



# Sluttrapport

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**Jinghua Xie, Øystein Myrland, Finn-Arne Egeness**

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FHF-prosjektet: Produksjon i Kina: Faktorer som påvirker markeder for hvitfisk

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Jinghua Xie ([xie.jinghua@uit.no](mailto:xie.jinghua@uit.no)), Førstemanuensis, Handelshøgskolen i Tromsø, UiT Norges arktiske universitet. Telefon: 776 46929.

Øystein Myrland ([oystein.myrland@uit.no](mailto:oystein.myrland@uit.no)), Professor, Handelshøgskolen i Tromsø, UiT Norges arktiske universitet. Telefon: 776 46124.

Finn-Arne Egeness ([finn-arne.egeness@nofima.no](mailto:finn-arne.egeness@nofima.no)) Forsker Nofima, Norwegian Institute of Food, Fisheries and Aquaculture Research. Telefon 90 65 88 40 / 77 62 92 17

## 1. Sammendrag

Prosjektet hadde til hensikt å analysere Kinas rolle i det globale markedet for hvitfisk. Vi har spesielt sett på handelsstrømmer av hvitfisk via Kina, utviklingen av prosesseringsindustrien i Kina og etterspørselen etter hvitfisk innenlands. Vi har også sett på kinesiske hvitfiskprodukter i det europeiske markedet, og i det brasilianske markedet for klippfisk.

Vi har benyttet oss av både kvalitative og kvantitative analyseteknikker. Vi har benyttet økonometriske analyser for å estimere effekten av økte prosesseringskostnader og kvoter på den kinesiske prosesseringsindustrien. For bedre å forstå utviklingen i innenlands etterspørsel i Kina, EU og Brasil har vi benyttet oss av survey og intervjuer i disse markedene.

Vår hovedkonklusjon er at den kinesiske prosesseringsindustrien står ovenfor store utfordringer. I løpet av 2011-2013 gjorde svak etterspørsel i EU og USA at industrien fikk store problemer med lønnsomheten. Også på lang sikt vil stadig økende lønnskostnader, om lag 20% per år føre til tap av konkurransekraft. Styrking av den kinesiske valutaen svekker også eksportindustrien. En høy grad av effektivitet og fleksibilitet kan til en viss grad kompensere for dette, men vi ser at land som Polen og Vietnam kan konkurrere med Kina på litt lenger sikt. Kostnadsnivået til filetindustrien i Norge er for høyt til å kunne konkurrere med Kina.

Alaska Pollock fra Russland er hovedingrediensen i produksjonen av frossen filet i Kina. Norsk eksport av torsk til Kina har økt som følge av økte norsk torskekvoter frem til 2013. EU og USA er kinas primære markeder for ferdigprodukter, men lavere etterspørsel i disse markedene i 2011 og 2012 påførte den kinesiske industrien store økonomiske tap. En gradvis bedring i markedsforhold har skjedd, spesielt i siste halvår av 2013. Den kinesiske industrien har ekspandert inn i det Brasilianske markedet, det Afrikanske markedet, og i innenlandsmarkedet. Det Brasilianske markedet er viktig både på klippfisk og frosne filetprodukter.

Samtidig med en sterk vekst i den kinesiske økonomien har vi sett en fremvekst av en stor gruppe av kinesisk middelklasse som er på jakt etter høy-kvalitets sjømat. Økt fokus på matsikkerhet, høy kvalitet, miljøvennlig, økologisk og enkel tilberedning har blitt godt tatt imot av kinesiske konsumenter. Norsk torsk passer perfekt inn i dette konseptet. Nye spesialiserte fiskebutikker og fiskedisker i supermarkeder ønsker å selge importerte hvitfiskprodukter av høy kvalitet. Vi anbefaler derfor at norske aktører utforsker muligheten av å inngå langsiktige avtaler med kinesiske aktører i hvitfiskbransjen.

Som et biprodukt av våre analyser finner vi at det er svært mye feilregistrering av fiskearter i både Kinesisk og Russisk statistikk. Russiske data er mindre pålitelige enn kinesiske. Eksporten av Alaska Pollock og torsk til Kina er underrapportert i russisk eksportstatistikk sammenlignet med kinesisk importstatistikk. Det er verdt å merke seg at dataene er blitt mer pålitelig de siste årene.

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## Summary

The purpose of this project is to analyze the role of China in the global supply chain for whitefish. Special attentions are placed to the global trade flow of whitefish via China, the development of the whitefish processing industry in China, the Chinese domestic demand for imported whitefish, market impact of Chinese products in the European markets, and Brazil as a market for klippfish.

Both quantitative and qualitative methods are applied in the analysis. More advanced econometric modeling is used to estimate the impacts of increasing processing cost and the growing fish quota on

the Chinese whitefish processing industry. To better understand the development in China, EU and Brazil, intensive surveys and interviews were conducted in these countries.

The project finds that the Chinese processing industry is facing a big challenge. In the short time between 2011 and 2013, slow demand in the consumption market (i.e., the EU and the USA) made the industry struggle economically. But in the long term, growth of wage cost by about 20% per year will evidently make the industry less competitive. Moreover, the appreciation of the Chinese currency makes Chinese products much more expensive. Efficiency and flexibility of the industry and a good infrastructure in China might compensate the loss of a comparative advantage of cheap labor in the short run; however, some other countries, such as Poland, or Vietnam might substitute the role of China in long run. Norway is still too expensive to process fillets, compared to China.

Pollock from Russia is the main raw fish used to process frozen fillets in China. Norwegian exports of cod to China have greatly increased due to the growth of the cod quota in 2013. USA and the EU are conventionally destination markets for frozen fillets from China. These markets had huge problems during 2011 and 2012. However, demands have been recovering in 2013, particularly in the latter half of the year. The Chinese industry has been expanding the Brazilian market, the African market, and the domestic market as well. The Brazilian market is not only important for klippfish, but also for frozen fillets processed by China.

Along with the significantly growth of Chinas economy, a huge group of middle-class people is looking for high quality seafood. The new concepts such as safety and high quality, environmental friendly, ecological, easy to prepare and to provide good customer service, has become popular in China. At the same time, Norwegian cod perfectly matches these new concepts. New fish shops and special fish counters in big supermarkets are in an increasing rate going to sell good quality whitefish products imported from abroad. We therefore suggest the Norwegian industry explore the Chinese market by co-operating with local businessmen.

As a by-product, we find that there is a problem of miscoding of fish species in both the Chinese and Russian data. Russian data is less reliable than Chinese data. The exports of pollock and cod from Russia were far less reported in the Russian statistics. However, in general, the reliability of data from these countries has been much improved in recent years.

## **2. Introduction**

China is currently the world's largest seafood producer. Except for farmed carps for domestic consumption, and tilapia and catfish for exports mainly to the USA, a large portion of production is processing of whitefish for exports. Since 1995, through the development of the free trade zone, China became the main global processing center of wild-caught whitefish. The processing industry has been growing significantly since 2000. However, in recent years, the whole industry has been facing a big challenge. These challenges include appreciation of the Chinese currency, growth of labors' wage, and the Economic Crisis in 2008. Several companies survived between 2008 and 2011 due to accumulated capital and profit; however, between 2011 and 2012, lots of small companies collapsed.

China has a high consumption level of seafood, especially in the coastal areas. With the growing economy, demand for seafood is expected to grow steadily in the future. Although a large part of this growth will come from domestic aquaculture, some will come from imports. Norwegian seafood meets the demands of middle-class people for safe and quality food very well.

Norway is a supplier of raw fish for the Chinese processing industry and domestic demand, and is a competitor of Chinese processed products in the EU and Brazil as well. The development of the

Chinese processing industry and the Chinese markets are thus important for the Norwegian whitefish industry. Therefore the main purpose of this project was to investigate what happened in China, both for whitefish processing and domestic consumption, the competition of Chinese frozen fillets in the EU (e.g., England and France), and what happened in the Brazilian market. These findings are important to the Norwegian whitefish industry to position its role in the world whitefish trade.

Our project team includes Professor Øystein Myrland and Associate Professor, Jinghua Xie, both from University of Tromsø, Professor Jingtian Gao and Professor Jingmei Li from China Ocean University, and Professor Jian Gao from Shanghai Ocean University, China. They are responsible for working packages 1 to 4 and 6. Researcher Finn-Arne Egeness from Nofima AS is responsible for package 5. The members of project board were: Svein Ove Haugland from Norges Råfisklag, Terje Kjølsvøy from Ålesundfisk AS, Olav Holst-Dyrnes from Aker Seafoods ASA, Rolf Domstein from Domstein ASA, Arnt Olav Aarseth from Brødrene Aarseth AS, Odd-Arild Sperre from Nils Sperre AS, and Kyrre Dale from Nordea Bank AS. There were also two observers, Jan Trollvik and Ove Johansen, both from Norges Sjømatråd. In addition, Zuoyou Liu from Hongfu group Co., Ltd, Qingdao and Yichan Gao from Xiyuan Frozen Food, Co., Ltd. Qingdao have been involved throughout our project work.

### **3. Problem statements and research objectives**

In the four reports submitted on the project, we have covered all the research questions listed in the project proposal. The report "Kinesisk produksjon av fryste filetprodukter av torsk" analyzed the growing exports of the Chinese processed double frozen fillets in the EU markets and their impacts on the Norwegian fillet industry; The report "Whitefish Processing in China" analyzed the industry processing capacity, cost structure, logistics, product additives, product forms, imports of raw fish and exports of domestically caught products; The report "Klippfisk i Brasil" analyzed the challenges of new products from Portugal and China to the Norwegian products; the report "Whitefish Consumption in China" analyzed the current situation of whitefish demand in the Chinese market, the development of the Chinese economy and its impact on whitefish consumption in the coming years. The final report analyzed the trade flow of whitefish via China, cost differences of processing fillets in the Norwegian and Chinese industry, possible new processing countries instead of China, effects of increasing processing cost in China and the growing fish quota on the world whitefish trade, at same time as we updated with new information in 2013.

Considering the consumption of whitefish in China, new fish shop chain called "One Hundred Meter" has been rapidly extended from 40 shops in Qingdao in July 2013, to 15 shops in Shanghai in a couple of months. These chain shops were established by a CEO of a processing company who we have been in contact with for many years. In the shops, only seafood imported from the Arctic areas are sold. It will be very interesting to follow the development of these shops in the future. Particularly in terms of what consumer segment they attract, and purchasing behavior in terms of buying Norwegian fish.

The findings in this project are important for the Norwegian whitefish industry. Considering the rise of Chinese processing cost by around 10-20% a year, the industry may have to face increased competition from countries such as Poland or Vietnam, or to produce more value-added products in China. On the other hand, China has a huge potential market for high-quality Norwegian whitefish. The question is how to co-operate with local businessmen to have Norway as a preferred brand.

### **4. Project implementation**

Both qualitative and quantitative methods were used in the project. The import and export data used in the analysis were provided by Norges Sjømatråd. Chinese statistics on seafood processing, macroeconomic development and seafood consumption were collected from the Chinese official statistics records. These were the Chinese Fishery Statistical Yearbook, Chinese Yearly Book of Economy, Yangtze River Delta Yearly Book, Chinese Statistics Yearly Book of Regional Economy, Yearly Book of Shanghai Economy, and Chinese Business Affairs Yearly Book. The data for processing cost were collected through our field work.

The secondary data of the processing and market information in China, Brazil, Great Britain and France were collected by intensive surveys and interviews. Advanced econometric modeling were used to estimate the impact of rising processing cost and the growing fish quota on the world whitefish trade.

The project requested Professor Jintian Gao, Professor Jingmei Li and their master students from China Ocean University to conduct surveys and interviews with the whitefish processing industry in Qingdao and the Dalian areas. More than 20 companies were visited. Among them, the project has kept very close contact with CEO Yichuan Gao from Xiyuan Frozen Food, Co., Ltd., and manager Zuoyou Liu from Hongfu group Co., Ltd. These two industry CEO's have been involved throughout the project and has provided immediate new information on what was happening in China. The project has also asked Professor Jian Gao and his PhD and master students to investigate the domestic demand for whitefish in China. They investigated 4 representative cities in China.

To ensure the validity of our findings, and also to help the Norwegian industry and the Chinese industry to have a dialog between each other, the project has organized three workshops, one in July 2012 in Qingdao, and one in June 2013 in Shanghai and another in October 2013 in Tromsø. Researchers, board members and observers, CEO's and managers from the Chinese industry, the Norwegian industry and supermarkets, whole sales companies were all invited. The delegation visited local industry, supermarkets and some organizations. We believe an open and good discussion in these workshops provided a very good platform for the attendants to get valuable information from.

Two observers, Jan Trollvik and Ove Johansen from the Norwegian Seafood Council have helped us to keep a close contact with the Norwegian industry, and to get all the trade data we needed. We think the project has finished its planned tasks. The members in the project organization have had very good communication between each other. The finding of the project should be valuable to the Norwegian industry.

## **5. Main research results and conclusion**

The project finds that pollock from Russia is the dominant raw fish for frozen fillet processing in China. According to data in 2012, pollock (lyr), cod (torsk), haddock (hyse) and coalfish (sei) accounted for 56%, 13%, 4% and 1% of the total Chinese imports of whitefish, respectively. Russia, USA, Norway and Japan had a share of 76%, 8%, 7% and 6%, respectively. Some 14% of cod and 80% of haddock were from Norway, which resulted in 7% of the Norwegian share in the total Chinese imports of raw fish. The Norwegian cod is generally 2-3 NOK/kg more expensive than that from other resources. At the same time, the Chinese industry thinks the quality of cod from Norway is higher compared to that from Russia.

The EU and the US are the most important consumption markets for Chinese processed products. According to the data between 2008 and 2012, the EU and USA accounted for 63% and 28% of total Chinese exports. The Brazilian market is growing, having a share of 4% now. Brazil is not only the most important market for the Chinese processed klippfisk, but also has become more important for

frozen fillets. We found that China is expanding the Brazilian market by selling cheap and low quality frozen pollack fillets. The export price of frozen pollock fillets to Brazil was 4-5 NOK/kg lower than that to the EU market.

On average it takes the Chinese industry half a year from importing raw fish to exporting the processed products. It takes 15-30 days to import raw fish from source countries, 15 days for imports from Russia and 30 days for imports from Norway. The industry normally order raw fish 3-5 months before processing, and keep the processed products in storage for 1-2 months, depending on market conditions.

In general, the Chinese processing industry has a problem of overcapacity and is facing big challenges. Starting in 2011, small companies have begun to collapse. In 2012 the industry gained around \$100-200/ton to process cod fillet, and lost \$200-300/ton to process pollock fillet. In 2013, the situation was much better. Although the industry still lost around \$150/ton for processing pollock, industry became much more active with more orders from consumption markets.

We found that the total processing cost was \$1010-1060 in 2012, which included \$105 for electricity, \$490 for wages, \$25 for quality control and management, \$60 for low-value consumables, \$80 for depreciation, and \$200-250 for transportation and custom control. Among these, wage was the largest cost component. It accounted for 49% of the total cost. The main comparative advantage of the Chinese whitefish processing industry is cheap mass labor. This makes it possible for the industry to use manual filleting instead of machine filleting. The yield rate of manual filleting is around 65-70%, much higher than that of machine filleting. However, this advantage is now facing a big challenge when the labor wage and welfare cost for the labor has increased by some 20-30% annually in the last years.

We calculated the total costs of processing cod fillets in Norway using local raw material and exporting it to the EU, and compared this to the total costs of processing cod fillets in China using raw material imported from Norway and re-exporting it to the EU. Our results suggest that it is still too expensive to produce fillets in Norway compared to China. According to the data in March 2013, the total cost for the Norwegian industry was 35.92 NOK/kg, while it was 27.30 NOK/kg for the Chinese industry. The difference of 8.62 NOK/kg is explained by a higher yield rate of manual filleting and cheaper labor cost. An important finding is that this cost difference is almost equal to the price premium the Norwegian seafood industry is able to get in the market. The price difference is mainly because Norwegian industry delivers single frozen products compared to double frozen products from China.

The Chinese domestic demand for whitefish products is currently relatively small and there are market problems. The names used for codfish are ambiguous. Consumers do not know the exact species they are buying. Most codfish currently sold in the Chinese market is actually Alaska pollock. However, with the growing of the Chinese economy, there is a huge potential demand for high quality whitefish products. Examples we found are special counters in big supermarkets and new fish shops only selling seafood from abroad. Chinese consumers generally believe that foreign products are much safer than domestic products. Food safety is a key issue in China nowadays as a result of frequent food scandals and people's increased sensitivity to this issue. Of vital importance is how the Norwegian industry is able to cooperate with local businessmen to explore the Chinese market together. Salmon from Norway is a significant brand in the Chinese market. It should be possible to have a brand of Atlantic cod from Norway in the near future.

The estimated results of the econometric modeling suggest that if Chinese processing cost increases by 10%, it will raise export price of frozen fillets by 2.1%, and reduce the world demand for frozen fillets by 3.1%. This on the other hand will reduce the total world demand for raw whitefish by 2.3% and price of raw fish by 2.8%.

The role of Norway in the global whitefish industry is complex. Norway is both a raw fish supplier for the Chinese whitefish industry and a competitor with the Chinese products in the EU and Brazilian market. As a raw fish supplier, when the Chinese industry is facing growing costs, the Norwegian industry has to look towards competitive production markets such as Poland or Vietnam. The Chinese cost level still has a comparative advantage in the short run and the loss of advantage might be compensated by increased efficiency and flexibility of the industry. However if wage cost keep increasing, it is unavoidable that China will become too expensive to keep the position of the world's processing center. Our results show that Norway is still too expensive to produce fillets; however Poland could be a substitute producer to China. Poland doesn't only have a lower labor costs, it also has a greater flexibility, both toward sourcing input and proximity to the EU market. They can use both fresh and frozen raw material and sell fresh, frozen and thawed products in the end market. This competitive advantage is created because they are located close to both the raw materials and the consumer market.

China is a growing competitor in the Brazilian market because the market wants more value added products, which traditionally have high labor cost than the traditional dried and salted Norwegian "Bacalhau". The demand for more value added bacalhau-products in the market indicates an increasing competition from Chinese industry in the future.

## **6. Deliveries**

The project has completed all the presentations, reports and paper stated in the application. To better communicate the knowledge of the project findings, we submitted one additional report to sum up the findings in each working packages and also update the information in the reports submitted earlier. The followings are the details of the submissions.

The project findings have been presented in several conferences and meetings. These where: 8/2012: Nor-Fishing, Trondheim; 8/2012: Matfestivalen i Ålesund; 9/2012: FHF, Faggruppe Hvitfisk Filet, Gardermoen; 10/2012: Global Pelagic Forum, Istanbul; 10/2012: FHF Faggruppe Konvensjonell, Tromsø; 11/2012: Torskefiskkonferansen, Tromsø; 11/2012: Havbrukskonferansen, Oslo; 12/2012: Styremøte; 03/13 FHF Faggruppe Hvitfisk Filet, Gardermoen; 10/2013: Torskefiskkonferansen, Tromsø; and 10/2013: Styre-møte, Tromsø.

Five reports have been submitted to FHF. These are "Kinesisk produksjon av fryste filetprodukter av torsk", "Klippfisk i Brasil", "Whitefish Processing in China", "Whitefish Consumption in China" and this final report. Four articles and papers were published. These are: "Hvem skal produsere fryste torskefileter?" and "Norsk klippfisk taper markedsandeler i Brasil" in Norsk sjømat, "Økt konkurranse for klippfisk av sei i Brasil" in Matindustrien, "Norsk klippfisk taper terreng i Brasil" in Sunnmøresposten and "What determines China's re-export in the future", submitted to the academic journal called Journal of Policy Modeling. There were also a couple of newspaper articles.

Three workshops have been arranged. One in Qingdao in July 2012, one in Shanghai in June 2013, and a final one in Tromsø in October 2013.

## **7. Quality assurance of project implementation and results**

We think the official statistical data, the extensive surveys and interviews helped us to get reliable data. This methodological approach, where we have used multiple methods to study the same phenomena is called triangulation. Since no statistical data are available regarding the domestic

Chinese consumption of whitefish, these quantities were estimated based on our market investigations. For this, we have widely discussed this in the submitted reports.

Extensive discussions in the workshops, board meetings and presentations in various conferences have well ensured the validity of the project findings. The articles and journal papers that are submitted to peer-review journals is currently in review and in a publishing process.