

New Sources of Seafood Supply: Norwegian Salmon for the Asian Table¹⁾

Bjørn Eirik Olsen

For fishing nations it is important to know that the demand for seafood in the world is increasing and that the production can not fill the expected gap between demand and supply in the next 10-20 years. Based on the estimated population growth, the demand for edible seafood by the year 2010 is estimated by FAO to be about 30 million Mt.'s higher than today. It is highly unlikely that this additional demand can be met by capture of wild aquatic resources. Much attention has therefore been drawn towards aquaculture as a means of filling the gap between supply and estimated demand.

The world production of Atlantic salmon (*Salmo salar*) is still relatively small with 470.000 Mt.'s in 1995, whereof Norway's share was 55% (260.000 tons). Sharp growth in production the last few years has caused some marketing problems, and Norway has introduced feed-quotas and other measures to slow down the expansion. But with further productivity increase, better product development and enhanced distribution and marketing effort, it is not unlikely that the total world production of Atlantic salmon should exceed 1,5 million tons within 10-15 years. The Norwegian coastal waters are among the most productive ecosystems of the world, and the coastline has proved itself to be ideal for aquaculture. Norway's share of the future production of farmed Atlantic salmon is therefore likely to be substantial.

It might seem natural to ask the question: Why should Asian countries buy seafood from a country as far away as Norway? In my opinion, the mere existence of farmed Norwegian salmon is part of the answer. In the same way as Norwegians can enjoy tropical fruits above the Polar circle, Asian consumers should be able to enjoy the "fruits" of the Arctic waters. Exchange of goods and growing international trade is a sign of development and growing welfare among nations. Together with trade follow technology exchange, cultural exchange and - if the trade is based on sound and equal terms - friendship.

International trade is growing. Half of the cars and televisions owned by Norwegian families are made in Japan. We import electronics and clothes from China, bicycles from Taiwan, plants and oil from Malaysia and cars from Korea. On the other hand Norway is offering metals, machinery, paper, chemical- and petroleum products, marine technology and seafood.

However, the trade is not in balance: We buy twice as much from Asian countries as we export to the same countries.

Most of the Norwegian export products are related to our affluence of natural resources including hydroelectric power, oil and seafood. The sea has always been Norway's "pantry" with its natural fish resources. The total production of fish and shellfish is about 2,5 million metric tonnes, while the total population is only 4,4 million. This corresponds to 600 kg of seafood per person, which of course is much more than can be consumed domestically. Therefore, Norway exports 90% of its seafood production. The total export value exceeded 3 million USD in 1995. Among the traditional products, cod, herring, mackerel and shrimp are most important. But more than one third of the export value is salmon and other farmed fish, and it is only a question of time before this value exceeds the value of traditional fisheries.

Economically, the offshore oil industry is presently our most important industry. However, in the 21st century the seafood industry has a potential to gradually take a leading place. The Norwegian fisheries are well managed, and the stocks of the most

important species are good - due to successful resource management based on the principle of sustainable yield. Capture fisheries have long traditions in Norway. Aquaculture has, on the other hand, a history of only 20 years. Nevertheless, aquaculture of Norway is now of almost the same economical size as the fisheries.

In order to meet this challenge, the industry has to mature and expand its international co-operation. Because of this, we have strong reasons to welcome extended collaboration with the great fishing nations in Asia. As a matter of fact, it is mainly in this part of the world that Norway can find fellow countries which put prime importance on the fisheries sector, both regarding the economical and cultural aspects of this industry.

When it comes to the cultural and culinary aspects of the fisheries, Norway has a lot to learn from Asia. Through centuries oriental people have developed ways of esteeming and exploiting all kinds of seafood that can inspire wider, more value added and more nutritious ways of utilising the resources.

Growing demand for seafood

For fishing nations and for customers who have to import and buy fish, it is important to know that the demand for seafood in the world is increasing, and that the production can not fill the gap between the expected demand and supply. Based on the estimated population growth, the demand for edible seafood is estimated by FAO to increase with about 30 million Mt.'s within 10 to 20 years (FAO; "The State of World Fisheries and Aquaculture").

The increasing demand for seafood is in fact very much due to the economical development in Asia. For instance Japan has strongly influenced the supply and demand situation for seafood on the international market the last two decades. From being a net exporter in the early seventies, Japan imported 3,6 million Mt.'s of high value seafood products in 1995.

We can expect China to be the next country to strongly influence this situation in the coming two decades. According to FAO,

China produced 18 million Mt.'s of seafood products in 1993. So far China's international trade has been moderate. But due to the large population and a growing purchasing power, it is reason to believe that the net import of seafood to China will grow strongly in the near future.

Together with a growing demand in other South-East Asian countries, and together with a growing demand in other parts of the world, it is likely to believe that FAO's estimates are realistic.

It is highly unlikely that the additional demand can be met by capture of wild aquatic resources. Much attention has therefore been drawn towards aquaculture as a means of filling the gap between supply and estimated demand. But not even the most optimistic estimates of production capacities of aquaculture are high enough to fill this gap. The most likely future *scenario* is therefore that aquatic food will be a limited resource on the international food market.

Latest estimates by FAO show that the world's total harvest of aquatic food and feed organisms, including farmed species, was 101 million Mt.'s in 1993. The modern industrial ocean fisheries expanded rapidly in the period from just after World War II and until the early 1980's. Since then the catches of marine fish and shellfish have reached a ceiling and started to decline after 1989; reaching 84 million tonss in 1993. According to FAO, about 70% of the worlds marine stocks are fully exploited, overexploited, depleted or in the process of being rebuilt as a result of exploitation.

While the harvest by capture fisheries has started to decline, the output from aquaculture has increased at a rate of about 20% per year reaching 17 million Mt.'s in 1993. This has, however, not been enough to compensate for the reduction in capture.

The general picture which emerges from this description of the status of the world's fisheries sector, is that the capture fisheries has severe health problems whereas aquaculture is in a vigorous shape. It is adequate to describe the present development as a "blue revolution", a revolution which takes place all over the world. But there are also limits to growth of aquaculture in the

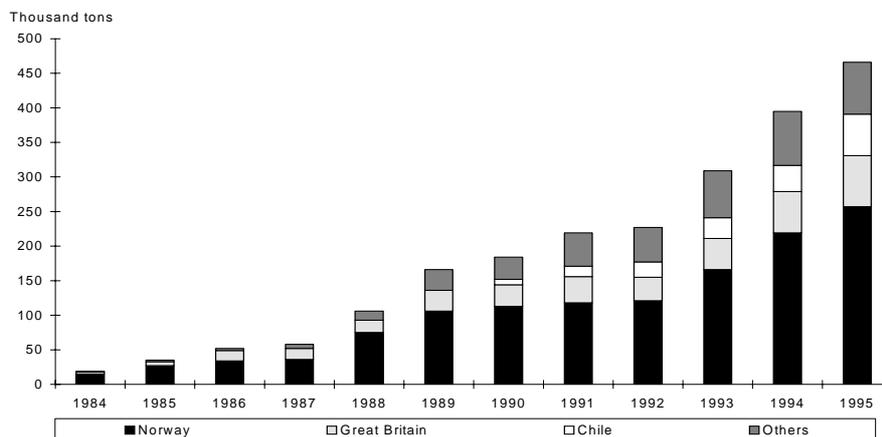


Figure A Total Production of Atlantic Salmon. The Norwegian Seafood Export Council, The Norwegian College of Fishery Science, Source FAO.

world, mainly due to the shortage of fresh water, farming locations and feed.

In the seafood business many people talk about over-production of farmed Atlantic salmon. The growth has certainly been strong, and there has not been enough marketing effort - especially regarding development of new markets. But considering the gap between demand and supply of seafood - that we can expect within a decade or two - the world will need all the first class salmon it can produce.

The production of Atlantic salmon is still relatively small - but steadily growing (figure 1). According to the FAO statistics, it was number 43 in volume on the list of the most important species in 1993 - with a production of 310.000 Mt.'s. In 1995 the total world production of Atlantic salmon increased to approximately 470.000 tons, whereof Norway's share was 55% (260.000 tons). This sharp growth naturally caused some marketing problems, and from the Norwegian side we have introduced feed-quotas and other measures to slow down further expansion. In fact, Norway has had a relatively lower growth rate the last few years than other main producers as Scotland and Chile.

With further productivity increase, better product development and enhanced distribution and marketing effort, we should not be surprised if we find Atlantic salmon among the 10 most important species in the world within 10 to 15 years. This means that the

production would pass 1,5 million tons. The Norwegian coastal waters are among the most productive ecosystems of the world, and the coastline has proved itself to be ideal for aquaculture. Norway's share of the future production of farmed Atlantic salmon is therefore likely to be substantial.

The farming of Atlantic salmon

There is few little industry in Norway, and the waters is not affected by pollution or runoffs. The clean oceanic water from the North Atlantic flushes like a river along the coast and keeps the ice away (figure 2).

Norwegian salmon (*Salmo salar*) is the predominant species in the Norwegian aquaculture. The life cycle of wild Norwegian salmon starts in the rivers along the coast. From there they migrate to the North Atlantic and return to the rivers when they are sexually mature and ready to spawn. When the wild "fingerling" reaches a certain stage in development, they migrate from fresh water towards the sea. This change, from living in freshwater to living in saltwater, is called the smoltification process. For wild salmon, the process follows the seasons. In captivity, the smoltification process can be controlled by the introduction of certain stimuli, like artificial light and temperature.

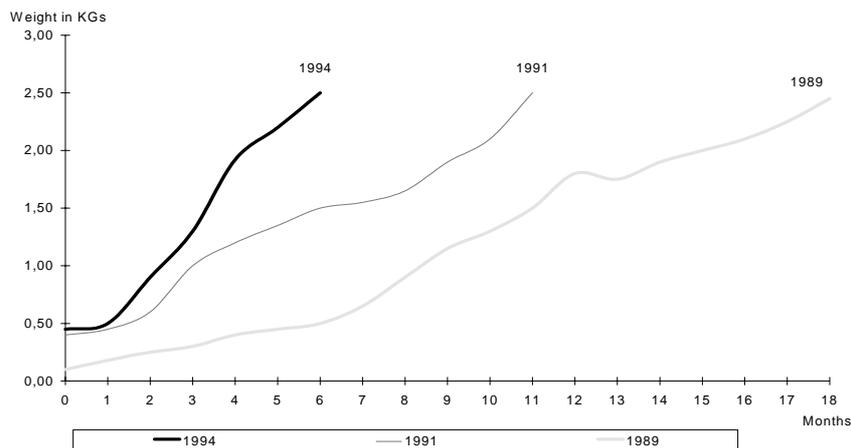


Figure B Growth Rate for Farmed Atlantic Salmon (Norway).

Once the fish is smoltificated, it is ready to be transferred to saltwater cages along the coast. In these cages, the fish is given a carefully developed and highly nutritious feed to induce fast and healthy growth. The fish reaches market weight - which normally varies from about 2 to 7 kg - in about 12 to 24 months, depending on the natural conditions at the site.

The development of the salmon farming industry is based on a close co-operation between research institutions and the indus-

try to solve the problems encountered by the fish farmers. The results are a farming practice which today is sustainable and in harmony with nature. One of the most significant achievements has been the new aquafeeds which yield 1 kg of salmon per kg of feed, compared to 2.5 kg feed per kg fish 10 years ago. Together with other improvements, this has led to a sharp increase in growth rate (figure 2).

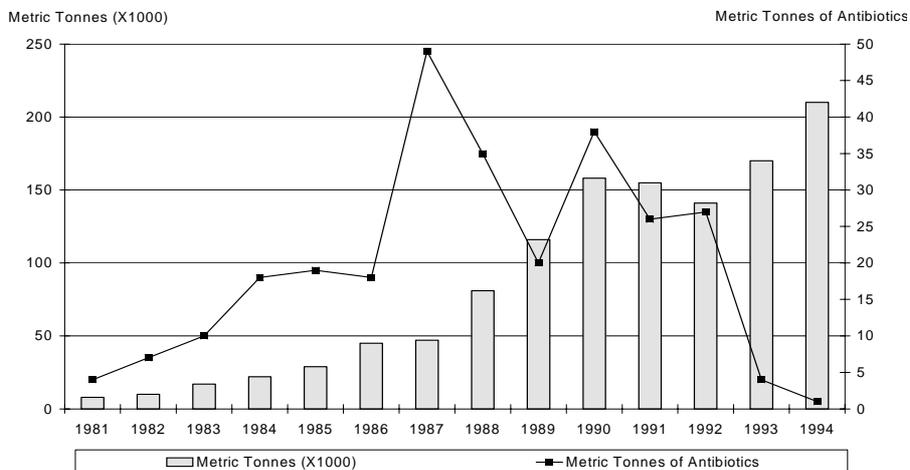


Figure C Production of Atlantic Salmon in Norwegian Aquaculture and the use of Antibiotics.

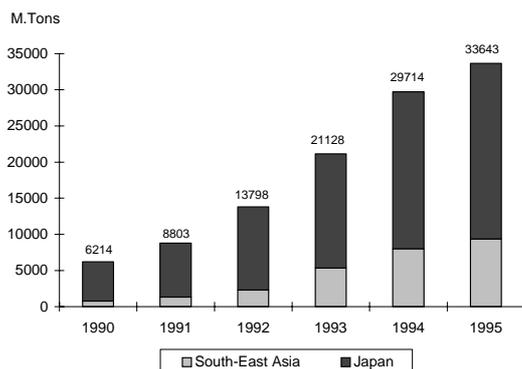


Figure D Norwegian Exports of Salmon Products to Japan and South-East Asia.

This has also reduced the load of organic waste from the farms and at the same time reduced the cost of feeding. The general improvement in the farming practice can be recorded directly from the use of antibiotics in the salmon farming industry, which has been reduced drastically and today is very low compared to other sectors of animal farming (figure 3).

Norwegian exports of salmon to Asia

At present the main markets for Norwegian salmon are the EU-countries, but we believe that the demand for imported salmon in Asian countries will grow. This is due to the growing economies in the Pacific region, and due to the fact that Asian people - with their innate love for seafood - have a tendency to eat more seafood as their purchasing power increase. We also believe that farmed Norwegian salmon has the quality to

meet the expectations of the demanding Asian consumers.

Total exports of farmed Atlantic salmon (*Salmo salar*) and trout (*Salmo trutta*) from Norway to East Asia has been growing from 6.300 Mt.'s in 1990 to 34.000 tons in 1995 (figure 4). The value of this export was approximately 190 million USD last year, while the total export value of Norwegian salmon was close to 1,1 billion USD. The relative share of exports to East Asia is also increasing. In 1990 East Asia accounted for less than 5% of the total value of salmon exports from Norway. In 1995, five years later, the relative share of salmon exports had increased to 17,5%.

Table A Norwegian Exports of Salmon to East Asia, 1995. (Totalt value 190 Mill. USD).

Country	Andel i %
Thailand	0,09
China	0,36
Malaysia	0,51
Singapore	3,00
Rep of Korea	4,23
Hong Kong	5,81
Taiwan	13,80
Japan	72,20
Total	100,00

Japan is by far the most important East Asian market, with a share of 72% of the total Norwegian exports of salmon products to this region (table 1). The most important products are fresh gutted salmon; 11.000 tons, frozen gutted salmon; 5.600 tons, frozen salmon fillet; 1.200 tons and frozen salmon trout; 7.100 tons, - in addition to some smoked products (table 2).

Table B Norwegian Exports of Salmon to Japan.

	1990	1991	1992	1993	1994	1995
	M. Tons					
Fresh salmon volume	4.115	4.033	5.106	8.163	12.197	11.146
Frozen salmon volume	576	782	3.239	3.613	2.445	5.593
Frozen salmon fillet volume	0	369	198	171	1.152	431
Frozen trout volume	735	2.273	2.957	3.838	5.917	7.106
	NOK/kg					
Fresh salmon price	41,31	42,08	39,55	39,14	38,77	32,80
Frozen salmon price	38,31	33,42	23,16	30,97	37,07	34,08
Frozen salmon fillet price	0	100,20	84,98	74,22	66,07	62,64
Frozen trout price	33,72	34,10	33,72	33,63	32,88	33,21

Japanese consumption of salmon has increased by 400% the last 25 years, to a level of more than 500.000 tons in 1995. The salmon consumed in Japan is mainly Pacific salmon. Sockeye and chum has always enjoyed a predominant position. Norwegian salmon has been able to penetrate this market. This is noteworthy, since the Norwegian farmed salmon is more expensive than the Pacific wild species. Eight years ago, the Japanese consumed only 1.500 tons of Norwegian salmon and trout. Last year, they consumed 24.000 tons. At the moment, Japan is the third biggest market for Norwegian salmon and trout, after France and Denmark.

There are many reasons why the Japanese seafood market has absorbed Norwegian salmon. One reason is that consistent fish farming allows close monitoring and control of the fish during their life cycle. The Norwegian farmers can guarantee supply 365 days per year. There is no risk of contamination of the product by parasites, which are often found in wild salmon. This means that it is safe to eat the fish raw. The farmed Atlantic salmon also has textural properties and oil content suitable for raw use, while pigmentation can be adjusted with natural ingredients in the feed according to the wish of the consumer. The flesh is tender, with no blood spots and a hygienic quality secured by Governmental authority.

Norwegian salmon differs from Pacific wild salmon in many important ways. The harvest and processing of farmed salmon is under strict control, and all fish are har-

vested before they are sexually mature. Prior to harvesting the fish are not fed for 1-2 weeks, to clean their intestines and enhance the quality. The whole process of harvesting, inspection and packing, preparing the salmon for shipment or freezing, takes less than one hour.

These attributes have given the Norwegian salmon an excellent reputation in one of the world's most demanding seafood markets. The fact that prices have been lowered, due to increased productivity in the farming process, has also strengthened the market accessibility.

From the Norwegian side we have great expectations about the future increase of the consumption of Norwegian salmon for *Sashimi* and *Sushi* use in Japan, and we are presently running campaigns together with Japanese importers and super market chains. In this way, we hope to increase our share of the total Japanese salmon market - from today's 5% - without competing with the traditional use of Pacific salmon as fresh or salted "kirimi" - mainly used as raw material for grilling in Japanese restaurants and homes.

The Norwegian marketing activities in Japan has been based on thorough marketing research. I was myself involved in a marketing and research program called "Project Japan" from 1986 to 1989, when Japan was a new market for the Norwegian seafood industry. This program co-operated with the industries of Norway and Japan and was supported by the authorities of both countries. I strongly believe that such an ap-

proach gave a sound base for the expansion of the seafood trade.

The experience of selling Norwegian salmon in Japan is insufficient for developing a marketing strategy for South-East Asia. The marketing approach for China, Korea or Malaysia will have to be different. In 1995 the Norwegian Institute of Fisheries and Aquaculture Ltd., in co-operation with the Norwegian Seafood Export Council, launched a marketing study program focusing on South-East Asia. The studies started out with Hong Kong and China. Next year we hope to include Taiwan, South Korea, Singapore and Malaysia. In addition to this, The Norwegian Seafood Export Council has established a market information system covering South-East Asia. In this way we hope to produce information that can be used for product development, marketing strategies and promotion activities.

We expect it to be more difficult to promote salmon in South-East Asia than in Japan, due to the enormous geographical area with complex cultures and distribution systems. Most of the consumers are unfamiliar with Atlantic salmon, the food culture and ways of cooking are complex - and the purchasing power among people in various South-East Asian countries is - on average - low compared to Japan.

For an exporter of Norwegian salmon, the worst case would be that their products were not accepted due to the characteristics of the fish itself; such as taste, texture, colour, appearance and size. However, so far our experience of selling salmon in Asia indicates that such obstacles are not insurmountable and that most consumers will accept Norwegian salmon, provided it is made available and prepared in the correct way.

Taiwan has become the most important country in *South-East Asia* for the Norwegian aquaculture industry (figure 5a). The growth has been tremendous. In 1990 the Taiwanese consumed 14 tons of Norwegian salmon. Five years later, in 1995, the Taiwanese consumed more than 5000 tons, consisting of 1.500 tons of fresh salmon, 3.200 tons of frozen salmon, 120 tons of frozen salmon fillet and 260 tons of frozen trout. In few years, Norwegian salmon has spread from Taiwan's hotels and restaurants

into supermarkets and even wetmarkets. Availability, taste and an acceptable price are the main reasons why new market segments have opened up and in turn has triggered the increase in consumption. The Taiwanese have a preference for big and relatively fat salmon, and they have started to use this salmon also as Sashimi.

The second most important market in South-East Asia is *Hong Kong*, buying 1.800 tons of salmon products from Norway in 1995 (figure 5b). Fresh salmon is the main product with 1.400 tons. The growth has been steady since 1990. The citizens of Hong Kong have a very high buying power, and it has been relatively easy to introduce salmon to restaurants and supermarkets. We are also aware of Hong Kong as an re-exporter of fish products to China. Because of the strategic location, the Norwegian Seafood Export Council has opened a representative office in Hong Kong.

Another promising market for Norwegian salmon in East Asia is *South Korea* (figure 5c). The export to this country has increased from 120 tons in 1990 to 1.300 tons in 1995; - mainly frozen gutted salmon. With a population of 37 million people, a strong buying power and a yearly economical growth of approximately 7%, we expect the demand for imported salmon to increase further.

Going back to 1990, *Singapore* was the most important market in South-East Asia for Norwegian salmon with an export of 305 tons (figure 5d). But with a population of only 3 million people they have a limited demand. The exportation reached 800 tons in 1995. But, like Hong Kong, Singapore has a strategic location and its cuisine is also a "trend setter" for the cuisine in the South Pacific. We therefore pay high attention to Singapore regarding market analyses and promotion.

Malaysia has been influenced by Singapore, and some Norwegian salmon has been re-exported from Singapore to Malaysia (figure 5e). In addition, the direct export to Malaysia has increased from 4 tons in 1990 to 180 tons in 1995. Even though the population of Malaysia is smaller than most of the neighbouring countries, it is regarded by Norwegian exporters as an interesting and promising market with a strong economical growth. The Malaysian consumers seem to

fancy the taste and the smooth texture of this - until now - relatively unknown fish.

In addition to some re-export from Hong Kong, 110 tons of fresh and frozen salmon was exported from Norway to *China* in 1995 (figure 5f). The Norwegian seafood industry is very optimistic about the future demand for farmed Atlantic salmon to China. This is due to the combination of a population of 1,2 billion people - and an expected yearly

growth in GNP of about 9%. So far, only a few airloads and containers of Norwegian salmon have been exported to China, mostly to high class hotels in the major cities. We believe that international hotels and restaurants are the first step in approaching this market. With a growing buying power, a growing interest in eating foreign dishes will usually follow.

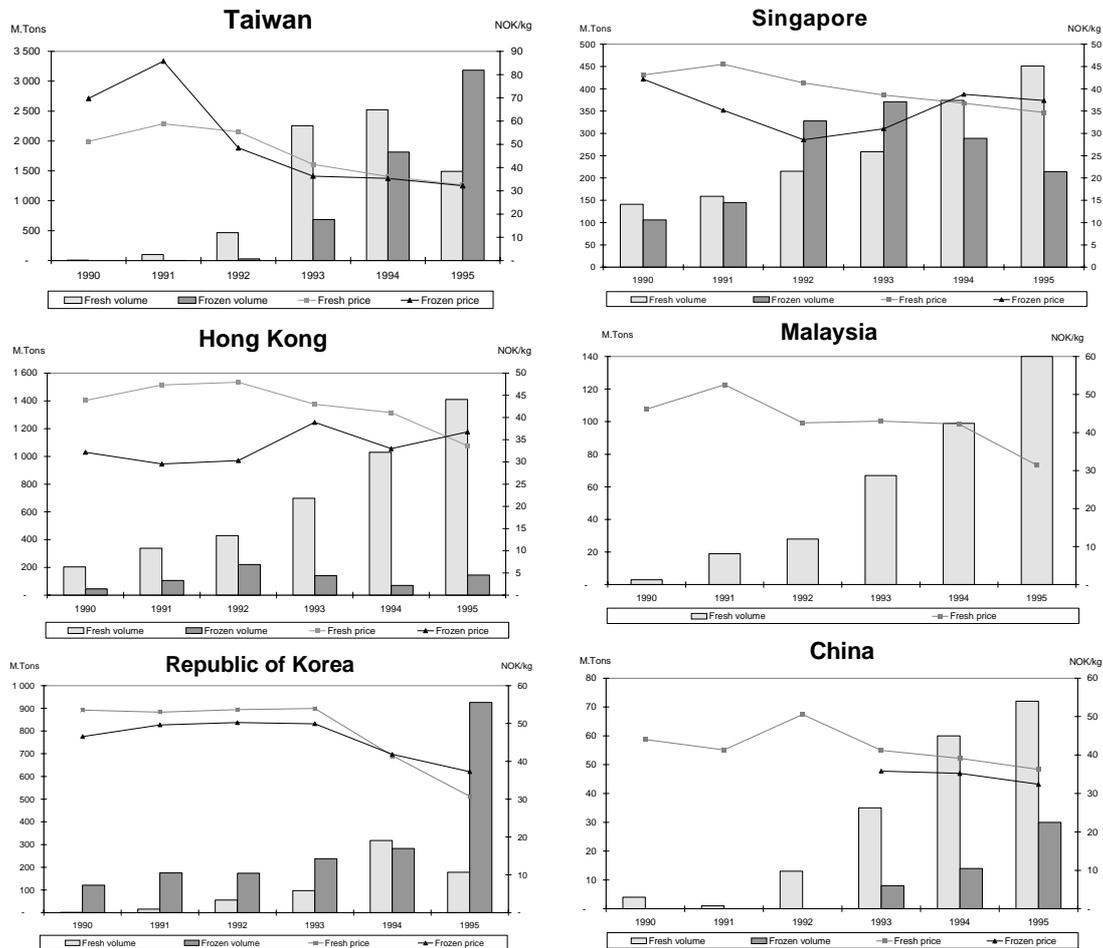


Figure E Norwegian Exports of Farmed Atlantic Salmon

Seafood has traditionally had a high status in Chinese cuisine, and in recent years, we have seen increased consumption of seafood

in the more affluent coastal provinces. The next, and most important step, will be to approach the supermarkets. Today there are

very few modern supermarkets in China, but the number is expected to reach more than 20.000 outlets within 10 years.

When it comes to the *Philippines, Thailand and Indonesia*, the exports of Norwegian farmed salmon has so far been of less significance. In sum, the three countries bought 66 tons of Norwegian salmon in 1995. But there is a certain growth, and with huge populations and a growing buying power - we are very interested in expanding the contact with these countries. There is also a growing interest from the Norwegian side in expanding the trade within other industries and sectors - including aquaculture- and fish processing equipment.

Conclusion

Based on the above, Norwegian salmon should have a bright future in Asia, providing we can make it available and market it effectively. However, there is one problem; namely the high tax which is imposed on imported seafood in most South-East Asian countries. The tax has an important impact on the retail price and therefore decides who

can afford to buy and eat imported salmon. Norwegian farmed salmon hardly competes directly with local fish. As I mentioned in my introduction, the trade balance between Norway and most South-East Asian countries show a strong unbalance in your favour, so there is good reason not to inhibit the growth of salmon imports. Here, bilateral co-operation between Norway and East-Asian countries will be of crucial importance.

This paper has shows that in my opinion there will probably be a growing demand for imported seafood to Asian countries in the future, and that Norwegian farmed salmon is a possible new source of supply - as an exotic, well tasting and healthy alternative - that can contribute to the welfare of the Asian consumers and the Asian seafood industry. While the buying power of Asian consumers are increasing, the price of Norwegian farmed salmon has been decreasing due to more efficient production. The trade has been multiplying the last few years, and I can see no reason why Norwegian salmon should not continue to "build bridges" between the continents also in the future.

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Noter

- 1) An earlier version of this paper was presented at the "Asia Fisheries and Seafood Conference 1996", Penang, Malaysia 24 - 26 June 1996.