2021, the EBIT margin of EU seafood processing industry is **more than four times higher** than Norwegian industry in average. However, while we have removed non-food-use (fishmeal, fishoil, etc) for the Norwegian industry, we are not able to know whether this has been done for the EU data found in the given data in the STECF report. Hence, it could be a smaller difference than described above.

Unfortunately, going forward evaluating this data lies outside the mandate and objectives of this report, but a rough evaluation clearly points to **cost of raw material** as the main reason. While cost of raw material in Norway weighing 78-79% (Nofima, 2023a) of total cost in production, the EU figures account to approximately 72% (STECF, 2023). While this seems like a small difference, the raw material share of the total cost is significant, which ends up playing a huge difference in economic potential and results. Without further analysis of details of the business sector and/or national regulative settings for businesses, we can **conclude that there is an increased potential for high profit by doing secondary processing of value-added seafood directly to retail and catering, compared to primary processing of generic (bulk) products for the international wholesale market[15].**

[15] Analysis of the total set of prerequisites

6 Employment Effects in the EU Seafood Processing Industry

As stated in Chapter 2 we base our calculation on looking into the average market share of imports to the EU. In addition to data presented by AIPCE (2023) given in WFE, we have also recalculated trade data given in product weight to WFE where not given by AIPCE, which gives more valid considerations when comparing EU's own catch and imports of many different product categories. Some being more "value added" or prepared than others, influencing the employment effect within the common market substantially.

Knowing the fact that Norway is the most important supplier of raw material and semi processed seafood to the EU, we can say, by using a calculated average market share as basis for employment; the method chosen does not overestimate the effect, rather being modest considering the composition of seafood export from Norway.

In addition, we use data from research made in Norway, funded by FHF (*Norwegian Seafood Research Fund)* which continuously from 2004 up until today have financed projects to create reports evaluating the national economic effects from the Norwegian seafood sector. This includes studies on fisheries, seafood processing industry, aquaculture and spin-off effects thereof. Spin-off effect is typically a supplier of processing equipment, logistics, technical and financial services, and a variety of other input factors necessary for the total output from the industry. Sub-contractors again have their own suppliers, which means both 1st degree and 2nd degree spin-off effects are included in our estimates. Assuming the structure of the EU fish processing industry is not that different in this respect from Norway, we think it will be a 'best estimate' calculation using similar multiples as can be documented from Norwegian empirical data.

6.1 Direct Employment Effects[16]

To calculate the direct employment effects on the EU fish processing industry of Norwegian export, we use the Norwegian proportion of EU's total resource base for the latest years. From Table 7 (below) we can see that Norway's market share of the total import volume for human consumption is around 21- 22%. This is a further increase from 2015 -2019 where the market share of EU import was varying around 20 %.

Finally, based on the '*Total EU resource base for consumption*' 2015 – 2022 including own catch in the EU, re-export to third countries, non-food resources excluded, we can see that the Norwegian supply accounts for **19 %** the last three years recorded, 2020 – 2022. Norwegian share of total seafood for consumption in the EU has grown even more than the import share. In 2015, approximately 14% of the total seafood resource base in the EU came from Norway. Now this has increased significantly to 18-19%. Stable consumption rates in the EU, but lower own catch and more import from third countries, including Norway, are the main reason.

[16] Note the calculation of direct employment effects in this report is based on EU-27 member states, UK not included. Further, we calculate the direct employment effect solely based on seafood for human consumption, "nonfood" i.e. fish meal, fish silage, fish oil for feed, etc. is not included in the resource base for calculation of employment effects.

Table 7: Total import to EU specified to product categories and Norwegian share (2015-2022, tonnes WFE)
Source: SINTEF calculations based on AIPCE (2023)

	2015		2017		2019		2020		2021		2022		NOR % 2022
	Imp tot	Imp NO	Imp tot	Imp NO	Imp tot	Imp NO	Imp tot	Imp NO	Imp tot	Imp NO	Imp tot	Imp NO	
White fish, wild capture (cod, saithe, redfish, haddock, hake, APO, hoki)	2 639 000	349 000	2 775 000	380 000	2 824 000	459 000	2 406 000	393 000	2 397 000	388 000	2 328 000	369 000	16 %
Salmon spp.	1 235 000	993 000	1 190 000	914 000	1 279 000	1 042 000	1 374 000	1 072 000	1 399 000	1 105 000	1 374 000	1 085 000	79 %
Tuna spp.	1 254 000	-	1 345 000	-	1 438 000	30	1 335 000	110	1 217 000	200	1 167 000	160	0 %
Herring spp.	272 000	199 000	297 000	234 000	314 000	260 000	389 000	296 000	352 000	271 000	316 000	240 000	76 %
Mackerel spp.	122 000	33 000	145 000	26 000	109 000	21 000	176 000	37 000	192 000	35 000	171 000	32 000	19 %
Other	3 468 000	194 000	3 554 000	316 000	3 505 000	155 000	3 233 000	198 000	3 411 000	144 000	3 500 000	129 000	4 %
	-	-	-	-	-	-	-	-	-	-	-	-	
Total import (live weight)*	8 990 000	1 768 000	9 306 000	1 871 000	9 469 000	1 936 000	8 913 000	1 996 000	8 968 000	1 943 000	8 856 000	1 856 000	
Norwegian market share of EU import		20 %		20 %		20 %		22 %		22 %		21 %	
Total EU, catch + production + import	15 441 000	-	15 867 000	-	15 758 000	-	13 870 000	-	13 038 000	-	12 744 000	-	
Non food	938 000	-	1 077 000	-	1 331 000	-	906 000	-	680 000	-	652 000	-	
Exports to third countries	2 012 000	-	2 114 000	-	2 233 000	-	2 494 000	-	2 338 000	-	2 241 000	-	
Total EU resource base for consumption	12 491 000	-	12 676 000	-	12 194 000	-	10 470 000	-	10 020 000	-	9 851 000	-	
Norwegian market share of total supply		14 %		15 %		16 %		19 %		19 %		19 %	

In conclusion, this means that of the total of close to the average of 100 000 (99 868) full time employees (FTE) in the EU-27 for the years 2020-2021, **nearly 19.000 FTE (18.975) was directly related to import of Norwegian raw materials for the industry.** This is a substantial increase in 'employment effect' based of Norwegian seafood export to the EU compared to 2015 when the same number was about 13 000 FTE. This is due to several development characteristics:

- Increased market share of Norwegian seafood of total EU import: 20% to 21-22 %
- Steadily declining own catch/production within the EU, resulting in a declining self-sufficiency ratio from 2014 to the last years: 46% to 30%
- Significant increase in Norwegian share of EU's total resource base of seafood for human consumption from 2015 to 2022: 14% to 19%.
- Some increase of employment in the EU seafood processing sector, possibly due to less import of seafood from China since COVID years of 2020 and 2021, resulting in more value-added processing internally in the EU.
- About 80-85% of total Norwegian export is H/G/whole fresh/frozen products in need for further processing in the EU[17]. Additionally, about 5-10%% semi-processed fresh or frozen fillets also need further processing[18].

6.2 Spin-off employment effects

Additional to direct employment effects, any economic activity also creates spin-off effects to related sectors of the economy. To calculate 'spin-off' (indirect) effects of one economic activity (here: seafood processing) needs detailed macroeconomic data. Such data for the whole economy normally needs thorough elaboration and analysis. As argued in the introduction, it is extensive and far beyond the time and economic framework of this analysis to make empirical estimates of average spin-off effects for the entire EU.

Since it is the estimate of the direct employment effect that is most interesting, it is nevertheless not insignificant to be able to provide an estimate of the total employment effect in the EU on the basis of Norwegian seafood exports. For this, we use figures from the annual surveys of the Norwegian fishery and aquaculture industry (Nofima, 2023b) Here we find sector-specific calculations of employment and associated demand effects at several levels in adjacent industries that can be used as an estimate of the average of similar effects in the EU. This way of doing so can be justified by the fact that the bulk of the fish

[17] HS0302, HS0303, ref. table 3
[18] HS0304, HS0305, ref. table 3

processing industry in the EU is structurally and technologically not very different from the same type of industry in Norway.

As Appendix (8.2.1) shows, the ripple effects are significantly different measured at different stages in the value chain. There is also a significant difference between what we define as a fisheries-based value chain and aquaculture value chain.

Spin-off effect by fishery-based processing:	0.56
Spin-off effect by aquaculture-based slaughter and processing:	1.25
Unweighted average processing in fisheries and aquaculture	0.87
Weighted by the EU distribution between fisheries-based raw materials and raw materials from aquaculture:	0.89

Therefore, we conclude that the EU and the Norwegian seafood industry structure are not significant different in what type of raw material they reprocess and have as their basic economic activity. Hence, using aggregated multiplies (average) found by primary data research from the Norwegian seafood industry seems to be a fair estimate used to calculate the employment ripple effects within the EU economic area.

Spin off employment = 18 975 (direct employment effect) x 0,87 (average multiple) = 14.800 (FTE) in ripple effects in related industries and total national economy sectors of society.

7 Conclusion

Based on calculations on best available data (2020-2022) we can conclude the employment effect of Norwegian seafood export to the EU.

Direct employment effect in the EU fish processing industry:	19,000 FTE
Spin-off effects in related EU economy sectors:	13,800 FTE
Total effect of Norwegian seafood/EU employment	**33,800 FTE**

As a main conclusion, Norwegian seafood, including aquaculture, creates more jobs in the EU than it does in Norway. While Norwegian direct employment in the fish processing industry roughly fluctuates around 10 - 11,000 full time employees (Nofima, 2023b), export to the EU creates around **19,000 full time jobs** in the EU industry. Using the same spin-off effect as documented from Norway means Norwegian seafood export gives full time employment for some **33,800 persons** within the total economy in the EU. This might be seen as a paradox, but has several (economic) explanations, which are similar to previous years:

1. **Trading tariffs – a stalemate situation**

   The established positions of trading tariffs (in seafood) between Norway and EU market are such that "the less processed – the less custom duty." Originally, import taxes are used to protect primary producers to foreign (cheaper) competition, but can have a reverse effect on the processing industry established to process value added products for the consumer market when national resources become scarce – as is the EU position with seafood. Therefore, AIPCE – the Organization of fish processing companies of EU argues for low or zero import tariff on vital product categories for reprocessing within EU:

   > *"To ensure continued access to opportunities, the industry should not be hampered by unnecessary burdens of tariff and non-tariff barriers. Therefor it is of importance to secure the industry need for raw material via the ATQ system without duty. Duty increases prices for the consumer and in consequence the sales continue to decrease. The threat is that the production will move from the EU to third countries."*
   >
   > Source: citation from AIPCE (2023, p. 14)

   Norwegian industry, however, focus on lower tariffs on value added or semi-processed products, but being stuck, and not being able to meet EU in the counterargument of lowering the comprehensive trading tariffs and barriers selling agriculture products to Norway. Hence, Norwegian seafood industry seems "stuck in the middle", both nationally and internationally between crossing interest of political interests. High import tariffs to value-added products adds to the negative side of Norwegian competitive disadvantages compared to EU processing industry.

   Therefore, also highly economic successful salmon farming enterprises choose to invest heavily in VAP processing facilities within EU, rather than in Norway. We find several processing units established within vital EU countries, in particular France, Poland, Netherlands, Belgium, and Sweden.

2. **Cost of labor -lack of labor**
   Fish processing is still rather labor-intensive. Although a steady tendency towards automation of some of the processes involved, processing seafood raw material still need skilled workers. It is well known that the cost of labor in Norway is much higher than the average EU level. For example, the average yearly wage in the EU processing industry was EUR 28 400 in 2017, increasing to EUR 31 200 in 2021 (STECF, 2023). In Norway the cost for a full-time employee would be around EUR 45 000 - 50 000, social costs included. Some costs disadvantages have been compensated by a steady

improvement in labor productivity, but as long as there are no significant barriers of entry for technological innovations, Norway cannot eliminate a higher production cost easily.

Another vital point is the lack of labour force in Norway. Food industry in general, not only seafood industry, losing out to better alternatives in public sector and industries directed to the national market not being cost sensitive to international markets. While in Norway approximately 50% of the employees are of foreign origin, mostly seasonal workers, only 5 – 20% (depending on country) of the workforce in the EU process industry are non-national.

3. **Marketing issues**
   Marketing is a vital issue for success at the highly competitive consumer level. Investing in such competence is costly, and a barrier of entry for many rather small processing companies in Norway. Production of consumer value added products in Norway then need an "extra" competence on top of economic competitive cost of production compared to "native" processing units. And most processing units in Norway does not have the financial strength to invest in forward (downstream) strategy.

4. **Quality issues**
   It is well known that natural skin-on products keep quality parameters better than processed, skin-off, pinbone-out products. With fresh fish products, which for many years have been the innovative product category in the EU retail sector, this gives a prolonged shelf life throughout the value chain. Thus, giving processing units "nearest possible the consumer end" a competitive advantage.

8 References and appendix

8.1 References

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8.2 Appendix

8.2.1

Table A2: 2022-data on employment per sector in the Norwegian seafood industry and ripple-effects
Source: Nofima, 2023b

	Fisheries	Wild fish industry	Sales	Entire value-chain
Core business	10 830	8 840	450	20 100
Ripple-effects	7 150	5 000	1 130	13 300
Multiple	0,66	0,56	2,49	0,66
	Aquaculture	Slaughter/preparation	Sales	Entire value-chain
Core business	11 150	7 200	1 200	19 600
Ripple-effects	20 900	8 950	3 050	32 900
Multiple	1,87	1,25	2,49	1,68
Average multiple industry fisheries/AC		**0,87**		