TROMSØ BUSINESS SCHOOL, UNIVERSITY OF TROMSØ

Fag Report

Whitefish Processing in China

4/30/2013

Table of Contents

Abstract

China is both the world biggest producer and exporter of seafood. A large portion of its exporter is based on import of the whitefish species from the resource countries, namely Russia, the US, Norway and Japan. The processed products, mainly frozen fillets are re-exported to the developed countries, mainly the EU and US. In the recent a couple of years, when the demand from the EU and the US is significantly declined due to the Economic Crisis and the Brazil market is still keep growing, the Chinese industry becomes to export more processed salted fillets to Brazil, particularly for those companies in Dalian area.

As we all know, the main comparative advantages of the Chinese whitefish processing industry is the mass cheap labor. This makes it possible for industry to use manual filleting instead of machine filleting. The yield rate of manual filleting is 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 20-30% annually.

The project has asked two professors from China Ocean University to conduct an intensive survey and interviews with 20 processing companies in Qingdao and Dalian areas. The project has also organized a workshop in July 2012 in Qingdao. Both Norwegian delegates and Chinese delegates were sitting together to sort out the questions of what happed in Chinese processing industry. The Chinese delegates include 4 mangers from these 20 companies visited during field work.

We found the industry gains around $100-200/ton to process cod fillet, and lose $200-300/ton to process pollock fillet in 2012. Since pollock is the main products in Chinese processing industry, the industry in general lost money in 2012. Some small companies began to collapse. The big companies still kept some production, in order to keep the factory running and to keep the skilled workers for the future, but in a much small scale.

Although the wage cost has increased significantly, the mangers in the industry think the bad situation nowadays is mainly due to slow demand from

the consumption markets. Some of the mangers emphasized that a portion of the industry produces the products according to what is asked by their buyers. If the consumption markets getting better, and if the EU and US buyers cannot find a better substitute country to produce instead of China, the buyers will cover the cost induced by the growing wage. At the same time, they do not think some developing countries like Vietnam can replace China for seafood processing in a short run. Although the wage cost is lower there, the less developed logistics and the bureaucracy in reality make the cost even higher. They emphasized that the comparative advantage of the Chinese industry is not only cheap labor, but also industry cluster, production flexibility, logistic and industry entrepreneurship.

1. General status of the aquatic products processing industry in China

China is the most important processing country of aquatic products[1] in the world. The total volume of aquatic products processed in China is more than 16 million tons in 2010. Most of the processed products, which are based on the raw fish both imported and domestic produced, are exported to the world market. Total value of the exported aquatic products is nearly $14 billion in 2010.

Table 1 presents the growing processing of aquatic products in China between 2006 and 2010. In 2010, the processing capability of aquatic product is around 24 million tons, and the total output of processed aquatic product is 16.3 million tons. The processing capacity and the output increased by 33% and 23% respectively in 2010 compared to that in 2006. From both the absolute number and the growth rate, we find there exists the problem of overcapacity in the Chinese processing industry of the aquatic products.

[1] Aquatic products hereafter refer to both fresh water fish and seafood. There is a substantial share of farmed fresh water carps in China, mainly for domestic consumption.

Table 1 Production of China's Aquatic Product Processing Industry From 2006 to 2010

Item / Year	Capability (mill tons)	Outputs (mill tons)	Total value (mill RMB）	Added value （mill RMB）	Value of total export (mil USD)	Number of company
2006	18	13.3	154	47.5	9.4	9548
2007	21	13.4	180	61.8	9.7	9769
2008	22	13.7	197	63.6	10.7	9971
2009	22	14.8	203	66.4	10.8	9635
2010	24	16.3	236	86.4	13.8	9726
Growth Rate	33%	23%	53%	82%	47%	2%

Data Resource: China Fishery Statistical Yearbook

Growth rate presented here is to compare the growth rate in 2010 compared to that in 2006.

From table 1, we can also see that the total value and the value added are increasing faster than the output. Particularly the added value is 82% higher in 2010 than that in 2006. It means China intends to process more value added goods. The growth rate of total processing value and the export value are 53% and 47% respectively, which suggests that more and more processed goods begin to remain in the domestic market.

The number of processing company increases only by 2% in the 2010 compared to that in 2006, which is quite low compared to the growth rate of all other indices. The peak number of the processing company is 9,971 in 2008, which followed by 9,635 in 2009, a significant collapse of companies in 2009.

To sum up, we found that there exists the problem of the overcapacity in Chinese processing industry of aquatic products. The industry has an intention to increase the production of high value added goods. More and more final processed goods begin to remain in the Chinese domestic markets. The economic crisis in 2008 has made some of small processing companies collapse. It has probably also made the consolidation of processing.

Fig.1 shows the number of employees in aquatic product processing industry. In 2011, the number of employees was up to 44 million. Compared to 2005, it increased by 32.5%. The annual growth rate was highest in 2006 and similarly high in 2007. However, in 2008, although the absolute number of the

employees was still increasing, the growth rate was quite tiny. In 2011, the number of employees decreased in the first time. This means that the economic crisis in 2008 is a turning point, which makes the industry difficult.

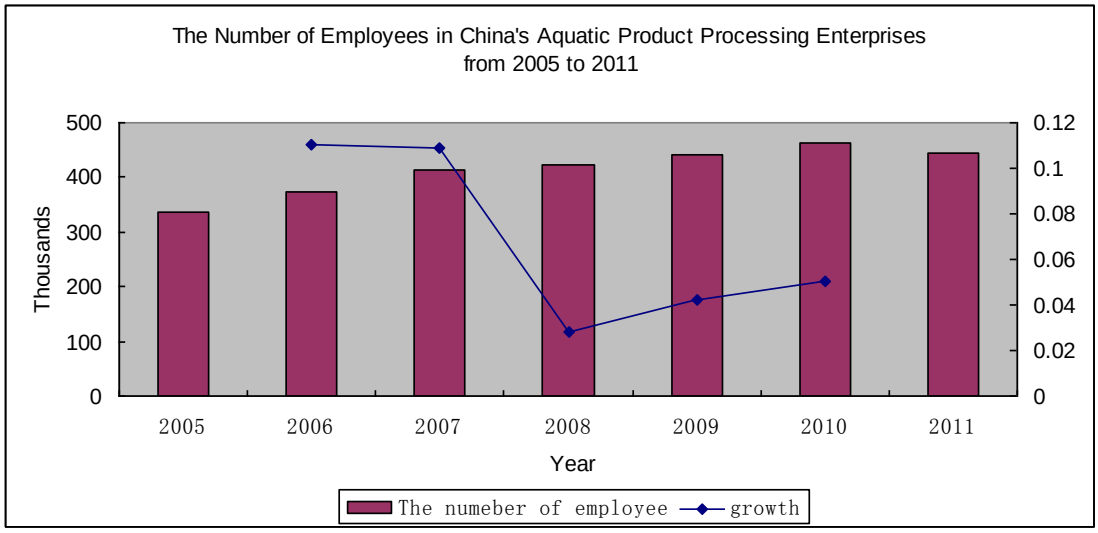

Fig.1. The Number of Employees in China's Aquatic Product Processing Enterprises from 2005 to 2011

Data Resource: www.askci.com

2. The location of aquatic products processing industry in China

China’s aquatic products processing industry is mainly located in the coastal areas. They are Shandong Province, Zhejiang Province, Fujian Province, Liaoning Province, Guangdong Province, Jiangsu Province, Hubei Province, Hainan Province, Guangxi Province, Hebei province. These provinces are highlighted in the following map.

Fig.2 .The Layout of China's Aquatic Products Processing

Data Resource: China Fishery Statistical Yearbook

Table 2 presents the processing proportions of the top five provinces in China. With the same information, figure 3 gives us a clearer trend of the change of proportion of each province. From both the table 2 and figure 3, we can see clearly that Shandong province has always been number one throughout years. Although other provinces grew in the past two years and the proportion of Shandong province decreased slightly, it is still the most important province in aquatic products in China. It accounts for 30-38% of the total Chinese processing. Due to its location and the convention of the province, it is particularly import for whitefish processing.

Table 2. The Rank of China's Main Aquatic Products Processing Provinces 2005-2010

Year / Province	2005	2006	2007	2008	2009	2010
Shandong	37%	38%	33%	32%	30%	30%
Zhejiang	15%	14%	15%	15%	14%	13%
Fujian	15%	14%	15%	14%	14%	15%
Liaoning	9%	10%	11%	12%	13%	13%
Guangdong	10%	10%	11%	10%	10%	9%

Data Resource: China Fishery Statistical Yearbook

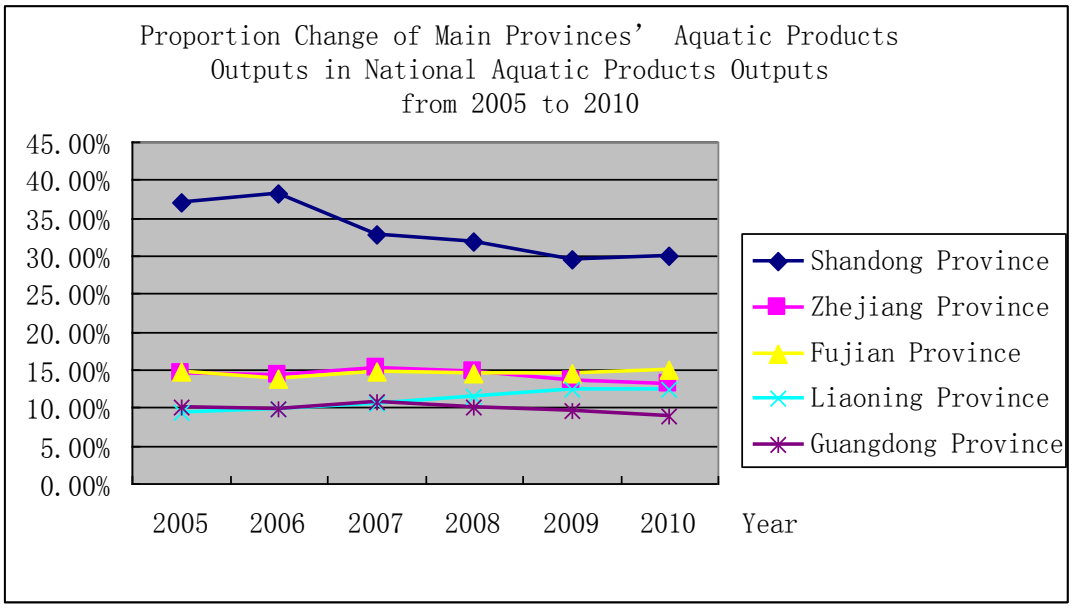

Fig. 3. Proportion Change of Main Provinces between 2005 and 2010

Data Resource: China Fishery Statistical Yearbook

3. The location of the whitefish processing in China

Whitefish[2] processing in China is censored in Liaoning Province and Shandong Province. As we know, China has very limited harvest of whitefish. Moreover a large share of this harvest is landed outside China when the harvest sites are too far away from China. Therefore, the majority of raw whitefish processed in China is imported from abroad, mainly Russia, USA, Canada, Norway and Japan. These two provinces have excellent locations of ports. The ports are closest to the resources countries, compared to other processing provinces, for example, Zhejiang in the middle of the coastline and Fujian and Liaoning in the south (see figure 2). Furthermore, the dominant share of the processed whitefish is re-exported to the developed countries. The European Union (EU) and the United States (U.S.) are two most important buying markets. This means Liaoning and Shandong province are also nearest to the destination markets of the final processed goods.

In Shandong province, the whitefish processing enterprises mainly locate in Qingdao Chengyang District (figure 4), which accounts for more than 80% of processing in Shandong province. It is also the most important processing site of the white fish in the whole nation of China. In Liaoning province, whitefish processing enterprises are mainly clustered in Dalian (figure 5).

[2] Whitefish hereafter refers to ground fish. They are cod, haddock, pollock and saithe.

Fig. 4. Processing Site in Shandong Province
Source: http://maps.google.com/

Fig. 5. Processing Site in Liaoning Province
Source: http://maps.google.com/

4. Whitefish processing in Shandong and Liaoning provinces

Since Shandong and Liaoning provinces are the main whitefish progressing sites in China, we selected twenty progressing enterprises in these two provinces to implement our investigation according to the location, the scale, the sources of the raw fish and the possible destination markets to make sure they are full representatives of the whole industry.

Jingtian Gao and Jingmei Li are two professors from China Ocean University, Qingdao, China. They are members of our project and were asked to conduct an intensive investigation of whitefish processing in China. They have guided a group of their master students to conduct both the interviews and the surveys in these twenty companies. In July 2012, our project held a workshop in China Ocean University in Qingdao. In the workshop, both our Norwegian delegates, who include the project members and observers, and five of the managers of the Chinese companies that involved in the interviews and surveys, were sitting together. Therefore the following reported results were proved to be valid based on both field work and workshop communication.

In general, we find that the two provinces are similar in the countries where raw fish imports from and the final products export to. They are also close in processed products, processing cost, technology and process of quality control. But due to the different quality required and different focus of the selling markets, there still exists some differences that we will discuss later on.

Ground fish processing companies in Shandong are mainly located in coastal cities like Qingdao, Yantai, Weihai and Rizhao. Therefore the following data of Shandong province are based on the interview and survey work in these areas. Most of the processing industry in Liaoning locates in Dalian. Therefore the data of Liaoning is based on the field work in Dalian. We analyze the production from the aspects of the import of raw fish, the export of the final processed products, the processing cost and the quality control, respectively.

4.1 Import of raw fish

According to our investigation, the industry imported raw fish including cod (Atlantic cod and Pacific cod), haddock and pollock from main resources

countries of whitefish in the world. The import shares of both species and the resource countries have little changes in recent years.

The dominant share of the raw fish is pollock, followed by cod (including both Atlantic cod and pacific cod) and haddock. In Shandong province, we got more detailed data. The data show that the imports of pollock in Shandong Province are 72% from Russia, 27% from the US and 1% from Norway (figure 6). 51% of cod is from the US, 37% from Russia and 11% from Norway. Haddock is also processed. 51% of haddock is from Norway, 23% from Russia, 15% from Iceland and 10% from the US.

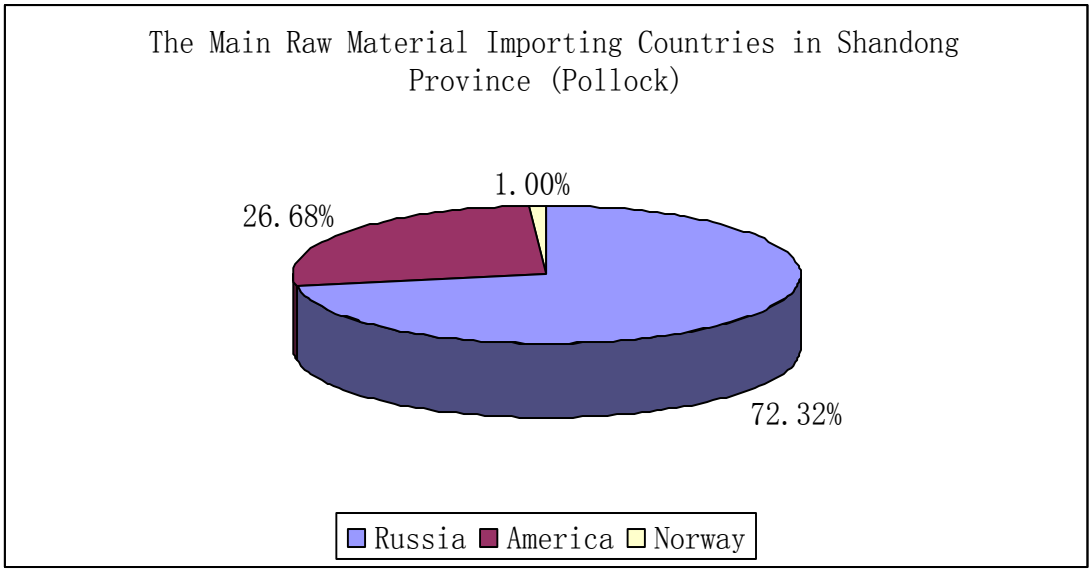

Fig. 6. Main Resources Countries of Pollock in Shandong Province

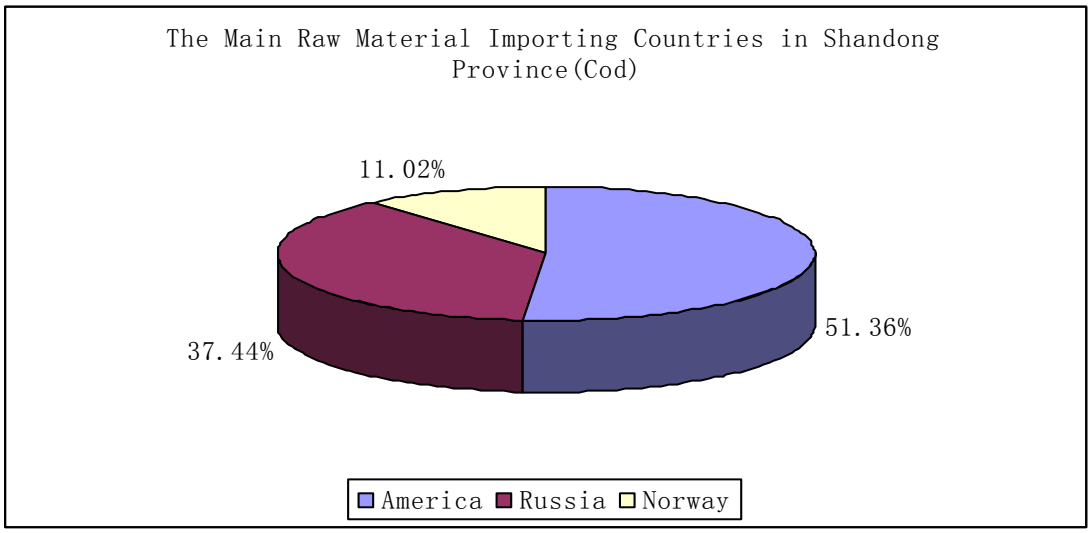

Fig. 7. Main Resource Countries of Cod in Shandong Province

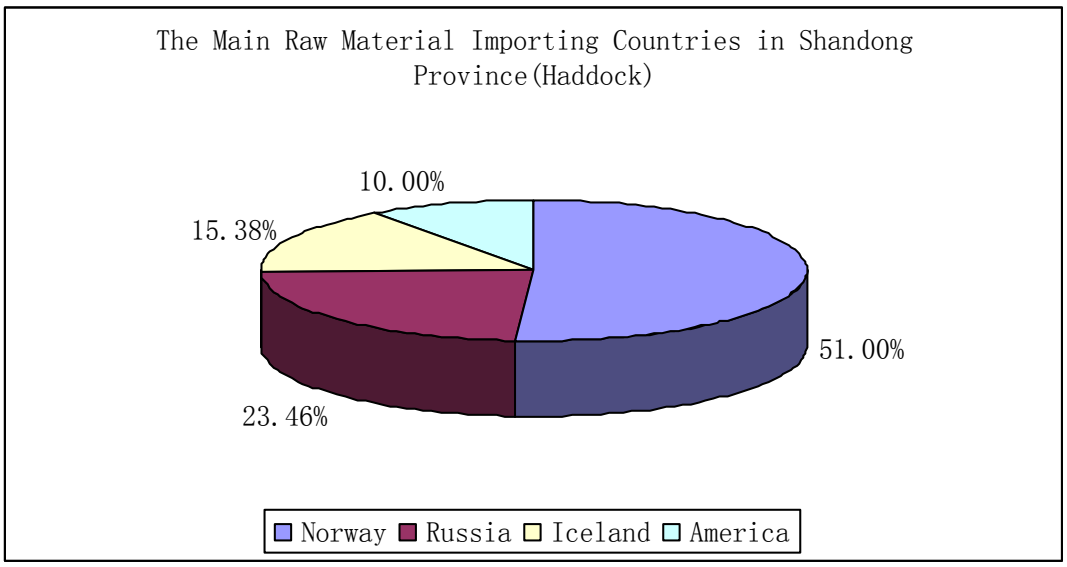

Fig. 8. Main Resources Countries of Haddock in Shandong Province

Similarly to that in Shandong provinces, the industry in Liaoning province imports raw fish of pollock and both Atlantic and Pacific cod from Russia, haddock from Norway and Iceland, Atlantic cod from the US and pollock from Japan (figure 9). Also the same with that in Shandong province, pollock is the main raw fish processed in Liaoning

area, which makes Russia is the most important exporter of raw fish to Liaoning province. Figure 10 presents that export share of Russia, the US, and Norway. They are 72%, 24% and 4% respectively.

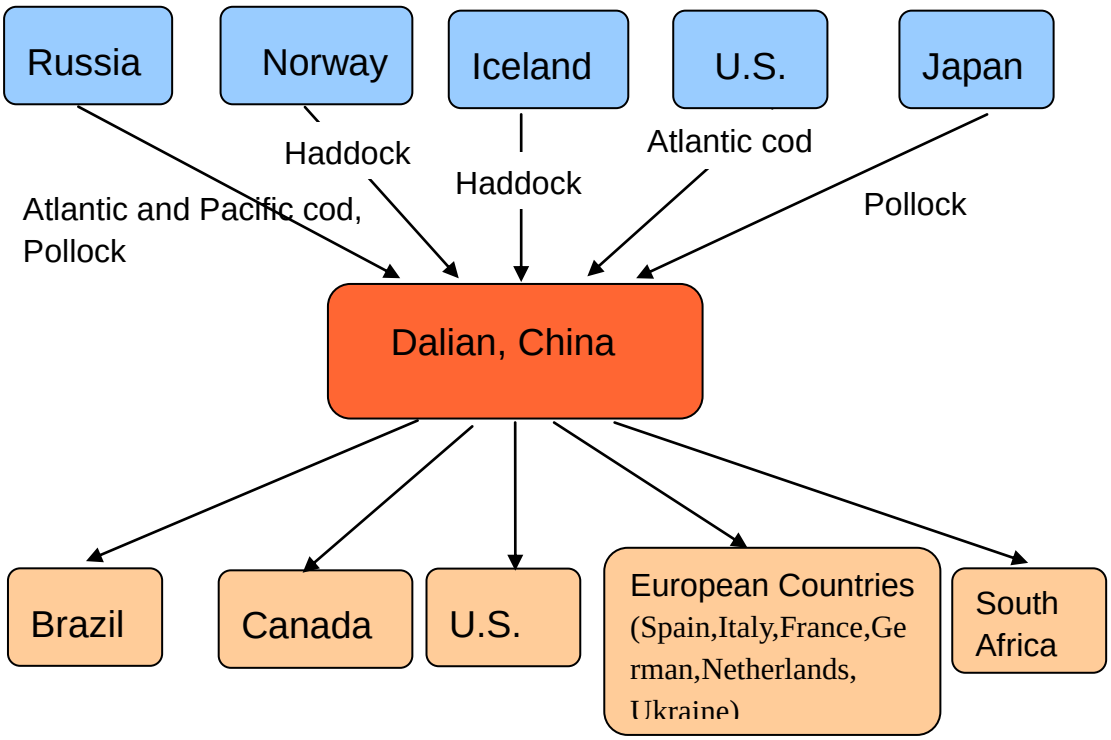

Fig. 9. Trade Flow of Whitefish Processing in Liaoning Province

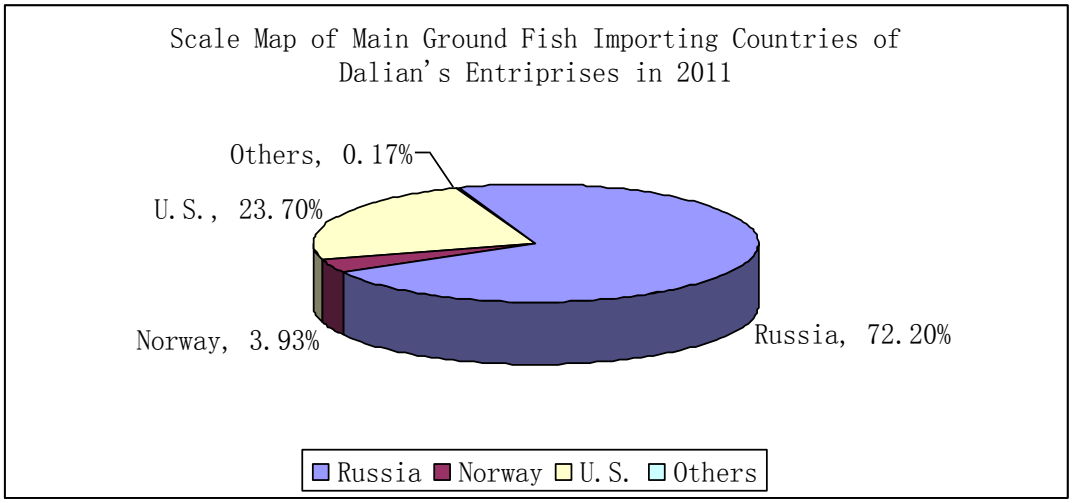

Fig. 10. Main Resources Countries of Whitefish in Liaoning Province

4.2 Export of processed products

The products processed in Shandong province are mainly exported to the EU[3] (not including Spain), the US, and a small amount of the products are also exported to Japan and South Korea, Brazil, and Spain. These markets have share of 55%, 29%, 3.8%, 2.6% and 2.3%, respectively (Fig.11). Obviously, the EU and the US are the two most important demand markets for the industry in Shandong provinces. Adding the market shares of these two markets, it yields 85%.

However, this is quite different for the industry in Liaoning province. Although the US and EU are still important markets for the industry, export to Brazil is bigger than export to EU, similarly to share of the US (Figure 12). During the workshop in Qingdao, July 2012, the managers from industries in Qingdao area mentioned that there are more small companies in Dalian area. Those small companies might have problem of capital flow and also have relatively short-term interests. When the demand from the EU and the EU declines significantly due to the Economic Crisis after 2008, these small

[3] Spain is separate because some of the project members were early involved in another project relevant to Spanish salted fish demand. The information got from that project is that there is a growing share of fillets processed in China and re-exported to Spain.

industries have tried to sell their products to the Brazil market, where the demand is still growing. Although large companies in Qingdao would like to stick to the EU and US market, where they have long relation with the buyers and price is well paid for quality products, they probably have to expand the Brazil market too if the EU and US market will not improve in the short time. In general, they mentioned that the price paid is lower in Brazil. At the same time, the quality required is also low.

However, Brazil cannot be a solution to replace the EU and US market. During our survey, many companies reflected that because the Brazilian currency continued to be depreciated, the export of many small and medium-sized companies in Zhuanghe of Dalian, which mainly exported to Brazil, was reduced. More than 4000 tons of whitefish products were overstocked in the plants. In order to reduce loss, many companies sold their stocks either to domestic market or fought each other in the overseas market. In addition, due to the low standard of quality requirement in Brazil market, many companies paid more attention to the quantity rather than quality, the export prices were thus reduced at the same time, which hurt other companies who want to sell good quality product with good price.

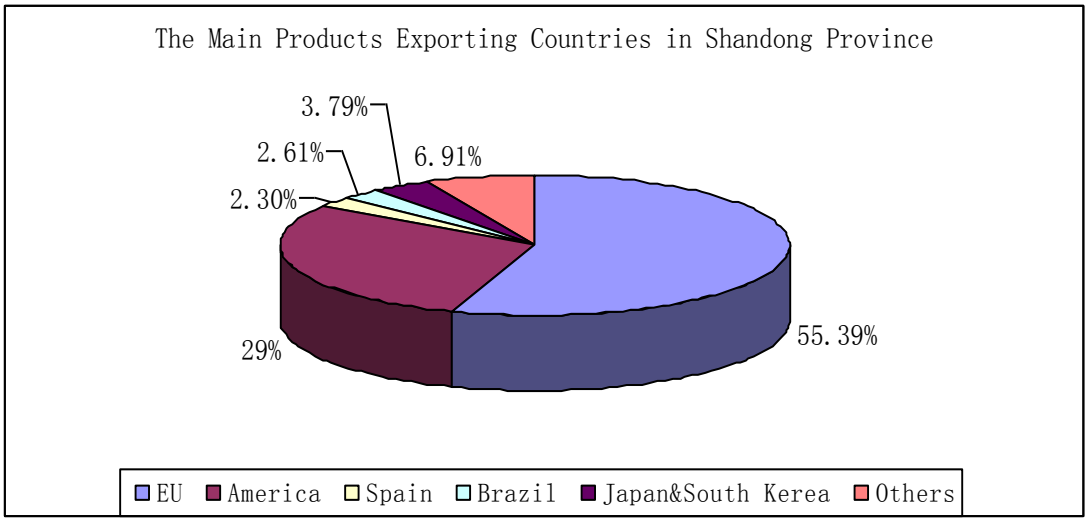

Fig.11. Main Destination Markets in Shandong Province

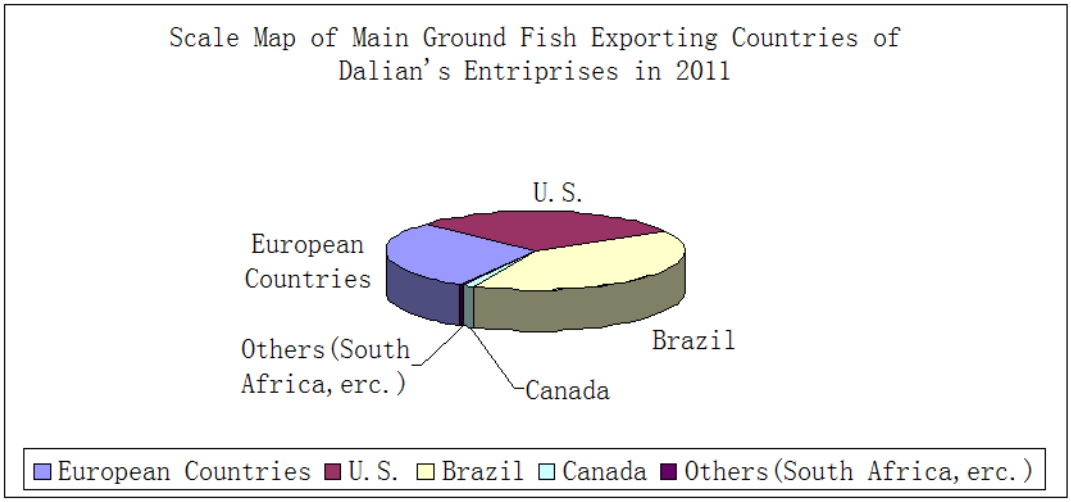

Fig.12. Main Destination Markets in Liaoning Province

4.3 The processing cost of white fish

The prices of raw material change greatly in every season and every year. According to different species, different product forms and different qualities required from the destination markets, the export prices vary from 5% to 30%. Nearly all the companies produce the fillets, pieces, frozen fillets and portion cut. In general, the price of fillet is the highest, and the price of frozen piece is higher than frozen block. Many of the companies process the exact products according to their clients' requirements. Out of these 20 companies visited, only several produce salted fillets (including light salted fillets) and smoked fillets, the dominant share of processed product is frozen fillet.

Compared to 2010, export prices of 2011 slightly increased. Since the major export product is frozen fillet, prices presented in table 3 is the average prices of these two years based on our field in Shandong and Liaoning, and the communication in the workshop in July, 2012.

Since the quality of raw fish is the lowest for pollock and highest for Atlantic cod. Thus, as shown in table 3, the prices of pollock are the lowest and Atlantic cod are the highest. Cod and haddock prices are double of Alaska pollock prices. The companies also mentioned, even for the same species of cod, the Russian price is $50-100 / T lower than that from Norway. However, if

the price margin is not big, the industry still would like to import cod from Norway, for the Norwegian fish is better treated during landing and freezing and the yield rate of frozen fillet is therefore relatively higher than those from Russia. The companies in Dalian also mentioned American companies would like to provide raw fish by themselves, ask them to process the exact products they asked and buy the final products afterwards. The companies in Dalian charge a reasonable processing cost.

Table 3 Import Prices of Whole Fish and Export Prices of Frozen Fillet

	Import price（$/T）	Export price（$/T）
Pacific cod	2350——2800	4400——5000
Atlantic cod	2500——2900	4500——5000
Haddock	2400——2500	4000——4500
Pollock	1300——1400	2400——2600

The yield rate from whole fish to frozen fillet varies with the types of raw materials and products. In general, the yield rate of raw fish without heads and entrails is about 8% higher than that of with heads and entrails ones. Yield rate of pollock is 5% lower than that of cod, and the yield rate of Pacific cod is about 2% lower than that of Atlantic cod. The companies visited suggest pollock's yield rate is 67%-72%, cod is 75%-80%, and the average rate is 70%. This high yield rate is largely due to manual filleting, instead of machine filleting in the most developed countries.

Although the labor cost increased a lot in the last years, the companies still use workers rather than machines. The reason is that the yield rate by machine is much lower than that by workers, and the machines can't process perfectly. For example, the machines can't remove the skins and bones completely, so the industry has to use workers to clean them for a second time. During the workshop, the mangers mentioned a couple of big companies are trying to

replace some of manual work with machine, but not many. They do not think they will replace machine with manual in a large scale in a short time.

A common processing procedure for whitefish is: unfreeze — cut open— pick the main thorn — pick lateral spines — peel — check worm — wobble — freeze — weigh — cut — reshape — sectional specification — weigh — plate ice coat — package — chilled frozen.

Throughout the above processing process, the cost includes water and electricity, wage, quality control and management, low-value consumables (e.g. knives and gloves), depreciation of machine, transportation and customs control (figure 13).

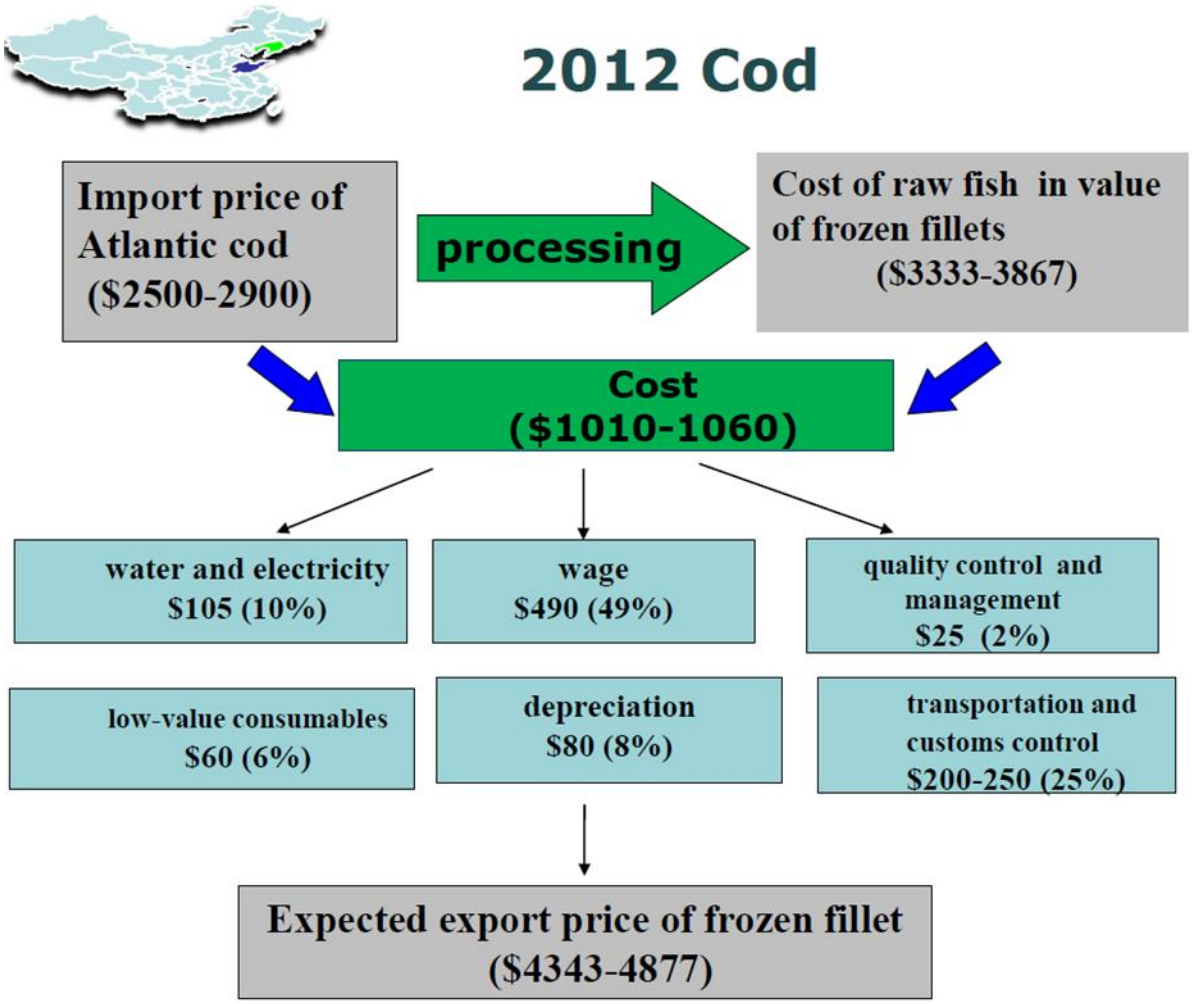

Fig.13. Map of Cost Structure in China (cod)

Figure 13 presents the cost structure of Atlantic cod processing in China in 2012. As we discussed, the average import price of Atlantic cod is $2500-2900/ton (raw fish). We take an average yield rate of 70%. It means to produce one ton of frozen fillet, the cost of raw fish is $3333-3867. The total processing cost of processing one ton frozen fillet in China is $1010-1060/ton, which include $105 for electricity, $490 for wage, $25 for the quality control and management, $60 for the low-value consumables, $80 for the depreciation, and $200-250 for the transportation and custom control. Among them, it is evident that wage is the largest cost. It account for 49% of the total cost. Adding up the cost of raw fish and processing, the expected price of one ton frozen fillet should be $4344-4877 in order to cover the total costs. Otherwise, the industry will lose money. Referring to the export price of frozen fillet of cod presented in table 3, the actual price provided by the industry visited is $4500-5000. It means the industry has an average profit margin of $150. This is exactly what the mangers of the industry mentioned when we had workshop in Qingdao in July 2012. A profit margin of $150 is too tiny to account for the possible production and market risks. Obviously, as mentioned by all the companies visited, Chinese processing industry is facing a huge challenge now.

The situation for Alaska pollock is even worse. Similarly we presented the cost structure of pollock in figure14. The import price of the average import price of pollock is $1300-1400/ton (table 3). Again, we take an average yield rate of 70%. It indicates to produce one ton of frozen fillet of pollock, the cost of raw fish is $1733-1867. Since the industry uses the exact same production line to produce both pollock and cod fillets, the total processing cost to produce one ton of pollock fillet is the same to produce one ton of cod fillet. It is $1010-1060. Adding up the cost of raw fish and processing, the expected price of one ton frozen pollock fillet should be $2743-2877 to cover the costs. Again, referring to the export price of frozen fillet of pollock presented in table 3, the actual export price provided by the industry visited is $2400-2600. It means averagely, the industry loses $250 per tons to produce pollock fillet. As mentioned by the managers of the industry during the workshop, the companies were losing money. However, they had to keep some production in order to keep the machine and skilled workers. They looked forward to better demands

from the EU and US markets in the next years.

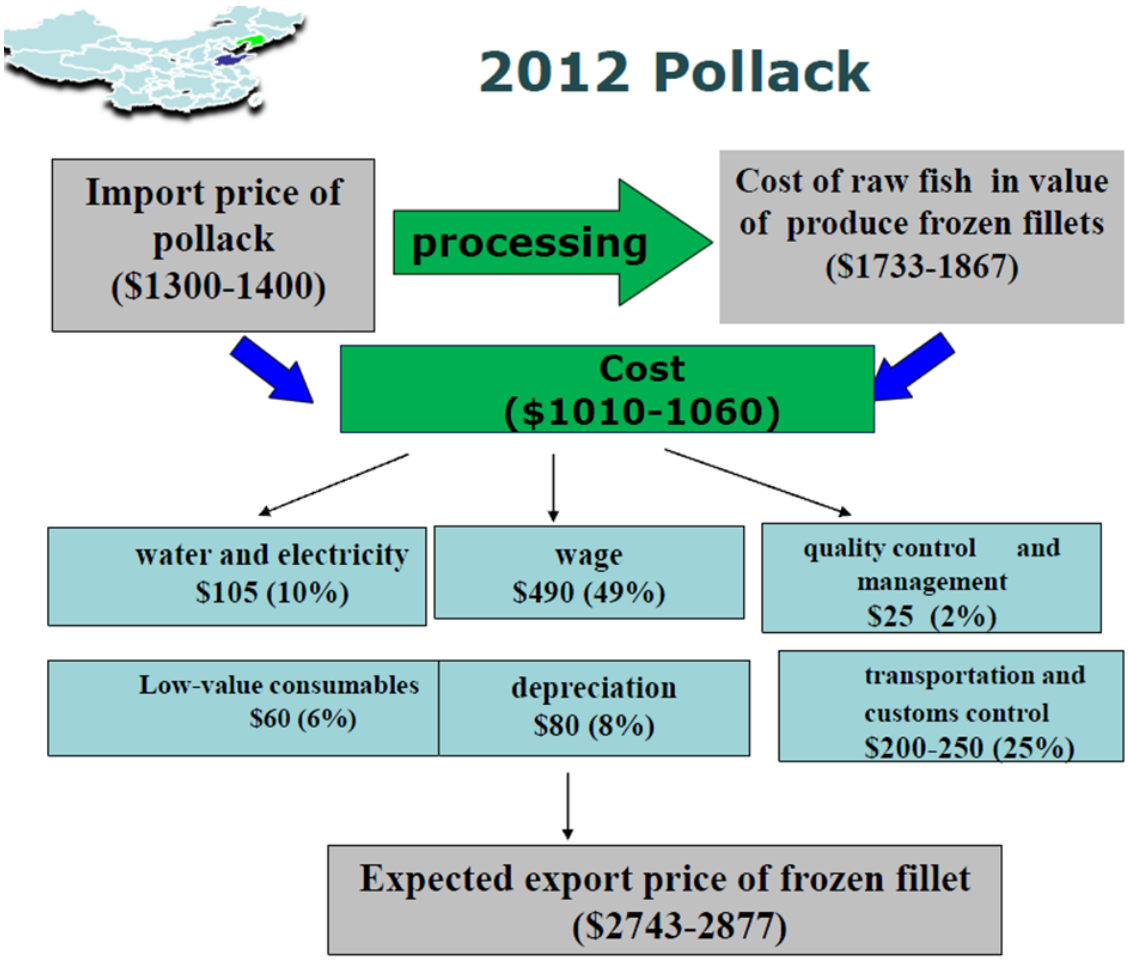

Fig.14. Map of Cost Structure in China (pollock)

Although the recovering of the destination market will help the industry getting a better situation in the future, however, the Chinese processing industry has to face a problem of growing wage cost so far as China's economy is growing.

Figure 15 and 16 present the growing wage costs suggested by the twenty companies in Shandong and Liaoning that we have visited during the field work. Both figures indicate a significant growing of wage in last 5 years. The average growth rate is 20% annually. The growth rate in 2011 and 2012 is around 30%. As we mentioned, the comparative advantage of China processing is manual work based on the cheap labor cost. If the China economy is keeping growing, the wage will grow definitely alongside the growing economy. Moreover, as a result of One-Child policy, the total man power will decrease substantially. In that case, the processing industry is losing its conventional advantage.

During the workshop, all the industry mangers realize the increasing wage cost will be a problem in the future. However, they are still optimistic. They argued that the comparative advantage of the Chinese industry is far more than cheap labor. The clustered industry zone with good ports, logistics, flexible production line and Chinese industry entrepreneurship are also advantages. These advantages will make the industry last for a long time. One manger mentioned that they have actually opened a plant in Vietnam. Although the wage cost there is much lower, the poor infrastructure and bureaucracy make it better to have production in China than in Vietnam.

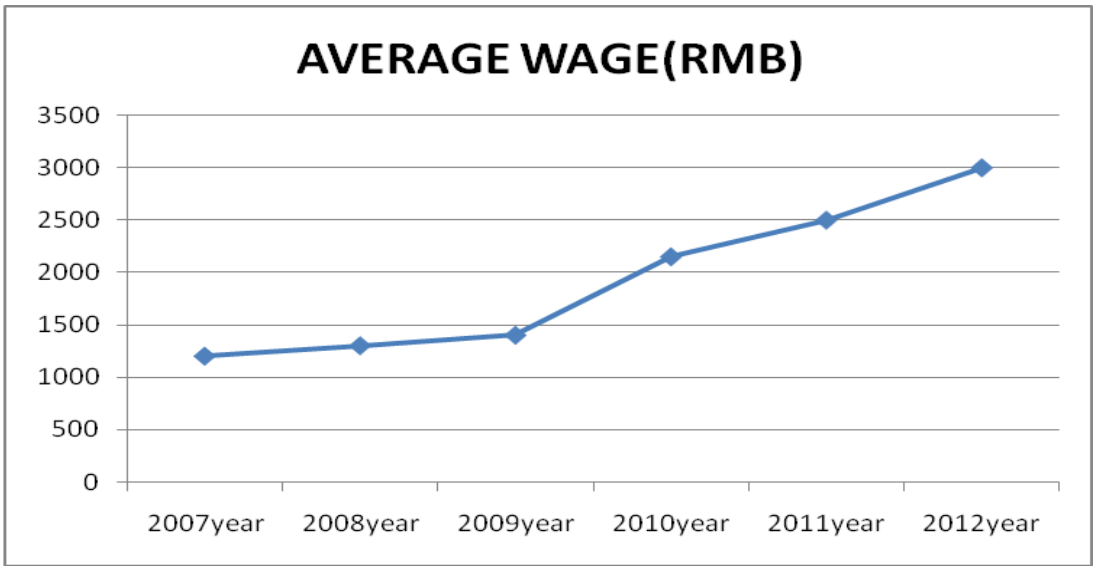

Fig.15. The Trend of Workers' Average Wage in Aquatic Product Processing Companies from 2007 to 2012 in Shandong Province

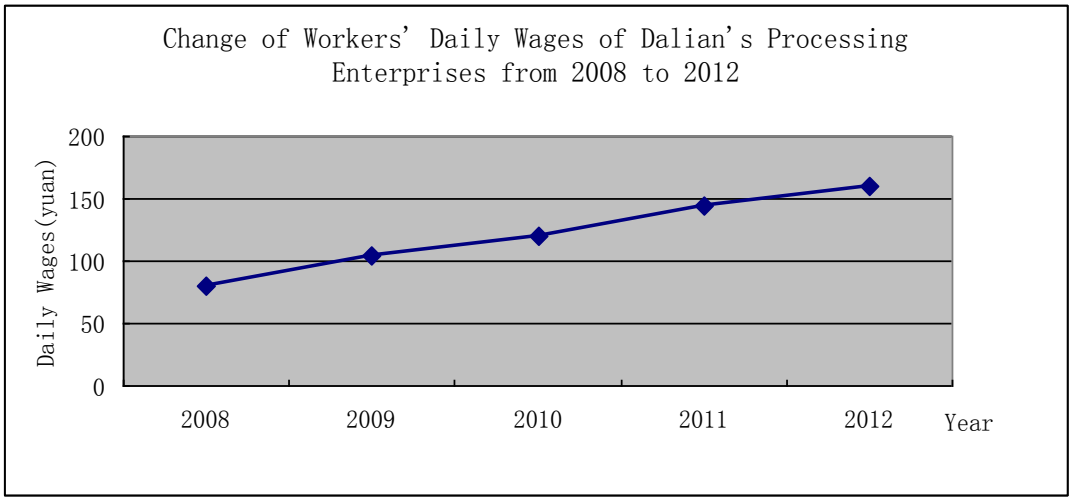

Fig.16. Change of Workers' Daily Wages of Dalian's Processing Companies from 2008 to 2012

4.4 Quality control

The problem of the possible additives used in Chinese processed products is widely discussed in the western world. The accurate information of quality control is difficult to get due to well understandable reason. The information what we get during our investigation are follows.

All the visited companies have these following certificates: Chinese ISO, American HACCP and FDA, English BRC, and MSC. Several companies also have French IFS, OHSAS18000, HALAL and IUU certification of Brazil. In general, every company has all the certificates that the importing countries require.

The companies in Qingdao mentioned that they don't add the additives, because the raw materials' quality is very good, the Chinese Commodity Inspection Bureaus have a quite strict additives control and the EU does not allow the imported products to have additives. However, sometimes the

products exported to America can be added additives, for example, America allow to add small amount of sodium tripolyphosphate in order to keep moisture and don't let products become dry. However, it cannot exceed a standard amount. Sometimes American clients ask Chinese companies to add some recognized additives.

The companies in Dalian mentioned that in general, companies don't use additives, but sometimes they will determine whether to add the chemical composition according to the specific requirement of clients. Some clients may require adding water retaining agent (polyphosphate), but the amount must be limited strictly, say, approximately 0.5%. In addition, some European countries allow adding citrate, but the citrate must be imported from Europe which has strict additive control. The citrate is a taste improver which has no phosphorus and can make meat crisp.

5. Concluding remarks

Based on the above analysis, we conclude our main findings as follows:

a. There exits the overcapacity problem in the Chinese processing industry.

b. Small companies began to collapse, which makes the total numbers of the industry decline.

c. More value added goods are processed in China and exported from China.

d. Some of the processed products begin to leave in the domestic Chinese market.

e. Shandong (Qingdao) and Liaoning (Dalian) areas are the main whitefish processing sites in China.

f. The whitefish processing industry in Qingdao and Dalian import raw fish from Russia, the US, Norway and Japan and export the processed frozen fillets to the EU, the US and Brazil. The EU and U.S. are two conventionally most important demand markets for Chinese products. However, the orders from these two markets decline significantly these years due to the Economic Crisis.

g. The industry in Dalian exports more products to Brazil compared to that in Qingdao. However, Qingdao industry has to expand their market to Brazil too due to much less order from the EU and U.S.

h. Since a part of companies produce exact products according to the specific requirement of the order, the exact product forms and cuts, and the question of whether the products have additives or not depend on the specification of the orders. In general, all the companies have the quality control certificates issued by the specific countries.

i. Although wage cost has increased by 20-30% annually, the industry suggests that the main challenge is less demand from the EU and US. So far as no country can replace the production of China, the buyers will cover the increasing wage cost.

j. The mangers from the industry in general do not agree that the other countries like Vietnam can replace the position of China in a short run. Although these countries have lower wage cost, lower efficiency in these countries greatly offsets the benefit from lower costs. They emphasize the comparative advantage of the Chinese processing industry is not only low wage cost, also the industry cluster, the well-developed infrastructure and logistics, and not the least, the flexibility of the production and the industry entrepreneurship.

References

China Fishery Statistical Yearbook

http://www.askci.com

http://maps.google.com/