

Research on the Application of Crab Culture in the Development of River Crab Industry of Shanghai

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Abstract

River crab is a unique aquatic product in China. As a kind of food with high nutrition, delicious and intriguing, it is deeply loved by the majority of consumers. At present, the research on river crab mainly focuses on the breeding techniques, neglecting the important role of crab culture in the development of industry. Taking crab culture as the breakthrough point, the author analyzes the connotation of crab culture and the current situation of the development of Shanghai river crab industry through literature review and field investigation, and then analyzes the strengths, weaknesses, opportunities and threats of the application of crab culture in the development of Shanghai river crab industry by using SWOT model. Based on this analysis, the author puts forward some ideas about the application of crab culture in the development of Shanghai river crab industry. It is expected to promote the sustainable development of river crab industry in Shanghai through the application of crab culture.

Keywords

crab culture, river crab industry in Shanghai, application

1. Introduction

River crab, scientific name is the Chinese mitten crab (*Eriocheir sinensis*), commonly known as hairy crabs, is a unique aquaculture species in China. Chongming Island in Shanghai, located at the estuary of the Yangtze River, facing the river on three sides and bordering the East China Sea on the southeast, is the cradle of crab seedlings. It has special hydrological characteristics of the transition of salty and fresh water and is the place where crabs breed. Every autumn,

adult crabs growing in inland fresh water move along the river to the Yangtze River Estuary, mating at the junction of salt and fresh water. The coastal wetlands of Chongming Island are their 'wedding bed'. Fertilized female crabs live in shallow sea. The female crabs returned to the Yangtze River Estuary in the spring of the following year and the fertilized egg begin to hatch and grow into crab seedlings (*megalopa*) in the coastal waters of the Yangtze River Estuary. At this time Chongming Island is the natural breeding ground for river crabs in the Yangtze River Basin. The megalopa becomes juvenile crabs after molting, and began to go upstream along the Yangtze River Estuary. In the process of migration, individuals leave the group at any time to live in suitable rivers, lakes and other waters. The young crabs that settled down have reached sexual maturity after two years of fattening before they began to migrate again.

River crab is called 'three high' food, that is, high nutrition, high delicious and high intriguing food (Qian & Liu, 2002). The nutritional value of the river crab is extremely high. Every 100g edible part of the river crab contains 17.5g of protein, 2.6g of fat, 2.3g of carbohydrate, 126mg of calcium, 26mg of phosphorus, 2.9mg of iron, vitamin A, vitamin B, vitamin E, micro-cholesterol and more than ten kinds of free amino acids (Cheng, 2009). As the saying goes, 'the rest of the food was boring when the crab got to the table', that is say the delicious of crabs. The crab is nacarated when it is cooked. The color is very nice and exudes a unique fragrance so that people cannot suppress the desire to eat. Crabs have four flavors: foot meat, filament long and beautiful as whitebait; chela meat, filament short and taste like scallop; breast meat, white crystal and like whitefish; crab ovary and digestive glands, fragrant glutinous delicate and mouthful of fat (Zhao, 2004). There are three reasons why crabs are fun to eat: The first is the fun of creation. Crabs looks strange and ferocious, but once cooked, it becomes a lovely food, white like jade and yellow like gold, making the color, flavor and taste reach the peak. This contrast aroused people's interest. The second is the fun of eating. In general, the food is served on the dining table when it is ready and can be eaten in the mouth with chopsticks, but except crabs, you need to dislodge bad and take fine, shelling and eat meat, according to the order to eat, by the labor to pleasure. The third is the interest of chanting crabs. There are thousands of years of crab-eating history in China, which accumulated a lot of poetry and anecdotes about crabs, like 'Crab Fahai'¹, and we talk and chant when we eat crabs together, which add a lot of joy.

The utilization of river crabs has great potential. At present, the research on river crab is mainly based on technical research. This paper mainly from the crab culture as the breakthrough point, analyzes the current development of crab culture and Shanghai river crab industry, and use the SWOT analyzes its strengths, weaknesses, opportunities and threats. And then, we put forward some ideas about applying crab culture and boosting the development of Shanghai river crab industry.

2. Methods

Literature review and qualitative research are combined. The researchers consulted journals, books, papers, websites, government publications, such as poetry collections, official statistics, newspapers to learn more about the subject matter. Through collected, distinguished and sorted out the literature, the connotation of crab culture has been summarized. In addition, the researchers went to the Chongming District of Shanghai to conduct research in the form of household interviews and field visits, collected relevant information and analyzed the current situation of the

development of the Shanghai river crab industry, and then used the SWOT model to analyze the survey results. On this basis, the ideas of the application of crab culture in Shanghai river crab industry were put forward.

3. Results and discussion

3.1 The connotation of crab culture

As a kind of aquatic product, river crab is not only rich in nutrition, but also rich in deep cultural heritage. Crab culture refers to the formation of the material and spiritual results in the practice process of understanding and use of this kind of crustaceans. Mainly include people understand river crab, fishing river crab, river crab trade and diet, and the crab fishing gear, edible method, product concept, market characteristics, anecdotes, legend, fables and customs, and crab folk songs, fishing songs, poetry, prose, novels, calligraphy and painting, song and dance, sculpture, music and so on. Sometimes focused on the crab customs, diet, literature, art and other spiritual content.

Zhu (2000) summed up four names, four delicious parts and four uneatable parts of crabs from many previous sources. Zhao (2004) believed that crab culture generally refers to people's understanding of river crab, including their use, and even the formation of an industry. Qian (2007) believed that the spiritual and material achievements formed during social practices can be called crab culture. Zhu (2006) roughly divided the crab culture into three levels: crab's regional culture, crab's eating culture and Crab's chant culture. Crab's regional culture mainly based on the production of a certain area of crabs, combined with the shape, taste and food of crabs to introduce, praise and expresses their feelings. Crab's eating culture refers to the crab made into a variety of food, and know how to properly eat crabs. Crab chant culture is about crab poetry, painting and other works of art.

3.2 The development status of river crab industry in Shanghai

The initial stage of the development of Shanghai river crab industry was mainly small-scale dispersal cultivation, mainly fishing or breeding crab seedlings for sale, and a small amount of adult crabs bred in the city, mainly to the local market sales. This small-scale and dispersal cultivation model made it difficult to give full play to the resources superiority of river crab in Shanghai, and the development potential of the river crab industry was limited. After the 1990s, the development strategy of two ends inside and one end outside was implemented, that is, crab seedlings and commodity crab market in the city, while adult crabs breeding outside the city. This approach not only played the resources superiority, aquaculture technology and capital investment of Shanghai, but also played the advantages of other province's ecological lake resources and cheap labor, which promoted the two places' resources advantages complementary and common development (Yuan, 2010).

According to the data provided by the Shanghai River Crab Industry Association, the basic situation of the development of Shanghai river crab industry in 2016 are as shown in Table 1. The total area of the city's river crab breeding is about 23,000 acres, of which about 8,000 acres are bred in the city and about 15,000 acres are bred outside the city. The city river crab breeding is mainly distributed in Chongming District, Songjiang District, Baoshan District, Qingpu District and

Jinshan District, and outside the city river crab breeding are mainly distributed in some lakes in Anhui Province, Shandong Province, Jiangsu Province, Zhejiang Province and Qinghai Province. The total production of river crabs in the city is 9253 tons, accounting for about 3% of the total output of the city's aquatic products, but the annual output value of the river crab is about 750 million, accounting for about 14% of the total fishery output value of the whole city. The per capita net income of fishermen in the city is 26,321 yuan, an increase of 9.92%. This shows that Shanghai river crab industry is a potential industry in Shanghai fishery industry, and plays an important role in adjusting rural industrial structure and promoting farmers' income. At present, Shanghai river crab industry has been initially formed a set of seed crabs, breeding, processing and sales for the integration of industrial chain, while driving the catering, ecommerce, logistics, feed, pharmaceutical and other industries to contribute to the development of regional economy.

Table 1. Basic situation of the development of Shanghai river crab industry in 2016

Total area of cultivation (mu)		Distribution area	Annual production (tons)	Annual output value (billion yuan)
Inside the city	Outside the city	Chongming District, Songjiang District, Baoshan District, Qingpu District, Jinshan District	9253	7.5
80,000	150,000			

Source: Provided by Shanghai River Crab Industry Association.

3.3 SWOT analysis

3.3.1 Strengths

1) Chinese people have a long history of eating crabs and crab culture is profound

Chinese people eat crabs for a long history and the earliest records can be traced back to the Western Zhou Dynasty. In *Rites of Zhou*, there was a record of Emperor Zhou eating crab and crab sauce (Xu & Chang, 2014). During the Wei and Jin Dynasties, eating crabs, drinking wine, appreciating chrysanthemum and composing poems have become a kind of pleasure. From the words of Bi Zhuo, "one hand holding crab claws, one hand holding a glass, swimming in the wine pool and life has been satisfied." (Fang et al., 1974) We can see that the Jin Dynasty had taking crab eating as an elegant thing. After the Southern and Northern Dynasties, there was a way to eat the sugar crab. In the Tang and Song Dynasties, the pickled crab and the spirits steeped crab had become tributes, which were recorded in the *Crab Spectrum* in the Song Dynasty (Fu, 1985). People in Yuan Dynasty love to eat boiled crabs, but people in Ming and Qing Dynasties pay attention to eating steamed crab and pickled crab, which has been popular till now.

As early as the Ming Dynasty, skilled craftsmen created a set of exquisite crab-eating tools. According to the *Kao Chi* records, the Ming Dynasty initially created the crab-eating tools, like hammer, small square table, tong, hatchet, spoon, fork, scraper and needle, which were called 'eight crab-eating tools' (Zhu, 2005). These tools were generally made of copper, and elegant with silver. The craftsmanship was very sophisticated. When eating crabs, put the crab into the lotus-shaped plate first, and beat the whole part of the crab with the hammer, then split the crab shell with the hatchet, and cut

off the chelate and foot with the scissor, then take out the fresh crab meat with the tong, fork, scraper, and needle separately. Crafty crab-eating tools greatly improved the taste of eating crabs.

2) Superior natural conditions and suitable for crab breeding

To become a famous river crab producing area requires the following conditions. The natural conditions are superior and there must be large tracts of wetlands, and natural crab seedlings are rich and close to rivers, then the economic and cultural prosperity, which has a long history and cultural accumulation and a broad market consumption base (Wang et al., 2007). Shanghai has the conditions to produce good crabs. Shanghai located in the eastern edge of the Yangtze River Delta, which is the center of the north and south coasts of China. The Yangtze River enters the sea from here, and it has convenient transportation and vast hinterland. The economic and cultural prosperity and the geographical location is superior. Chongming Island in Shanghai is the third largest island in China, located in the Yangtze River Estuary and rich in natural crab seedlings resources. It is suitable for crab growth and reproduction, also known as 'Crab Island'. Chongming Island is full of rivers, abundant in water and grass, and rich in aquatic organisms, such as snails and clams. It is a natural animal bait for crabs, which provides a good ecological environment for the growth of river crabs.

3.3.2 Weaknesses

1) Weak cultural innovation awareness and lack of features

The rich crab culture resources left over from history were merely an intangible commodity. Only relying on high-tech and market demand, reforming and innovating the crab culture products with tangible features and competitive advantages through diversification management, it can promote the development of river crab industry. But for now, crab products in China are still mainly on fresh sale, the development and utilization of crab culture resources rarely, and lack of deep processing. The added value of crab products has not been well developed and improved, which seriously restricted the balanced development of the river crab industry. Shanghai river crab industry is also the same situation. Although the Shanghai Baodao crab research institute has developed crab products, which is the first in China to carry out the deep processing of crab meat products, the product type is still single and the output is low. It cannot meet the diverse demands of Shanghai people's diet, and the added value of the river crab product is not high.

2) Weak brand awareness, and low degree of scale

According to on-the-spot investigation in Chongming District of Shanghai, the result of communication with local farmers shows that the cultivation of river crab in Chongming District has always been based on the family retail farming mode, but has not formed the scale effect. In recent years, with the great efforts and support of the government, although a certain number of professional cooperatives have been set up for the cultivation of river crabs, they have not really formed leading enterprises or professional cooperatives that have the leading role in the industry. As a result, standardized breeding techniques are difficult to implement, the quality of commercial crabs is mixed, the brand construction is separate, and the resultant force of the development of river crab industry is difficult to form, which hinders the rapid and healthy development of river crab breeding industry in Chongming District (Ma & Gao, 2015). In addition, in terms of scale and the brand, the crabs in Shanghai cannot be compared with those in Yangcheng Lake. Yangcheng Lake is a famous production base for hairy crabs at home and abroad. If there is no special explanation, what people call hairy crabs usually refers to Yangcheng Lake hairy crabs. Shanghai's unique Chongming hairy crabs are obviously less famous than Yangcheng Lake hairy crabs.

3.3.3 Opportunities

1) *The government's attention and support, and industry association's help*

Shanghai Agriculture Commission and the relevant departments attach great importance to the development of Shanghai river crab industry. Leaders have visited the breeding base for many times, and held many meetings to listen to and discuss problems encountered in the process of river crab breeding. The attention and support of the government departments have provided a good environment for the development of the river crab industry in Shanghai. Industry associations also have an important influence on the development of crab industry. Industry associations can allocate funds, organize farmers to carry out technical trainings, establish breeding demonstration areas, and hold crab technology promotion activities and breeding experience exchange activities to promote intra-industry information flow and technical exchanges (Liu & Zhang, 2016). Since its foundation of the river crab industry association in Shanghai, relying on the advantages of Shanghai crab seedlings resources, river crab industry has become bigger and stronger. The industry association takes the industrialization of Shanghai river crab as a goal, adheres to the development in the city and the development out of the city simultaneously, and gives full play to the function of providing guidance, coordination, services and self-disciplines, and unites the majority of Shanghai crab enterprises and crab households to make a positive contribution for the development of Shanghai river crab industry.

2) *The market is broad, and atmosphere of crab-eating is strong*

Shanghai is not the largest breeding base for river crabs in China, but it is the largest consumer city of river crabs in China. People in Shanghai like to eat crabs, whether it is for the historical tradition or the actual situation. Shanghai is the leading city to consume hairy crabs all over the country. More than this, Jiangsu and Zhejiang area have been the major consumption areas of hairy crabs since ancient times. After the media continued to publicize the hot speculation, the hairy crab is not only a pure seasonal food, but also a representative of gifts and identity. In the cities that did not have the habit of eating crabs, the hairy crab stores have gradually increased. In addition, with the improvement of living standards, people have more and more demands on the environment of eating crabs. They are increasingly pursuing a spiritual enjoyment, which has led to the development of many unique places for eating crabs. For example, the Baodao Crab Village in Chongming District of Shanghai, the design of this small crab village is particularly exquisite. It has not only beautiful environment, but also crab culture museum. The museum has four exhibition areas: crab history culture, crab popular science culture, crab experience culture and crab eating culture. The four exhibition areas allow people to have a fuller understanding of crabs before eating crabs, and this is a humanized design for people who can't eat crab.

3.3.4 Threats

1) *Many brands of river crabs, and the market competition is fierce*

There are many hairy crabs' brands in aquatic products markets. Such as Yangcheng Lake hairy crabs, Hong Gao hairy crabs, Baoying Lake hairy crabs, Junshan Lake hairy crabs and many other well-known brands, which bring greater market competition pressure to promote Shanghai crab brands. Moreover, many hairy crab brands have greater influence in origin, so Shanghai crab brand must face greater pressures when entering the corresponding market. Some hairy crab brands, such as Yangcheng Lake hairy crabs in Jiangsu province, are far more famous than Shanghai's Chongming hairy crabs and Huangpu River hairy crabs. This also puts Chinese mitten crabs in Shanghai under heavy pressures in the market competition.

2) High labor costs

Shanghai is the economic center of our country, and the human cost is higher in this area, which makes the production of the river crab more expensive. The increase of product cost can easily affect the market competitiveness of the product. Therefore, how to control the cost effectively and improve the market competitiveness of Shanghai river crabs is an important problem for the development of the river crab industry in Shanghai.

4. Conclusions and suggestions

4.1 Combing crab culture resources and extracting special elements to build brands

Based on the collection and perfection of the crab poems, crab words, crab books, crab couplets, crab paintings, crab persons and other crab history resources related to crab culture, a set or several sets of historical materials about Shanghai river crab can be compiled to combine with comics, animations, albums, audio and other entertainment forms in a more user-friendly manner presented to a wide range of readers. At the same time, special elements should be extracted from the crab culture resources, combining with modern technology to develop crab products with Shanghai characteristics so as to actively shape Shanghai's featured brands, and apply for intellectual property protection.

4.2 Allocating crab culture resources rationally and developing the leisure tourism routes of river crab industry

Chongming Island in Shanghai is the birthplace of Chinese mitten crab, and it is also the most important provenance base for Chinese river crab. Relying on the advantages of modern transportation and taking advantage of the construction of Chongming International Ecological Island, we should focus on the development of green tourism in leisure agricultural with crab cultural resources as its main content to guide visitors to come close to nature, experience nature and feel the nature, which is in line with the boom of pursuing green consumption and healthy living in contemporary society. Based on the concept of cultural tourism industry and combined with the leisure tourism of Baodao Crab Village, Huichun Crab Village and other places, we should propose a feasible plan for crab culture tourism and realizes the interaction between crab culture and tourism, which can enrich the cultural connotation of river crab and enhance the comprehensive benefits of river crab industry.

4.3 Strengthen the policy guidance and deepen crab culture atmosphere

Enterprises should give full play to the promotion channels of network media, uniting television, radio, news, and websites to regularly develop plans and materials to promote crab culture. At the same time, the government should formulate relevant policies to guide and support the construction of crab culture bases, standardized processing and production, and characteristic crab culture brands. In addition, we should choose the bustling areas of the city to establish a crab culture exchange platform, and through the construction of the Crab Culture Museum, vigorously

promote the meaning and spirit of the crab culture, so that the Shanghai people can understand the crab culture as a starting point, and establish a distinctive brand to promote the development of crab industry with crab culture and spread it.

4.4 Improving the ability of developing creative products of river crab

To actively integrate into Shanghai's unique human history and rural culture, highlight the local characteristics in the crab packaging design, store design, crab handicrafts and other aspects. This is not only concise, vivid and unique, but also virtually enhances the consumer's attention and lasting impression. In the aspect of food culture, adding the river crab flavor elements and exploiting river crab leisure food are both healthy and flavorful. We should create and make full use of crab shell for the material of drawing text, patterns and other crab crafts which is low-cost, significantly special, and interesting. Integrating crab culture into life can increase the ornamental and interesting taste of products and create a consumption atmosphere. It is of great significance to promote the integration of crab culture industry and daily life.

4.5 Broaden the sales channels of Shanghai river crab and increase its market share

Based on promoting sale in both markets inside and outside of Shanghai, we will continue to integrate and excavate the cultural resources of crabs and expand the public trademark and brand effect of crab products such as Chongming Qingshui Crabs with the characteristic culture of Shanghai. United with the Shanghai River Crab Industry Association, the Industrial and Commercial Bureau, the Radio and Television Bureau and the news media to create a well-known brand product with independent characteristics and ability to adapt to the domestic market consumer demand through the ways of new products promotion, presentations and river crab competitions in influential cities in China. We should encourage enterprises to get involved in the deep processing of river crabs, use modern high-tech to independently research and develop river crab foods with Shanghai-specific brands, and quickly increase the share of Shanghai river crabs in the domestic market from different levels.

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Endnotes

1. Crab Fahai, also known as Crab Monk, refers to the stomach of a crab. The crab fahai comes from the legend of the White Snake. According to legend, the Crab Fahai locked the White Snake into the Leifeng Tower, Taibai Venus obeyed the order of the Jade Emperor to seize the Crab Fahai, under the crisis, the Crab Fahai took refuge in the crab shell.

References

- Cheng, J., 2009. *An empirical analysis on competitiveness and development of Jiangsu hairy crab industry*. Nanjing Agricultural University, Nanjing.
- Fang, X.L., 1974. *Book of Jin*. Zhonghua Book Company, Beijing.
- Fu, H., 1985. *Crab Spectrum*. Zhonghua Book Company, Beijing.
- Liu, H.N., Zhang, J.X., Whang, C.H., & Huang, S.B., 2016. SWOT analysis and countermeasure on Shanghai provenance industry. *Journal of Chinese Fisheries Economics*. 34(4):57.
- Ma, J.Y., & Gao, Y., 2015. Current situation, problems and countermeasures of the development of river crab industry in Chongming County. *Journal of Fisheries Science & Technology Information*. 42(4):180.
- Qian, C.S., & Liu, W.X., 2002. *Know crabs, praise crabs and eat crabs*. Heilongjiang People's Publishing House, Heilongjiang.
- Qian, C.S., 2007. *Saying crab*. Shanghai Culture Press, Shanghai.
- Que, Y.Q., & Yang, Z.G., 2012. Ecological farming technology of large scale of river crabs in Chongming County. *Journal of China Fisheries*. 39(2):66.
- Wang, W., Li, Y.S., & Chen, Y.X., 2007. Crab lecture (6) Crab culture. *Journal of Fisheries Science & Technology Information*. 34(6):265.
- Xu, Z.Y., & Chang, P.Y., 2014. *Rites of Zhou*. Zhonghua Book Company, Beijing.
- Yuan, G.L., 2010. Implement trans-regional development strategy and change the development mode of river crab industry. *Journal of Shanghai Rural Economy*. 17(9):13.
- Zhu, Y.X., 2000. Crab culture and wine culture of Wang Baohe. in: Shanghai Society of Food Culture (Eds.), A collection of essays on food culture in shanghai (1996-2006). Shanghai Food Culture Research Society. *Shanghai Society of Food Culture*, Shanghai, pp.284-285.
- Zhao, N.G., 2004. Crab culture and crab industry. *Journal of Fisheries Science & Technology Information*. 31(6):243.
- Zhu, W., 2005. *Kao Chi*. China Renmin University Press, Beijing.
- Zhu, X.X., 2006. On the meaning of Chinese crab culture from ancient poems, in: Shanghai Society of Food Culture (Eds.), A collection of essays on food culture in shanghai (1996-2006). *Shanghai Society of Food Culture*, Shanghai, pp.279-280.