Preliminary Study – Chinese Market for Seaweed and Carrageenan Industry

Final Report

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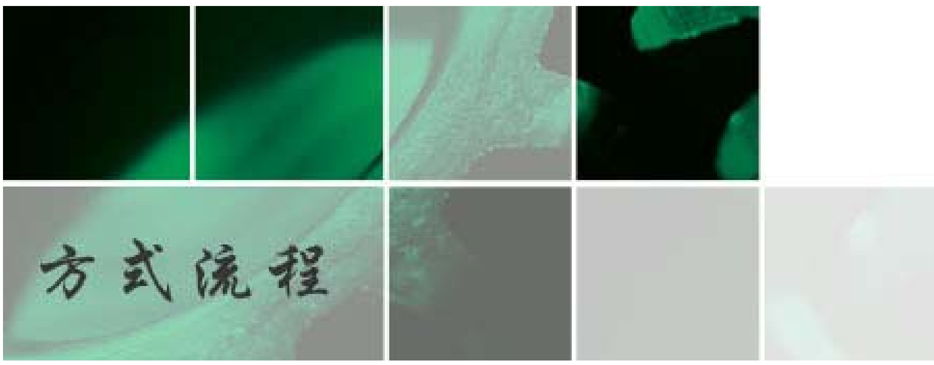

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INTRODUCTION

Project background and objectives

- The International Finance Corporation (IFC), a member of the World Bank Group, promotes sustainable private sector investment in developing countries as a way to reduce poverty and improve people's lives. IFC-Pensa is a technical assistance facility established to support the growth of SMEs in Indonesia.

- Indonesia and the Philippines account for more than 90% of world seaweed production. A preliminary report that looked at global trade of seaweed/seaweed derivatives found that the Chinese market has grown rapidly in the last five years. However, questions remained as to what China is using seaweed/seaweed products for. The main objective of this study is to:

  - Understand the demand and use of seaweed in China, including the size, structure and nature of processing undertaken in China
  - Identify the supply chains from seaweed producers in Indonesia to processors, solution providers[1] and end-users in China
  - Estimate the derived demand and future trends for seaweed requirement in China

Doing market research in China and methodology for this study

- In general, conducting market research in China is different and significantly more challenging than it is in developed countries because of 1) the size and diversity of the country; 2) lack of fully reliable centralized/official information databases; 3) the change is constant and extremely rapid – the whole China economic system is far from equilibrium.

- Therefore a solid market research must be based on multiple resources and activities. The methodology used in this report leverages a combination of resources / activities including:

  - All relevant background information (existing information, interacting with IFC etc.)
  - Secondary research, including several B2B websites and news sources
  - Extensive primary research
    - Factory visits to about 20 carrageenan manufacturers and solution providers

[1] In this report, the term "solution providers" only includes carrageenan-blended solutions

- Visit to food additives exposition and conducted face-to-face interviews with about 20 solution providers
- Telephone interviews with nearly 200 industry players including carrageenan manufacturers and solution providers
- About 10 interviews with end-users (food companies)

Format of this report

- The report is organized so as to provide different levels of details in different places – executive summary, overviews, paragraphs in the body of the report, summaries and appendixes
- Bullet points have been used throughout the entire report to make for easier reading
- Abbreviations are also used for recurring terms, a legend of all terms used is included in the appendix

Sources

- In the report, sources are mentioned for chart, tables and key data
- As highlighted in the methodology, key sources of information for this report include all background information at IFC, secondary sources such as news and B2B websites, and, above all, extensive targeted primary research (factory visits, exposition, and interviews) as well as continuous analysis / data elaboration of the JLJ team

EXECUTIVE SUMMARY

Chinese market for carrageenan and solution providers

- The Chinese market for carrageenan is undergoing consolidation, with currently about 50 – 60 manufacturers (thus, significantly less than the 150-200 originally estimated by IFC)

- These carrageenan manufacturers are mainly located in Fujian and Hainan province; all are also solution providers or able to provide solutions

- There are no "pure" carrageenan manufacturers which do not also manufacture solutions

- The raw material for carrageenan (Eucheuma) is sourced mainly from both the Philippines and Indonesia (with a small portion sourced from Hainan)

- As far as sourcing from Indonesia, 70% of manufacturers import directly from Indonesian traders, who are found through personal contacts and network with Indonesian Chinese

- In addition to the carrageenan manufacturers who are also solution providers, there are about 100 – 130 "pure" solution providers which do not manufacture carrageenan

- The key parties in the value chain are: seaweed farmers, Chinese and Indonesian traders, Chinese carrageenan manufacturers, "pure" solution providers, distributors, and end-users

- An estimated 40% of the carrageenan produced is sold directly to food companies, with 30% being exported. The rest is either blended to supply solutions to food companies, or sold to "pure" solution providers and distributors

- The **key market dynamics** in the carrageenan and solution industry are:
  1. *Continued strong growth in carrageenan demand* – from both domestic food industry and international markets
  2. *Increasing exports for carrageenan* – rising quality of top Chinese manufacturers can meet export standards
  3. *Consolidation in carrageenan industry* – due to intense competition and rising quality requirements
  4. *Overall favorable government attitude* – government monitoring and control over carrageenan industry may not be strict, although no specific incentives for industry
  5. *Increasing applications of carrageenan in other non-food industries in the long run* – will develop as technology and R&D capability of companies improve

6. *Increasing quality of solutions required by food companies* – due to strict government monitoring for food sector and rising consumer demands
7. *Increasing R&D for carrageenan-blended solutions* – due to higher quality and higher specification solutions demanded by customers

Regulatory environment

- The carrageenan industry is governed by general laws and regulations regarding treatment of pollutants, production hygiene and food safety; there are no laws specifically for the carrageenan industry only

- There is also a national industry standard ("GB") for carrageenan production, which specifies the minimum quality all carrageenan must meet, in terms of ash content, lead levels etc.

- Import of seaweed from ASEAN countries, including *Indonesia* and the *Philippines*, are subject to a *Special Preferential Tariff (SPT)* of 7.5%, lower than the 15% tariff rate accorded to other WTO member countries. In addition, there is a *Value Added Tax* of 13%

- For carrageenan, the SPT rate (which applies to ASEAN countries) is 8%, while the tariff for other WTO members is 15%. There is also a VAT of 17%.

End-user industries

- About 95% of carrageenan produced for domestic use goes to the food industry, in particular to meat, jelly and soft sweets

- The use of carrageenan in other industries is not developed in China

- Meat producers are mainly concentrated in the East, in *Shandong, Henan,* and *Jiangsu* province; jelly and sweet producers are mainly concentrated in the South, in *Guangdong* and *Fujian* province

- Out of the three key end-user industries, the largest demand for carrageenan comes from the jelly industry; the jelly industry also has the highest growth rate at about 20% annually in the last few years

Derived demand for seaweed

- An economic model was built to estimate the derived demand for seaweed in the next five years (2007-2012). The model takes into account three angles – 1) the supply side (carrageenan production), 2) the demand side (carrageenan demand from end-users), and 3) trade data of seaweed

- The demand for seaweed is derived based on 15-20 key assumptions and the triangulation of data from the three angles – supply, demand, and trade data

- Based on the model, total seaweed demand in 2006 was about 55,000 tons. This is expected to increase at a CAGR of about 14% between 2007-2012, to reach a total annual demand of about 123,000 tons in 2012

- The "cottonii" species accounts for about 90% of total demand (or 49,700 tons in 2006), with the rest being the "spinosum" species

Overall assessment

Challenges in the carrageenan industry

- Although there is still market growth potential in the carrageenan industry, it is not without challenges

- The key challenges in the carrageenan industry are:

  1. *Intense price competition* – competition is based mainly on price rather than on product standards, due to generally low levels of sophistication and, therefore, product requirements of customers

  2. *Predominantly low technology level* – in line with price competition; only the top few manufacturers have higher technology and quality levels, which in turn may also strengthen their price competitiveness due to better efficiency and economies of scale

  3. *Limited R&D capabilities* – mainly due to lack of R&D talent, and also low sophistication and requirements from end-users (food companies)

- Nevertheless, there is a clear positive trend. With increasing government supervision on food standards and rising consumer demands on food quality, food manufacturers are forced to raise their standards, and consequently, their raw material requirements

- This will trickle down the value chain to solution providers and carrageenan manufacturers, which will also improve in technology and product standards; smaller factories which cannot meet the higher requirements may be forced to exit

Potential opportunities for further study for IFC-Pensa

- This report looks mainly at the carrageenan manufacturers and solution providers, with brief outline of end-user industries. Further study could be undertaken in the end-user industries to understand in greater detail the volume and trends by detailed product category

- There are opportunities for further in-depth study on the top few carrageenan manufacturers which are also solution provider and are all private Chinese companies, to identify potential investment opportunities for IFC

- There is also potential to study other solution industries, besides carrageenan-blended solutions, which have greater foreign presence and are thus presumably, at a higher stage of development

- Other opportunities for further study may also come from IFC after studying this report, based on the current understanding of the Chinese carrageenan market

CHINESE MARKET FOR CARRAGEENAN / SOLUTION PROVIDERS

Product Overview (summary)

Carrageenan

- Carrageenan (also called carrageenan gum) is a hydrocolloid extracted from red seaweed which has gelling, thickening and stabilizing properties

- Carrageenan is obtained by alcohol precipitation, by drum drying, or by freezing

- The *Kappaphycus cottonii* species of red seaweed yields *kappa-carrageenan*, while the *Eucheuma spinosum* species of red seaweed yields *iota-carrageenan*

- Carrageenan comes in the form of a powder, which ranges from white to brownish in color depending on raw materials and process used

- Carrageenan is frequently diluted with sugars for standardization purposes and mixed with food grade salts to obtain gelling or thickening characteristics

- In China, more than 95% of carrageenan produced is applied to the food industry, although its applications include other industries such as medicine, chemicals, paints, textile printing and agriculture

Solutions

- Solutions is a general term that does not only apply to carrageenan-blended products but also other food additives. This report focuses on carrageenan-blended solutions

- Carrageenan-related solutions are blended using carrageenan and other products, including other natural gums such as *Konjac gum*, *guar gum* and *locust bean gum*

- Examples of carrageenan-blended solutions used in the food industry include: meat additives, jelly powder, wheat extract clarificant, soft candy powder and stabilizing agents for beverages and dairy products etc.

Market Overview

Carrageenan

- The carrageenan industry grew rapidly between 1995-1998 due to high demand, relatively low barrier to entry (low level of investment and technology) and attractive profits. With the rapid growth of the jelly industry in the 1990s, demand for carrageenan increased as it was the best alternative product to CMC

- Many small workshops were set up but supply still could not meet demand. During that period, there was no benchmark and no regulations regarding carrageenan production, and it was known as a "seller's market"

- However, since 2000 the government has strengthened supervision of the FMCG industry, and food companies were forced to raise their production standards and quality. Consequently their product requirements for raw materials, like carrageenan, also increased

- This resulted in consolidation in the carrageenan industry. Small carrageenan manufacturers which could not reach the requirement of the new standards were forced to closed, while some merged into larger companies

- In addition, new companies were founded with better technology and management. Two of the current top five manufacturers (who each hold about 10% market share) were founded after year 2000.

- There are currently about 50-60 carrageenan manufacturers, who are also solution providers or able to provide solutions. This represent a sharp decline from more than estimated 100 manufacturers only five years ago

- The total domestic production of carrageenan in China is about 10,000 tons annually, of which about 30% is exported

- The current industry growth rate is about 10% annually

- With intense competition, carrageenan prices have also declined in recent years. Currently the price of refined carrageenan is about RMB 60,000 to 70,000/ton (US$ 7,700 – 9,000), while the price of semi-refined carrageenan is about RMB 30,000 – 40,000/ton (US$3,800 - $5,100)[2]

[2] US$ equivalent calculated at RMB-US$ exchange rate of 7.75

- The two largest production bases of carrageenan are in *Hainan* and *Fujian* province, which accounts for about 80% of total domestic production

- The majority of the raw material used for carrageenan production is imported from the *Philippines* and *Indonesia*, although there is some small-scale seaweed production in *Hainan* province. Cultivation in Hainan utilizes the *Kappaphycus* origin from the Philippines

- However, the natural conditions in *Hainan* are not conducive to seaweed growth (lower water temperature and salinity than in *Indonesia* or the *Philippines*).

- Typically, larger manufacturers who have better resources use 100% import seaweed, which are higher in quality, while small factories use a mix of domestically produced and imported seaweed

- Seaweed is primarily sourced from traders in Indonesia, and larger factories maintain close relationships with Indonesian seaweed traders

- Such relationships are usually obtained through a network of personal contacts with Indonesian Chinese

- *As the quality of seaweed is critical to carrageenan production, most manufacturers are very cautious about revealing their networks and how they purchase the seaweed. Purchasing, if done well, is one area in which competitive advantage can be gained over other manufacturers*

Solutions

- As the carrageenan industry consolidates, carrageenan manufacturers are also moving into providing solutions, which have higher value.

- Currently, all carrageenan manufacturers are also solution providers. There are no “pure” carrageenan manufacturers which do not manufacture solutions

- In addition there are about 100 – 130 “pure” solution providers which do not manufacture carrageenan

- Most pure solution providers do not only supply carrageenan-blended products, but also produce other food additives such as products blended from other gums

- Most of the pure solution providers are located along the East Cost including the *Pearl River Delta* and *Yangtze River Delta* region

- There are also pure solution providers scattered in other inland provinces which mainly supply to local food companies in their province

- As average disposable incomes in China continue to rise, consumption of meat and dairy products will continue to increase. Thus there is considerable room for growth since carrageenan-blended solutions are widely applied in these industries

Competitive Landscape

Carrageenan

- There are about 50 - 60 carrageenan manufacturers in China, with a total production of about 10,000 tons annually. Of which, there are:
  - ~ 5 – 7 large companies with production capacity of 800 – 1,500 tons/year
  - ~20 medium companies with production capacity of about 200 tons/year
  - ~25 - 35 small companies with production capacity of less than 100 tons/year (some less than 50 tons/year)

- Exported carrageenan is mainly produced by large factories with advanced machinery, some imported from Japan or Taiwan. Large companies also have greater R&D capabilities; some also have wholly-owned subsidiaries which provide solutions.

- Most medium-sized companies are privately owned Chinese companies, and they mainly target the mid-low end market. During low season, some of these medium companies fulfill production for larger companies

- The number of small factories has declined in recent years due to inability to compete effectively due to poor technology, low standards and low volumes. Therefore, many small factories have stopped producing carrageenan and have become solution providers (usually producing very simple, low value-added solutions) or distributors

- Production of carrageenan is concentrated in *Hainan* and *Fujian* province, which account for about 70% of total domestic production. The maps on the following page shows the distribution of carrageenan manufacturers in China and the relative production volume by province

- There are about 20 manufacturers in *Hainan* province, mainly concentrated in the cities of *Qionghai* and *Wenchang*, with a total production capacity of about 3,500 tons annually

- In *Fujian*, there are about 20 manufacturers, mainly concentrated in *Quanzhou* and *Shishi* city, with a total production capacity of about 3,500 tons annually

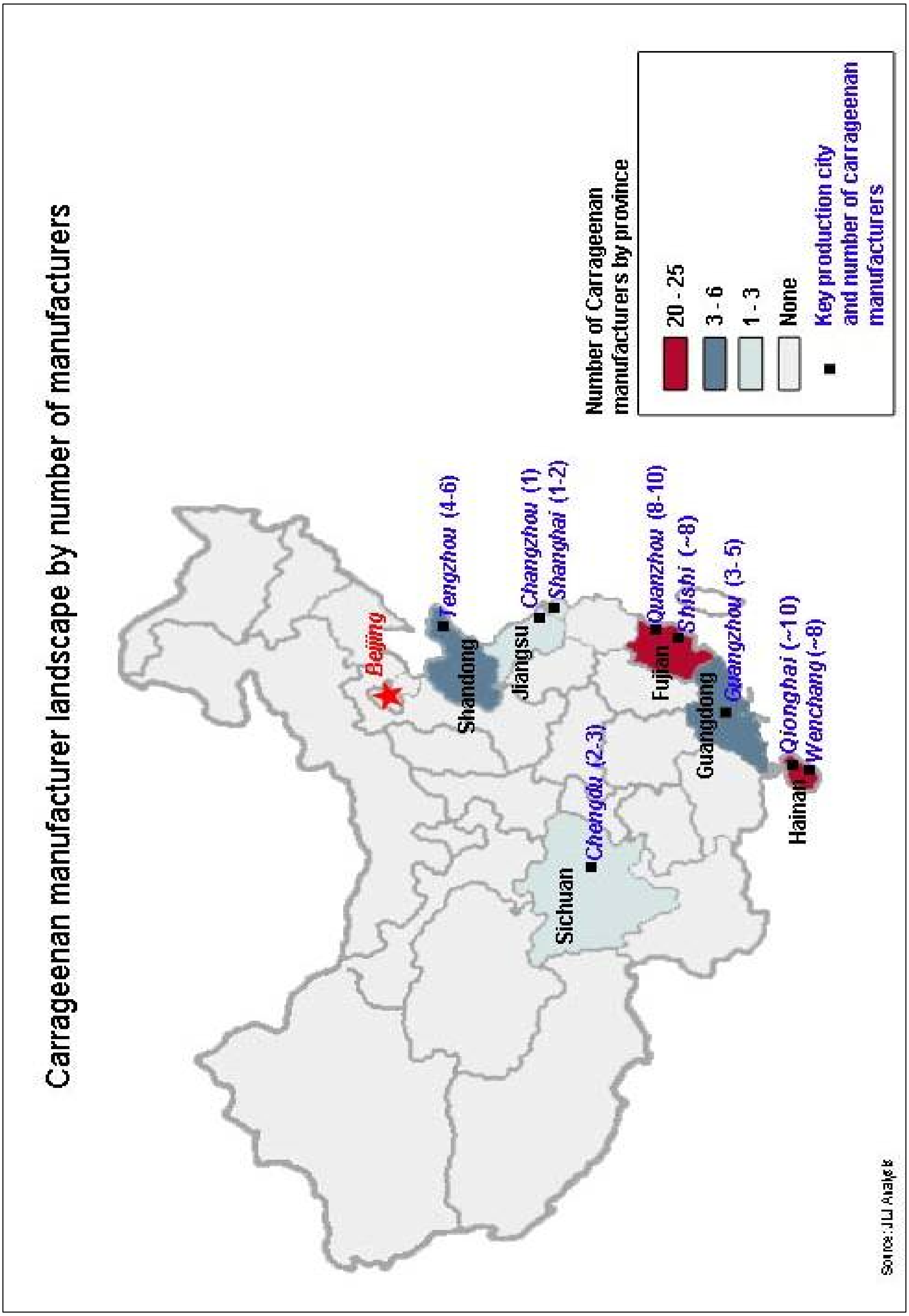
- However the two largest producers, which account for about 20% of total domestic production, are located in *Shanghai* and *Changzhou*

- In addition, there are a few small manufacturers scattered around other provinces of Shandong, Guangdong and Sichuan; the total production volume in each of these provinces is only about 200 – 300 tons annually

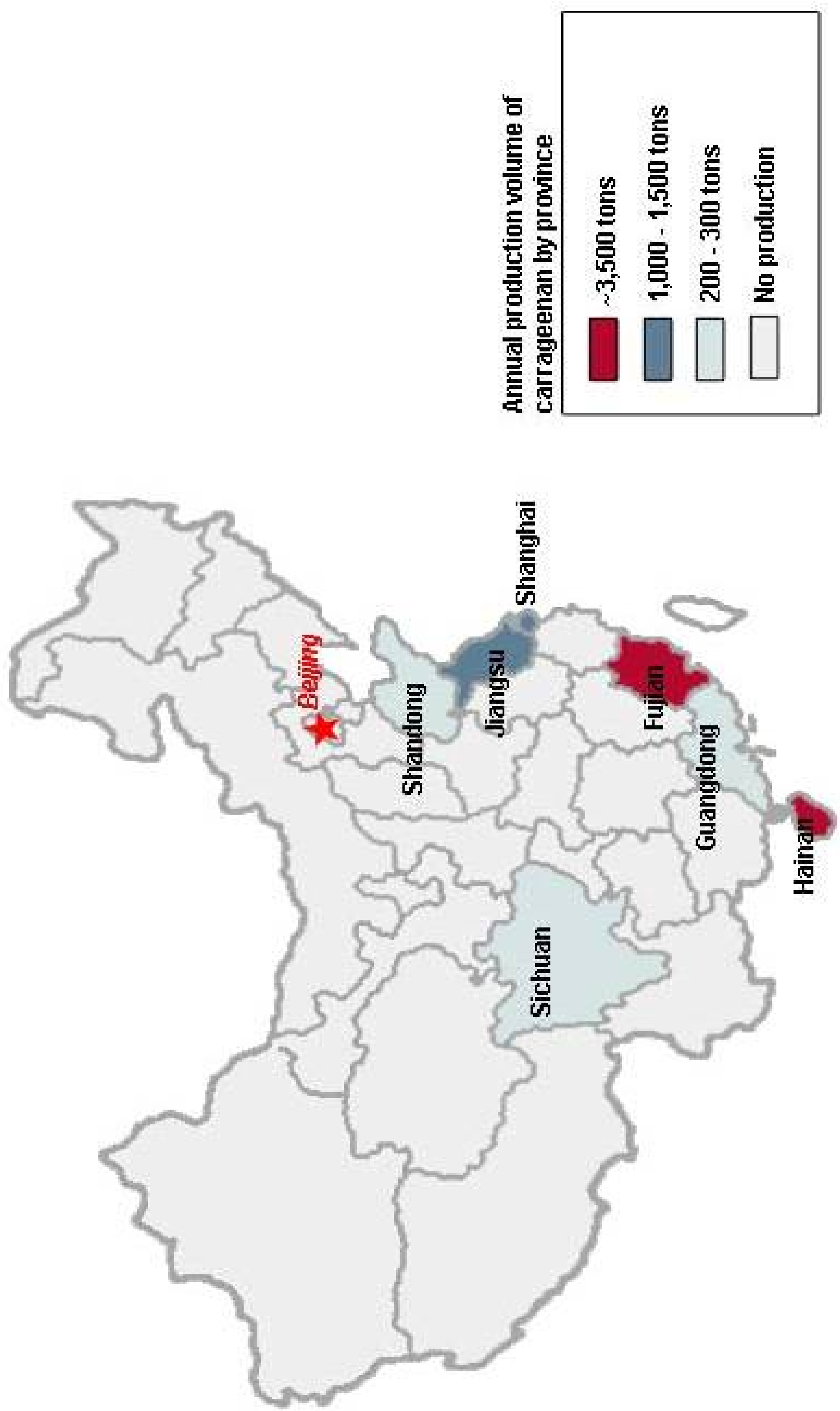
- The vast majority of carrageenan manufacturers are private Chinese companies, with only two which are Hong Kong and Taiwan-invested; there are no foreign-invested [3] manufacturers

- All the carrageenan manufacturers are also solution providers; there are no "pure" carrageenan manufacturers who produce carrageenan solely without providing other solutions

[3] "Foreign-invested" excludes Hong Kong and Taiwan-invested companies


Carrageenan manufacturer landscape by number of manufacturers
Beijing
Tengzhou (4-6)
Shandong
Jiangsu
Changzhou (1)
Shanghai (1-2)
Quanzhou (8-10)
Shishi (~8)
Fujian
Guangzhou (3-5)
Guangdong
Qionghai (~10)
Wenchang (~8)
Hainan
Chengdu (2-3)
Sichuan
Number of Carrageenan manufacturers by province
20 - 25
3 - 6
1 - 3
None
Key production city and number of carrageenan manufacturers
Source: JLJ Analysis

Carrageenan manufacturer landscape by production volume



Source: JLJ Analysis

- In recent years, the structure of the carrageenan industry has changed with the entrance of very large manufacturers. Large companies have economies of scale which small factories cannot compete with

- Factories in *Hainan* have advantages since the cost of labor is very low and the cost of treating polluted water is also significantly lower than on Mainland China. The main source of energy is from wood grown in *Hainan*, which is cheaper than coal. Other costs like land and factory buildings are also low

- However, R&D in *Hainan* is limited due to a lack of suitable talent, thus products are mainly mid-low end and the export rate is low

- Factories in *Fujian* have different strengths and advantages than those in *Hainan*. Overseas Chinese in Southeast Asia mainly originate from Fujian province, thus Fujian factories can easily find better local traders in Indonesia and Philippines to assure the steady quality and reasonable price

- Another advantage of Fujian is the close proximity to end-users. There are several large soft candy and jelly companies in Fujian and Guangdong which hold a large share of the food market in that sector

- On the other hand, Shanghai is an international city and the most important port in China. There is easier access to human resources (e.g. R&D personnel) and foreign clients. *Shanghai Beilian,* the only manufacturer in Shanghai, is also the largest carrageenan manufacturer in China and most of its products are exported

- The following table shows the top five carrageenan manufacturers in China. The top five manufacturers account for more than 50% of total domestic production

Table: Top 5 carrageenan manufacturers in China

Company name	*Location*		*Annual production capacity*	
	Province	City	Refined carrageenan (tons/year)	Semi-refined carrageenan (tons/year)
Shanghai Beilian Gum	Shanghai	Shanghai	1000	500
Jiangsu Changhang Hydrocolloid Technology	Jiangsu	Changzhou	500	500
Hainan Dazhong Ocean Industry	Hainan	Qionghai	700	500
Quanzhou Lubao Biochemistry	Fujian	Quanzhou	700	400
Hainan Qionghai Longfeng Carrageenan	Hainan	Qionghai	800	N/A

Source: JLJ

1. Shanghai Beilian Gum Co., Ltd.

- *Shanghai Beilian* was established in 1998 with a registered capital of RMB 10 million; the owner was a former employee of *Hainan Dazhong*, one of the oldest carrageenan factories in China

- Main products include konjac gum, carrageenan, and other carrageenan or konjac gum-blended products (including meat carrageenan, jelly powder, beverage stabilizing agents etc.)

- The company's Konjac gum plant is the largest in East China, while the carrageenan plant mainly serves the export market

- The revenue in 2006 was about RMB 80 million, and products are both sold to domestic food companies and exported to US, Europe and Southeast Asia

- The raw material for carrageenan is wholly imported from the Philippines (30%) and Indonesia (70%)

2. Jiangsu Changhang Hydrocolloid Technology Co., Ltd

- *Jiangsu Changhang* produces mainly carrageenan and konjac gum, and other solutions including meat additives, wheat clarificant, soft candy powder, stabilizing agents for milk products etc.

- The factory covers a 50,000 square meter area and has two production lines and a konjac gum blending line

- The company only started production in July 2006. The annual output of refined and semi-refined carrageenan is about 500 tons and 500 tons respectively

- *Jiangsu Changhang* also has another company, *Changhang Machinery*, which produces chemical processing machinery. This includes machinery that are used in carrageenan manufacturing, and machines produced by *Changhang* are also widely used in other Chinese carrageenan factories

3. Hainan Dazhong Ocean Industry Co., Ltd.

- *Hainan Dazhong*, formerly known as *Linwei Carrageenan Factory*, was founded in 1958 and was one of the first carrageenan factories in China

- The company was bought over by *Shanghai Dazhong Public Utilities Co., Ltd* in 1998 and renamed as *Hainan Dazhong*

- The factory is located by the beach and the company owns a 25 square kilometer sea area which harvests about 100 tons of Eucheuma annually

- Main products are carrageenan and solutions including emulsifying stabilizer for ice cream, stabilizer for sorbet, jelly powder, emulsifying stabilizer for cocoa milk beverages, meat additives etc.

4. Quanzhou Lubao Biochemistry Co., Ltd

- *Lubao (Quanzhou) Biochemistry Co., Ltd* is a wholly-owned foreign enterprise (WOFE) invested by *Long Green (Hong Kong) Development Company* with a starting capital of US$2.16 million

- The company was founded in 1999 and products include carrageenan and solutions e.g. meat additives, jelly powder etc.

- In order to meet increasing demand, in 2003, the factory invested another USD$1.28 million to expand production capacity

- All raw materials are imported from Indonesia (70%) and the Philippines (30%)

- About 50% of carrageenan products is exported to Europe, US and Asia

5. Hainan Qionghai Longfeng Carrageenan Co., Ltd.

- Established in 1986, *Longfeng* is a private Chinese manufacturer whose founder was also a former employee of *Hainan Dazhong*

- *Longfeng* currently has three factories and plant area of about 2,000 square meters

- Raw materials are mainly sourced from the Philippines (60%), Indonesia (30%) and Malaysia (10%)

- The company produces about 800 tons of refined carrageenan annually, of which about 40% are exported to Southeast Asia, Japan and Europe

Solutions

- Although all carrageenan manufacturers are also solution providers, we make a distinction between these companies and "pure" solution providers

- "Pure" solution providers refers to companies which only provide solutions but do not manufacture carrageenan, and as such do not purchase seaweed[4]

- These pure solution providers provide more value-added solutions than the carrageenan manufacturers can, as the core competency of such pure solution providers is in research and development

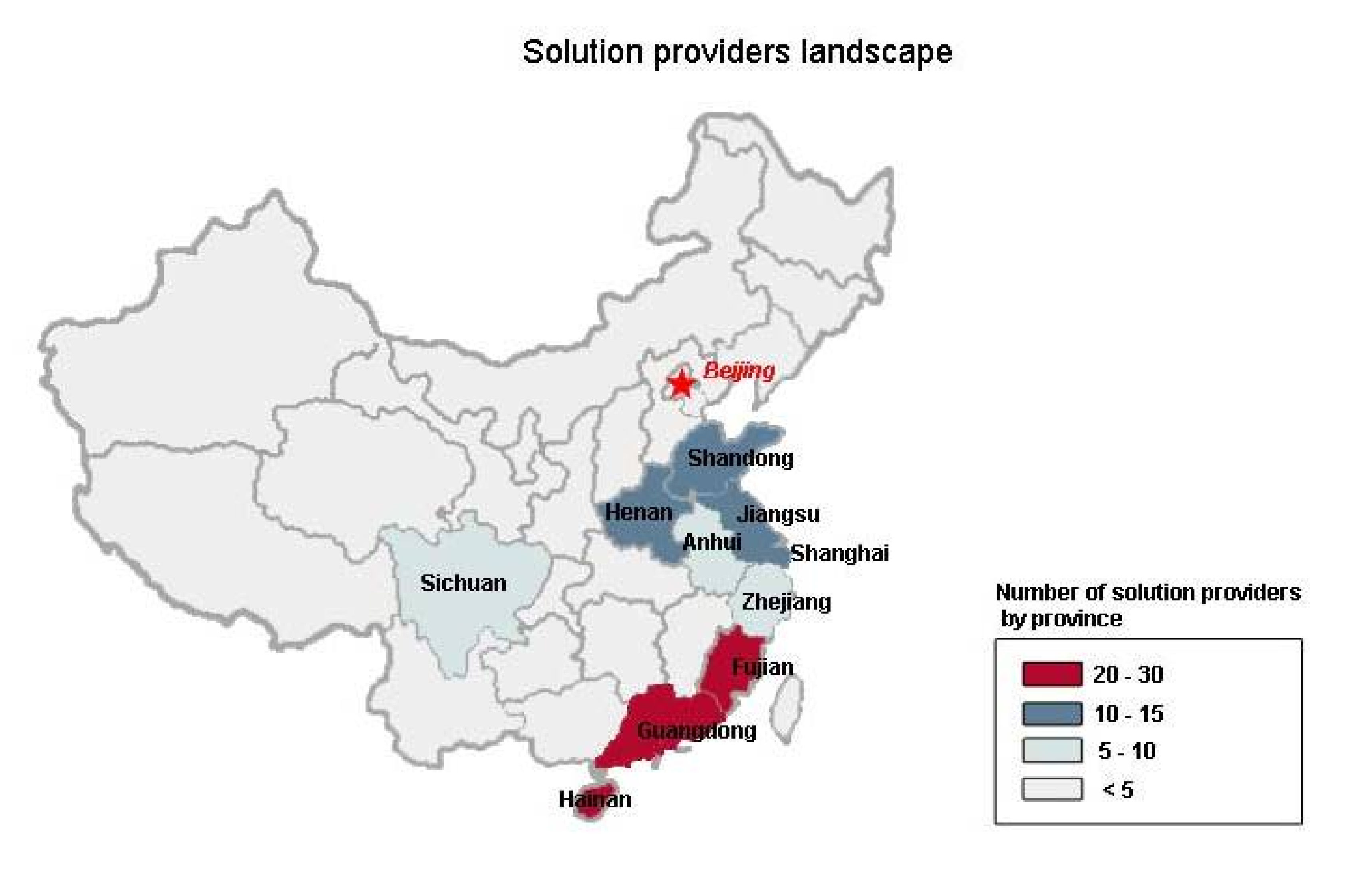
- In some cases, food companies purchase pure carrageenan directly from manufacturers and blend their own solutions

- There are about 100 – 130 pure solution providers in China, and the map on the following page shows the distribution of these companies

- Most of the pure solution providers are located in *Guangdong* and *Fujian* province as well as around the *Yangtze River Delta*

- Although there are pure solution providers scattered in other provinces, these are mainly small companies which produce low quality and low price products, aimed mainly at the rural markets

[4] In this report, we only look at solution providers that provide carrageenan-blended solutions. The estimate of 100 – 130 pure solution providers is only for those that provide carrageenan-blended solutions. On the other hand there are thousands of solution providers if we were to look beyond carrageenan-blended solutions.



Source: JLJ analysis

- The solution provider industry is predominantly focused in the low-mid end, and there is a lack of R&D talent and investment

- This industry is highly influenced by end-user requirements. As most food companies in China have limited sophistication, most demand for solutions is still for mid-low end products

- However, there is a clear trend towards increasing quality of solutions required, especially as government supervision on the sanitary standards of food companies increase

- Most of the pure solution providers are also private Chinese companies, with only very few foreign players

- The following table shows the international solution providers which have a presence in China (the four listed in the table do not manufacture carrageenan-blended solutions in China)

Table: Foreign-invested solution providers in China

Name	Year of China entry	Type of setup	Activities in China
With manufacturing presence in China			
CPKelco A HUBER COMPANY (US)	2000	• WOFE factory • Representative office • R&D center	• In 2006, *CPKelco* acquired the second largest xanthan gum producer in China, *Shandong Jinli Biochemicals* to establish *CPKelco (Shandong)* • The factory is located in Rizhao, Shandong province • Representative office in Shanghai and Guangzhou • R&D center in Shanghai • CPKelco does not manufacture carrageenan in China. Its GENU® line of carrageenan is produced in the Philippines (and Denmark)

DANISCO First you add knowledge... (Denmark)	1995	• 3 WOFEs and 3 JV • R&D center	• In 1995, *Danisco* established a wholly-owned factory to produce food ingredients, including emulsifiers and functional systems • In 2002, a trading company, *Danisco Ingredients (Shanghai) Co., Ltd*. was established in Shanghai Waigaoqiao Free Trade Zone • Also in 2002, the company opened a flavor plant in Kunshan, Jiangsu province • In 2004, *Danisco* established two joint ventures in Henan: 1) *Danisco Tianguan*, which produces Xantham gum and 2) *Danisco Tangyin Yuxin*, which produces Xylitol and Xylose • Another JV, *Genencor (Wuxi) Bio-Products* is Danisco's enzyme production base for the China and Asia-Pacific market
No manufacturing presence in China			
FMC (US)	2003	• Representative office • R&D center	• Representative offices in Shanghai, Guangzhou and Beijing. • Research and innovation center for Asia Pacific located in Shanghai • No manufacturing presence in China
TIC GUMS (US)	2006	• Representative office	• TIC gums has nearly 100 years history in gum technology but the company is still new to China • Representative office in Guangzhou to develop the Chinese market and provide technical services • No manufacturing presence in China

Source: company websites

Value chain of Eucheuma/ Kappaphycus seaplant

- During 2001-2005, China seaplant import from Indonesia almost tripled to reach about 34,000 metric tons. It is estimated that more than 90% is *Kappaphycus spp*. (trade name "cottonii" and the remainder was mostly *Eucheuma spp*. (trade name "spinosum")[5]

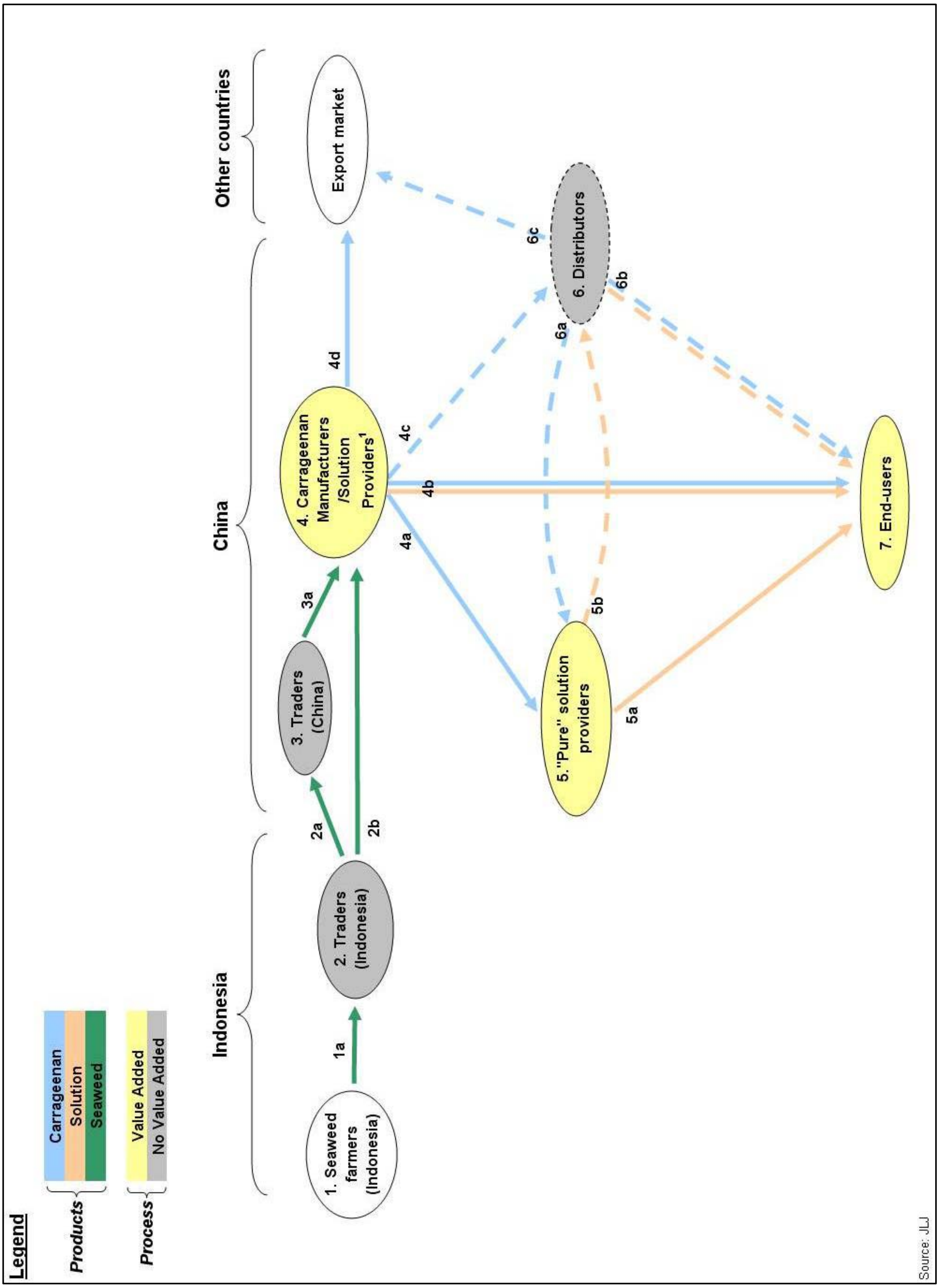
- The chart on the following page shows the value chain for Eucheuma and Kappaphycus seaplant production originating from Indonesia[6] and exported to China

- The numbered arrows show the key parties in the value chain and the flow of products.
- The key parties in the value chain are:
    1. Seaweed farmers in Indonesia
    2. Seaweed traders in Indonesia
    3. Seaweed traders in China
    4. Carrageenan manufacturers in China (who are also solution providers)
    5. "Pure" solution providers (who do not manufacture carrageenan)
    6. Distributors
    7. End-users (predominantly food companies)

[5] Source: SEAPlant.Net, Trade Data Summary for Agar and Carrageenan Seaweed Products of Indonesia and the Philippines

[6] Eucheuma seaplant production is concentrated in the ASEAN region of Southeast Asia, with the Philippines and Indonesia accounting for as much as 95% of world production. This report focus on Indonesia and the value chain originating from Eucheuma production in Indonesia.

Chart: Value chain of Eucheuma / Kappaphycus seaplant from Indonesia to China



Source: JLJ

1. *Seaweed farmers in Indonesia*

- Farmers of *Eucheuma* spinosum and *Kappaphycus* cottonii are located throughout Indonesia. In Sulawesi alone, there are about 10,000 farmers, usually small family units.

  1a. In smaller farms, dried seaweed is usually sold to traders at the site of production. Larger farms transport the dried seaweed to main city markets (e.g. Makassar) where it is sold directly to traders in the city

2. *Seaweed traders in Indonesia*

- There may be several levels of traders, from local traders who purchase seaweed from farmers, to larger traders in the city. Trading hubs are located in Makassar, Jakarta and Surabaya

- There are two main sales channels for Indonesian traders:

  2a. Export to traders in China – Chinese seaweed traders are mainly located in Guangzhou and Fujian province, which maintain ties with Indonesian Chinese businessmen

  2b. Direct export to carrageenan manufacturers in China

  - Larger Chinese carrageenan manufacturers source directly from Indonesian traders
  - Each company may maintain links with several traders in Indonesia. Such channels are usually obtained through personal contacts
  - The Chinese carrageenan manufacturer usually starts by seeking assistance from a personal contact, an Indonesian Chinese businessman, who will introduce seaweed traders to the manufacturer through his network of contacts in Indonesia
  - It was found from field research that several carrageenan manufacturers travel frequently to Sulawesi and Jakarta to meet with Indonesian traders

3. *Seaweed traders in China*

- Seaweed traders in China are mainly located in Guangdong and Fujian province. The Chinese traders purchase seaweed from Indonesian traders also through a network of personal contacts with Indonesian Chinese

3a. The seaweed is usually sold to smaller carrageenan manufacturers in China, since large carrageenan manufacturers usually purchase directly from Indonesia

4. Carrageenan manufacturers / solution providers

- There are about 50-60 carrageenan[7] manufacturers in China who all provide some form of solutions

- Of these, about 70% of manufacturers source seaweed directly from Indonesia, while the rest purchase from Chinese seaweed traders

- There are four main sales channels for carrageenan manufacturers:

  4a. *"Pure" solution providers* – carrageenan is sold to "pure" solution providers which blend it with other products to provide solutions to FMCG (food) companies

  4b. *End-users (predominantly food companies)* – in the case of more complex solutions which are critical to the end-products, food companies purchase carrageenan directly from the manufacturer and process solutions internally. Depending on customer request, carrageenan manufacturers also supply solutions to FMCG companies

  4c. *Distributors* – due to the large geography, distributors are commonly used to sell products to solution providers or FMCG companies in other regions which the manufacturer cannot cover with its own sales force

  4d. *Export* – pure carrageenan is also exported to other countries, e.g. US, Europe and Southeast Asia. It is estimated that about 30% (or about 3,000 tons) of China's annual production of carrageenan is exported

5. "Pure" solution providers

- There are an estimated 100 – 130 "pure" solution providers in China which develop and produce solutions for FMCG companies

- These companies do not produce carrageenan as it is not their core competency. Products are sold to:

  5a. *End-users (predominantly food companies)* – usually in the same region. For example, a solution provider located in Guangdong will usually supply to food companies in the South China region. Only the largest solution providers have nationwide coverage

[7] This includes both Refined Carrageenan (RC) and Semi-refined Carrageenan (SRC)

5b. *Distributors* – products are also sold through distributors, usually to cover other regions that the manufacturer cannot reach with its own sales force

6. Chinese distributors of both carrageenan and solutions

- There are both regional distributors and local distributors. Regional distributors can be divided into four regions - North, East, South and West China. For example, an East China regional distributor can usually cover *Zhejiang*, *Jiangsu* and *Shanghai*. Local distributors are usually focused in one province.

- The main sales channels of distributors are:

  6a. *"Pure" solution providers* – resale of carrageenan from manufacturers to "pure" solution providers

  6b. *End-users (predominantly food companies)* – resale of carrageenan (purchased from carrageenan manufacturers) and solutions (purchased from solution providers) to food companies

  6c. *Export* – pure carrageenan purchased from manufacturers is sometimes exported.

7. End-users – mainly FMCG (food) companies

- End-users are mainly FMCG (food) companies which purchase both carrageenan and solutions (*See section on end-users for more details*).

**

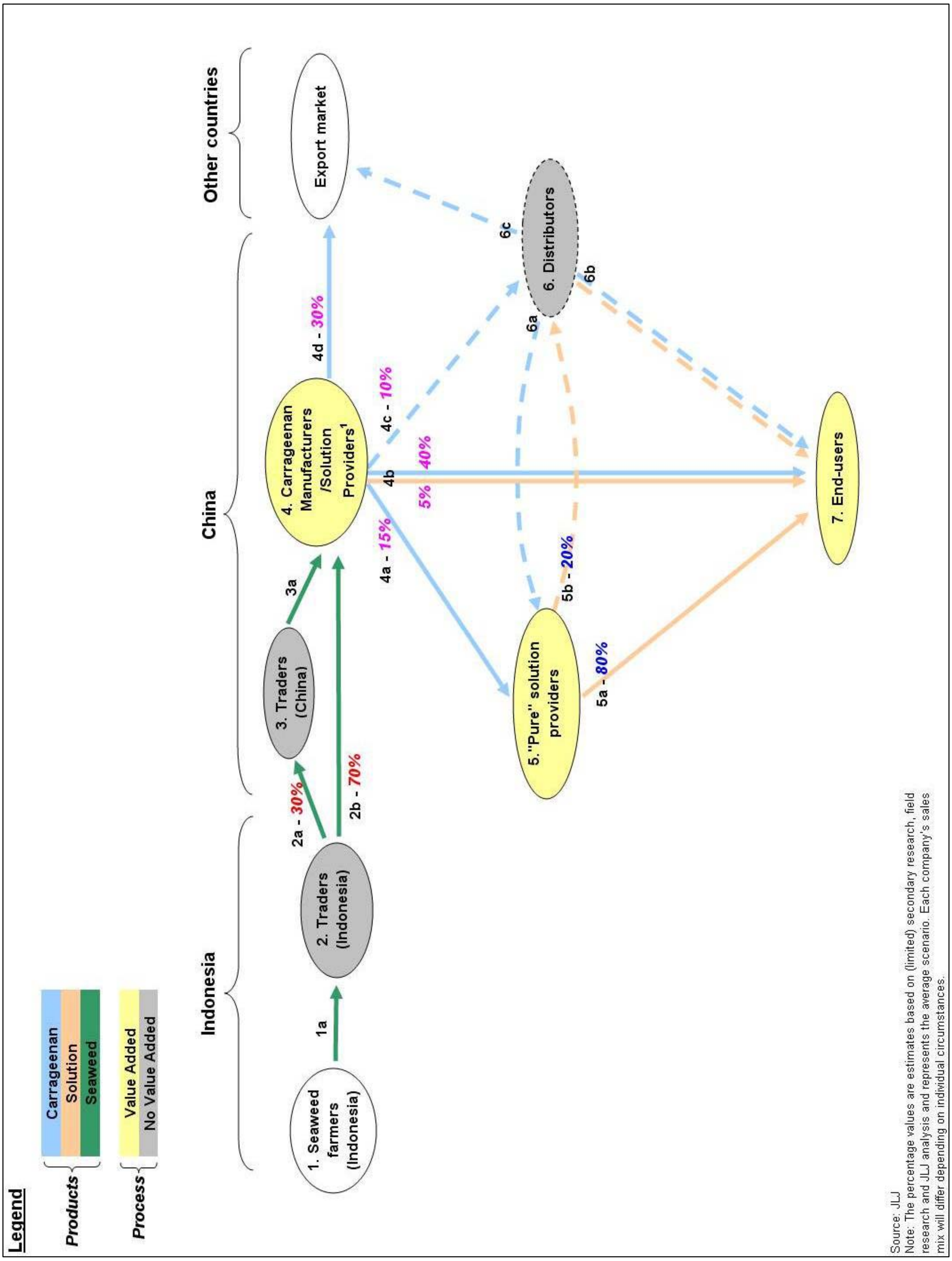
- The chart on the following page shows the value chain with the corresponding percentage flow of products between the different channels

- As shown in the diagram, about 70% of seaweed is exported directly from Indonesian traders to carrageenan manufacturers in China; only 30% is sold to Chinese traders

- At the carrageenan manufacturer, about 40% of the carrageenan manufactured is sold directly to end-users, with about 30% exported. About 15% is sold to solution providers and a small percentage (5%) is blended to supply solutions to end-users. Another 10% is sold to distributors

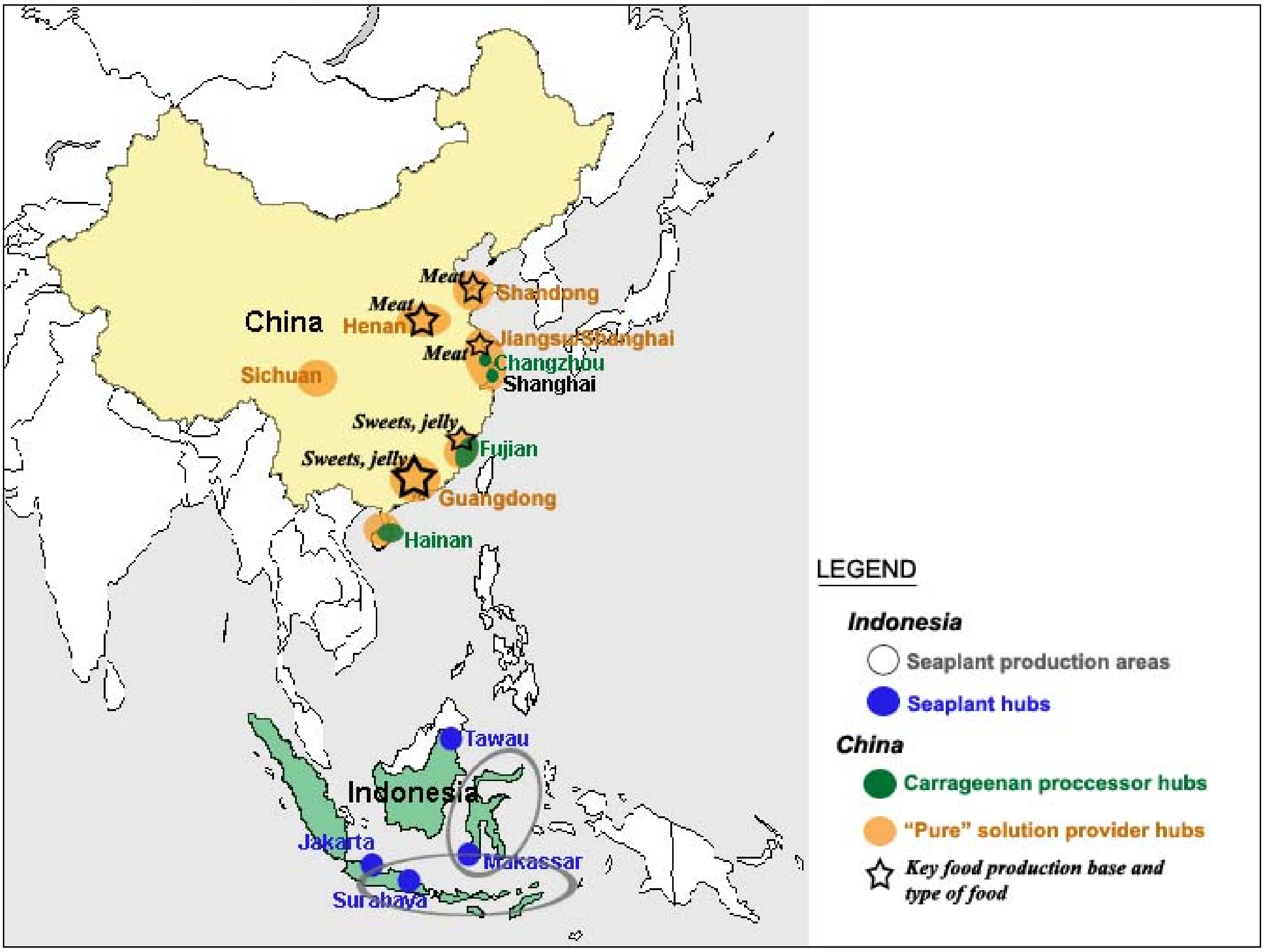
- "Pure" solution providers mainly sell direct to end-users (80%), with only 20% of products sold through distributors

Chart: Value chain of Eucheuma / Kappaphycus seaplant from Indonesia to China, with volume breakdown by sales channels



- The following map gives an overview of the landscape and key hubs for the different players in the value chain

Chart: Landscape of key parties and hubs



Source: IFC-Pensa, JLJ

- As the map shows, the landscape for carrageenan producers, solution providers and key food production base in China are largely similar

- The main hubs are in *Hainan, Guangdong, Fujian*, *Shanghai/Jiangsu* area, and *Henan*

- Carrageenan manufacturers and solution providers in the South mainly serve the sweet and jelly industry, which is concentrated mainly in *Guangdong* and *Fujian* province

- On the other hand, the end-users of carrageenan in the North is mainly the meat industry, which is concentrated in *Henan, Shandong,* and *Jiangsu* province

Introduction to database of key players

- An excel database listing information of key players is provided in addition to this report. The database includes:
  - Carrageenan manufacturers
  - Solution providers
  - Traders (Chinese and overseas)
- The following tables describe the information provided in the respective databases

Database 1: Carrageenan manufacturers

Company background	
Name (Chinese)	Legally registered name of the company in China
Name (English)	Translation of the Chinese company name
Province	Province where the company is located
City	City where the company is located
Company type	WOFE (Wholly-owned Foreign Enterprise) JV (Joint Venture) SOE (State-owned Enterprise) Private Chinese/ Local
Year established	Year of entry/ setup in China
Number of employees	Estimate or range
Supply/ purchasing information	
Annual seaweed demand	Estimated annual demand for seaweed (based on production figures)
Source of seaweed	Country of origin of seaweed
Price of seaweed	If available
Production	
Main products	Refined or semi-refined carrageenan, solutions etc.
Annual production capacity	Estimate or range, by product type
Sales	
Price of carrageenan	Price quotation of carrageenan, before negotiation
Annual sales revenue	Estimate or range (if available)
Export percentage	Percentage of production exported
Key customers	Type of companies, e.g. large domestic food companies
Contact information	
Address (Chinese)	Actual address of company
Address (English)	Translation of Chinese address
Telephone	Contact telephone
Fax	Contact fax number
Email	Whenever available, often unavailable for small companies
Website	Whenever available, often unavailable for small companies
Contact person	Contact name and position (if available)

Database 2: Solution providers

Company background	
Name (Chinese)	Legally registered name of the company in China
Name (English)	Translation of the Chinese company name
Province	Province where the company is located
City	City where the company is located
Company type	WOFE (Wholly-owned Foreign Enterprise) JV (Joint Venture) SOE (State-owned Enterprise) Private Chinese/ Local
Year established	Year of entry/ setup in China
Number of employees	Estimate or range
Supply/ purchasing information	
Annual carrageenan demand	Estimated annual demand for carrageenan (based on production figures)
Source of carrageenan	Description of type of supplier, e.g. location or size
Price of carrageenan	If available
Production	
Main products	Type of solutions, e.g. meat carrageenan
Annual production capacity	Estimate or range, by product type
Sales	
Annual sales revenue	Estimate or range (if available)
Export percentage	Percentage of production exported
Key customers	Type of companies, e.g. large domestic food companies
Contact information	
Address (Chinese)	Actual address of company
Address (English)	Translation of Chinese address
Telephone	Contact telephone
Fax	Contact fax number
Email	Whenever available, often unavailable for small companies
Website	Whenever available, often unavailable for small companies
Contact person	Contact name and position (if available)

Database 3: Traders

Company background	
Name (Chinese)	Legally registered name of the company in China
Name (English)	Translation of the Chinese company name
Province	Province where the company is located
City	City where the company is located
Company type	WOFE (Wholly-owned Foreign Enterprise) JV (Joint Venture) SOE (State-owned Enterprise) Private Chinese/ Local
Year established	Year of entry/ setup in China
Trading activities	
Main products	Type of products traded, usually a wide range
Annual sales revenue	Estimate or range (if available)
Key customers	Type of companies, e.g. large domestic food companies
Contact information	
Address (Chinese)	Actual address of company
Address (English)	Translation of Chinese address
Telephone	Contact telephone
Fax	Contact fax number
Email	Whenever available, often unavailable for small companies
Website	Whenever available, often unavailable for small companies
Contact person	Contact name and position (if available)

Key market dynamics

Carrageenan

1. **Continued strong growth in carrageenan demand**

   - With growth in disposable income and living standards, consumption of food products is increasing

   - The main use of carrageenan is in the food processing industry, especially snacks such as jelly and sweets

   - The food industry, depending on the specific product category, is growing at between 10 - 20% annually, which is driving demand for carrageenan-blended solutions used as food additives

2. **Increasing carrageenan exports**

   - Production of carrageenan is growing at slow rates in developed countries due to environmental concerns

   - Thus, there is increasing demand for carrageenan from China, which is also due to improving quality and consistency of Chinese products

   - Chinese exports are also able to meet rising international demand due to less strict environmental controls on carrageenan production

   - In the future, foreign companies, with larger production capacities and relatively advanced technology, may also set up factories in China to take advantage of lower labor cost and serve both domestic and export markets

3. **Consolidation in carrageenan industry**

   - In carrageenan production, it is important to have economies of scale as competition is based mainly on price

   - This has led to several large companies holding a dominant market share, with small companies closing or merging to form bigger companies

- Besides price competition, the closing of smaller factories and consolidation in the industry is also due to increasing quality requirements of carrageenan from customers (food manufacturers), which many small manufacturers cannot meet

4. Positive government policy

- One of the focus of the central government's 11th Five Year Plan (2006 – 2010) is a policy aimed at improving the living standards of rural residents

- The policy aims to develop all agriculture industries and related processing industries. Carrageenan, as a seaweed-processing industry, also falls under the policy

- Although there are no specific incentives aimed at encouraging the carrageenan industry, it is likely that government control and supervision over carrageenan factories will not be strict

5. Increasing applications and use of carrageenan in other non-food industries in the long run

- Besides the food industry, carrageenan can also be used in other industries such as pharmacy and chemicals

- Currently in China, carrageenan is used mainly as a food additive. However in the long run, it is expected that other uses will slowly develop as manufacturing technology and R&D ability of both carrageenan manufacturers improve

Solutions

6. Increasing quality of solutions required by food companies

- Currently most of the solution provider industry is concentrated in the low-mid end

- However with increasing government supervision on quality and hygiene standards of food producers, their demands from suppliers, in this case solution providers, also increase

- There is thus a clear trend towards improving quality and sophistication of solution providers, and increasing focus on research and development

7. Increasing research and development for carrageenan-blended solutions

- In line with increasing product quality demands from customers (food producers), there is a greater emphasis on research and development of solutions

- Carrageenan-blended solutions are used widely in processing meat, sweets, jelly, milk, ice cream, beer, and other food to improve taste and texture

- Chinese customers are increasingly sophisticated and demanding in terms of food variety and taste, and increase in demand for food products (both in terms of quantity and quality) is pushing the R&D efforts of solution providers to produce a greater variety of carrageenan-blended solutions with broader use

Selected case studies

- Two case studies have been selected to highlight some of the differences between the players in the carrageenan industry

- One company is an old, well-established carrageenan manufacturer, while the other is an aggressive new entrant with higher technology and better facilities

- Both are carrageenan manufacturers, which can also provide some solutions

- (Company names are not revealed in the report; however further details on the companies may be found in the database)

Case study 1: Example of a well-established carrageenan manufacturer and solution provider

Fig 1: Factory exterior

Fig 2: Processing area

Carrageenan

- The company is one of the oldest carrageenan manufacturers in China
- It was originally established in 1958 and bought over by a listed company in 1998
- The company has an annual production capacity of about 700 tons refined carrageenan, 500 tons semi-refined carrageenan, and 2000 tons of carrageenan-blended products (solutions)
- Si*nce the company is* one of the oldest carrageenan factories in China, many owners of newer carrageenan factories were former employees
- In fact, the owners of two of the top five carrageenan manufacturers (*Qionghai Longfeng* and *Shanghai Beilian*) were former employees at this company
- The company imports seaweed directly from Indonesia, and maintains relationships with about 2-3 fixed suppliers (Indonesian traders)
- The general manager travels to Indonesia annually to meet with the company's regular suppliers and also to source for alternative suppliers
- Key customers are large domestic food companies, which include *Xizhilang Strongfood*, one of the largest jelly producers in China

Case study 2: Example of a new, aggressive entrant

Fig 1: Filtration facility

Fig 2: Processing area

Fig 3: Drying area

Carrageenan

- This company is a good example of a new company with relatively better facilities and higher technology serving export demand
- The company is a Hong Kong-invested WOFE
- Since founding in 1999, the business has developed rapidly. In order to meet the increasing demand, the company added an investment of USD$1.28 million for expanding the factory and facilities at the beginning of year 2003
- The company has an annual production capacity of about 700 tons refined carrageenan, 400 tons semi-refined carrageenan
- The machinery used are mainly imported from Taiwan, with some imported from Japan
- Since the owner of the company was born in Hong Kong and used to work in the Philippines, it is relatively easy for the company to establish relationships with overseas seaweed suppliers
- The company has 3 – 4 long term suppliers in Indonesia and the Philippines, and the manager travels to both countries annually to check on seaweed quality
- The clients are mainly from the mid-high end food companies, such as *Yake* and *Strong food* which are well know food companies
- Export accounts for about 50% of sales volume, which mainly go to US, UK, Germany, and East Asia countries
- The company also has a subsidiary company in Hong Kong for import-export purposes

REGULATORY ENVIRONMENT

Overview

- In China, carrageenan manufacturing is regulated by general laws and regulations which apply to the whole processing industry; there are no laws specifically for carrageenan manufacturing (other than the national product standards for carrageenan)

- The main government agencies responsible for regulating the industry include: *State Environmental Protection Agency, State Food and Drug Administration, Standardization Administration, and State Administration of Work Safety*

- There are two main types of pollutants produced in the process of manufacturing carrageenan: 1) alkaline water, which is used in the production of carrageenan, and 2) microorganisms *[Note: seaweed residue is buried under ground, where it decomposes naturally. Although seaweed residue can be processed into organic manure, this use is not common in China]*

- Thus, like all other water-polluting industries, carrageenan factories are required to have water treatment pools to neutralize alkalinity and reduce microorganisms in the water

- Carrageenan manufacturers also need to comply with laws on food safety and quality

- There is also national product standards for carrageenan, and all carrageenan produced must meet the specified standards.

Key laws and regulations

- The laws which apply to the carrageenan industry cover food safety and hygiene standards, as well as environmental pollution

- The relevant laws are central government legislations apply to the whole of China, although there may be differences in regional / local implementation and application of the regulations, for example regulations on drainage fees

- The following are the key laws and regulations that apply to carrageenan manufacturers:

Table: Key laws and regulations for carrageenan manufacturers

Number	Governing agency	Regulation
1	*State Food and Drug Administration*	Regulation on food safety
2	*Standardization Administration*	National standards for carrageenan
3	*State Environmental Protection Agency*	Regulation on the use of water resources
4		Regulation on the prevention of water pollution and protection of water
5		Regulation on pollution fees
6	*State Administration of Work Safety*	Regulations on production safety and clean production

Source: JLJ

1. *Regulation on food safety*

   – The production and sales of food additives must meet certain hygiene standards set by the *State Food and Drug Administration* (SFDA). Products which do not meet the standards cannot be sold

   – In addition, food additive manufacturers are required to obtain a permit from the SFDA that certifies that their facilities meet hygiene and sanitation standards

2. National standards for carrageenan

   – China has national standards, known as "GB" (short for the Chinese word, "*Guo Biao*"), for a wide range of products, which are in many ways similar to international "ISO" standards

   – Carrageenan products have to reach mandatory requirements according to the GB 15044-1994 standard as follows:

Category	Unit Measure	Standard
Sulphur oxide (SO_4^{2-})	%	15 - 40
Viscosity	pa•s	⩾0.01
Weight loss after drying	%	⩽15
Total ash content	%	⩽30
Ash insoluble in acid (%)	%	⩽1
Lead (Pb)	%	⩽0.001
Arsenic (As)	%	⩽0.0002

Source: Standardization Administration

   – However, the GB standards were put in place in 1994, and current standards of the top few carrageenan manufacturers exceed the mandatory GB standards

3. *Regulation on the use of water resources*

 - The water law regulates and protects the use of water resources
 - Advanced technology and facilities should be used during production in order to increase the reuse rate of water
 - The government has issued a list of banned technologies and products that have a high consumption rate of water, and all manufacturers, sellers and users are prohibited from using the products in the list, for example, old machine tools and components

4. *Regulation on the prevention of water pollution and protection of water*

 - There are water quality standards set by the central government and local environmental departments that factories discharging water must meet
 - All factories are required to have a "permit for the discharge of pollutants" before the start of production
 - In order to obtain the permit, discharged water quality must be able to meet local or national standards. Thus all factories need to have a water treatment pool that treats polluted water to comply with standards

5. *Regulation on pollution fees*

 - Factories are charged fees for discharging pollutants, which vary depending on the product and volume. If discharged pollutants do not meet standards, factories will be charged two times the stipulated fees
 - Carrageenan manufacturers are charged 0.7 RMB per ton of discharge (US$ 0.09[8])
 - However lower pollution fees are charged in industrial zones

6. *Regulations on production safety and clean production*

 - The law on production safety is a general law that applies to every manufacturing company, and sets out safety guidelines for various aspects including workers, potential hazards, handling of goods, etc.
 - Also, the law states, in general, that efficient and low-polluting facilities and technologies should be used instead of energy-consuming and polluting ones

[8] US$ equivalent calculated at RMB-US$ exchange rate of 7.75

Import/export regulations and tariffs

Background

- Import tariffs for seaweed and carrageenan products fall into three categories, and different tariffs are applied for different categories:

  1. *General tariff rate* – this is the highest tariff rate that is applied to import from all countries that do not fall under the MFN or SPT tariff

  2. *Most Favored Nation (MFN) tariff* – this rate is lower than the general tariff rate, and applies to import from all WTO member countries. In the WTO agreement, all member countries agree to accord MFN rates to each other

  3. *Special Preferential Treatment (SPT) tariff* – this is the lowest tariff rate, which applies to import from all ASEAN countries. This was designed to improve China's trade ties with the ASEAN countries

     - ASEAN (Association of Southeast Asian Nations) consists of 10 countries - *Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar (Burma), Philippines, Singapore, Thailand,* and *Vietnam*

Import taxes

- China's import tariffs have decreased considerably since joining the WTO - tariffs for seaweed imports are currently at 15% for all WTO members (MFN tariff)

- Thus, seaweed imported from Indonesia and the Philippines is taxed at the *Special Preferential Tariff* rate, which is 7.5%

- In addition, imports are also subject to a *Value Added Tax* (VAT) of 13%

Table: import tariffs for seaweed and carrageenan

Product	HS code description	HS-code	General tariff rate	Tariff rate for MFN[9]	Tariff rate for SPT[10]	VAT rate
Seaweed	Other locust beans, seaweed and other algae, sugar beet and sugar cane, fresh, chilled, frozen or dried, whether or not ground	12122090	70%	15%	**7.5%**	13%
Carrageenan	Other mucilages and thickeners derived from vegetable products	13023900	80%	15%	**8%**	17%

Source: China Customs

[9] MFN: Most Favored Nation – includes all countries in the WTO agreement
[10] SPT: Special Preferential Tariff – includes all 10 ASEAN countries: Brunei, Cambodia, Indonesia, Laos, Malaysia,

- Thus, total tax payable is as follows:

  Tax Payable = VAT Rate x [Dutiable Value + Customs Duty]

  - The dutiable value of imported goods includes the purchase price and the transport and insurance cost

- Import of carrageenan from Indonesia and the Philippines is subject to a SPT rate of 8% and VAT of 17%

Export taxes

- In order to encourage exports of products manufactured in China, a rebate is given on *Value Added Tax* for exported goods

- For carrageenan, the VAT is 17%, and the rebate rate is 13%

Table: export taxes for seaweed and carrageenan

Product	HS code description	HS-code	VAT rate	VAT rebate rate
Seaweed	Other locust beans, seaweed and other algae, sugar beet and sugar cane, fresh, chilled, frozen or dried, whether or not ground	12122090	17%	13%
Carrageenan	Other mucilages and thickeners derived from vegetable products	13023900	17%	13%

END-USER INDUSTRIES

Background

- Carrageenan has a wide variety of uses in a variety of industries. As a food additive, carrageenan can improve the taste and texture of food. It can be used in the production of:
    - *Processed meat* - water binding properties, increase product yields, improve texture, fat replacement, etc.
    - *Dairy products* (e.g. milk, frozen desserts, flans, puddings etc.) - provides cocoa suspension, milk stability, emulsion stability, milk gelling functions
    - *Cold Milk Powders* (e.g. diet powder mixes, nutritional beverage mixes) - provides body, suspends solids
    - *Water gel Desserts* - provides wide range of textures and flavor release, all without the need for refrigeration

- In addition, carrageenan can also be used in other industries such as:
    - *Toothpaste* - provides structure without masking flavors, resistant to enzymatic breakdown
    - *Pharmaceuticals* - provides animal-free capsules (soft and hard)
    - *Air Freshener Gels* - provides structure and controlled release of active ingredients such as per fume in a water gel base

- The properties and uses of carrageenan depend on the type of seaweed species from which carrageenan is extracted. The following are the key types of carrageenan, main properties and end-uses

Type of carrageenan	Properties	Common uses
Kappa	Forms rigid, thermally reversible, high strength gels	Dessert gels, pet food gels, air freshener gels
Kappa 2	Forms weak gels which are highly milk reactive	UHT milk
Iota	Forms elastic, thermally reversible gels and thyrotrophic dispersions	Toothpastes, burger patties, soft jellies
Lambda	Non-gelling, high viscosity and cold-soluble	Instant whipped creams, milk shakes

Source: multiple sources including company websites and industry reports

Overview of end-users of carrageenan in China

- In China, about 95% of carrageenan produced for domestic use goes to the food industry, and in particular, to three key types of food industries: meat, jelly, and soft sweets

1. *Meat*
   - The total production volume of Chinese meat products ranks number 1 of the world, however, only about 10% of all meat produced is processed
   - Although Chinese generally prefer fresh meat, processed meat products like ham are rising in popularity and there is still growth potential in the processed meat market and consequently for carrageenan

2. *Jelly*
   - The jelly industry, which has been growing at 20% annually since 2000, is the largest end-user industry for carrageenan and still has significant growth potential
   - Jelly is highly popular among Chinese consumers, with a market worth of about RMB 5 – 6 billion (US$0.6 – 0.8 billion)

3. *Soft sweets*
   - The sweet industry is worth about RMB 20 billion (US$2.6 billion), of which soft sweets take up about 10%
   - The average consumption of sweets is still lower than international levels, and demand is expected to continue rising at more than 10% annually, together with rising incomes

- Most meat manufacturers and processors are located in the East, in *Shandong* and *Henan* province, which accounts for more than 40% of total domestic meat production

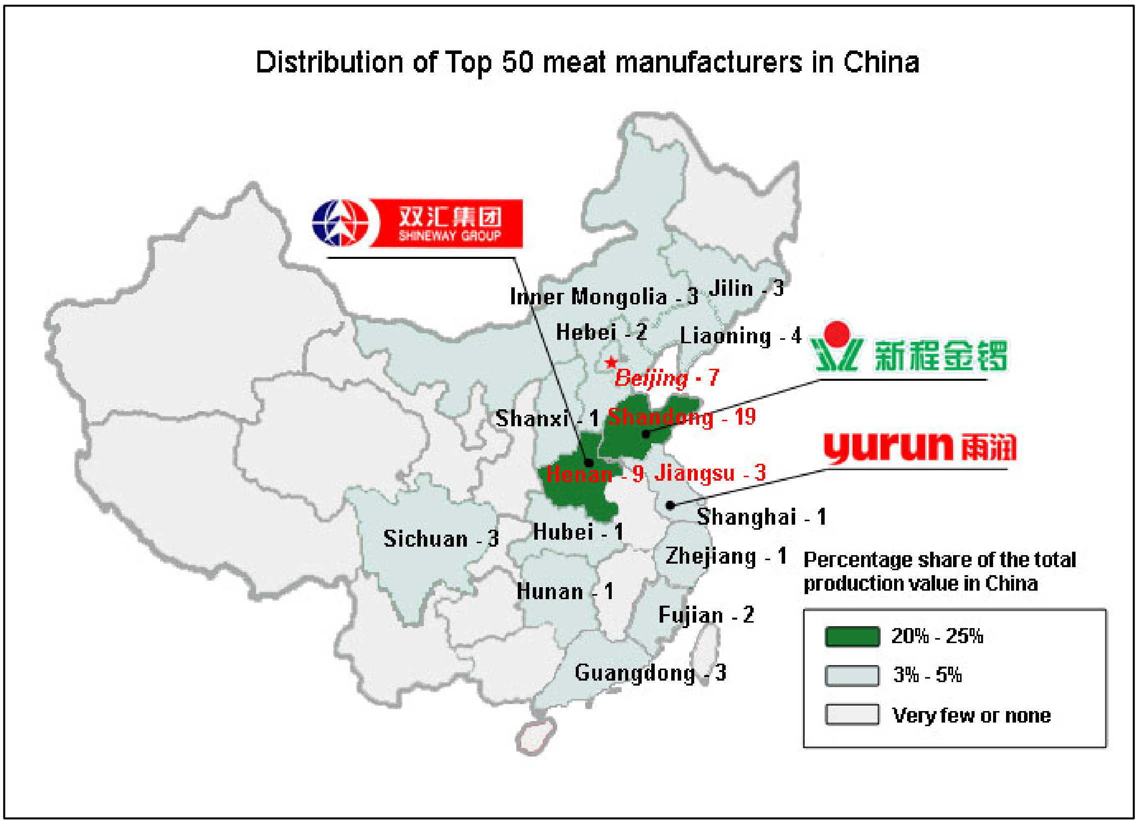
- On the other hand, most jelly and soft sweet manufacturers are located in the South, especially in *Guangdong* and *Fujian* province which together account for about 85% of total production of jelly and sweets in China

- The following sections show the landscape of the key end-users

Landscape of major end-users

Meat manufacturers

- The processed meat industry in China is still in a developing phase – processed meat products market production in 2005 was 8.5 million tons, which accounts for about 10% of total meat production
- "Western" style processed meat products account for 60% of total processed meat, of which 40% are high temperature treated such as ham and sausages
- On the other hand, 40% of processed meat are Chinese-style traditional meat products, such as Chinese sausages
- Carrageenan and carrageenan-blended solutions are used most widely in western-style meat products such as ham and sausages. Production of such meat in China is about 3 – 4 million tons annually



Source: JLJ analysis

- There are around 2500 meat products manufacturers in China, of which 1000 are also meat processors. The companies are spread out across many provinces, but the highest concentration is in Shandong and Henan province, which together account for more than 40% of total domestic meat production

- Although there are many manufacturers, the market is fairly consolidated – the top 3 brands - *Shuanghui, Yurun,* and *Jinluo* - hold more than 60% share in the western-style processed meat market

Table: Top 3 meat manufacturers in China

	Company name	Key products	Year established	Province	City	Sales revenue, 2006 (RMB B)	Annual production capacity (tons/year)
1	**Shineway Group**	Ham, sausages, chilled meat	1980	Henan	Luohe	~16	>1 million
2	**Yurun Food Group**	Ham, sausages, chilled meat	1993	Jiangsu	Nanjing	~13	0.8 – 1 million
3	**Linyi Xincheng Jinluo Meat Products**	Ham, sausages, chilled meat	1994	Shandong	Linyi	>10	~2 million

Source: JLJ

1. Shineway Group

- Established in the 1980s, *Shineway* is the largest meat processor in China with more than 40,000 employees

- The company has factories in 12 cities and more than 200 sales offices across China; Production capacity of processed meat products is more than 1 million tons annually

- Export takes up about 10% of the company's revenue, and products are exported mainly to countries in Asia such as *Japan, Singapore, South Korea,* and *the Philippines*

2. Yurun Food Group

- *Yurun* is one of the leading meat product suppliers in China, with a wide range of chilled and frozen pork. The products are marketed under a variety of brands, including *Yurun*, *Furun*, *Wangrun* and *Popular Meat Packing*

- In 2006, reached 13 billion RMB, and *Yurun's* processed meat products, which are positioned in the mid-high end, hold more than 30% market share

- *Yurun* is listed on the Main Board of the Hong Kong Stock Exchange

3. Linyi Xincheng Jinluo Meat Products

- Established in 1994, *Jinluo* mainly engages in the production of pork and chicken products. The company has about 20,000 employees, with production bases in *Shandong, Heilongjiang, Jilin, Inner Mongolia, Hunan, Sichuan,* and *Henan*

- Currently, the company has an annual slaughtering capacity of 15 million pigs and 45 million chickens and an annual processing capacity of about 2 million tons of meat and meat products, mainly in the low-mid end

- The company's sales network comprises of 42 sales offices, more than 3,300 franchise shops, and over 9,000 authorized dealers

Jelly manufacturers

- Jelly, as a very low cost and affordable snack, is highly popular in China. Cost is low as the composition of jelly is about 6% carrageenan, 5% konjac, 16% - 25% sugar, and the rest are water and other additives like pigment and flavor

- The first jelly factory was established in 1985, and the industry has developed rapidly since then. Currently annual production value is about 5 – 6 billion RMB

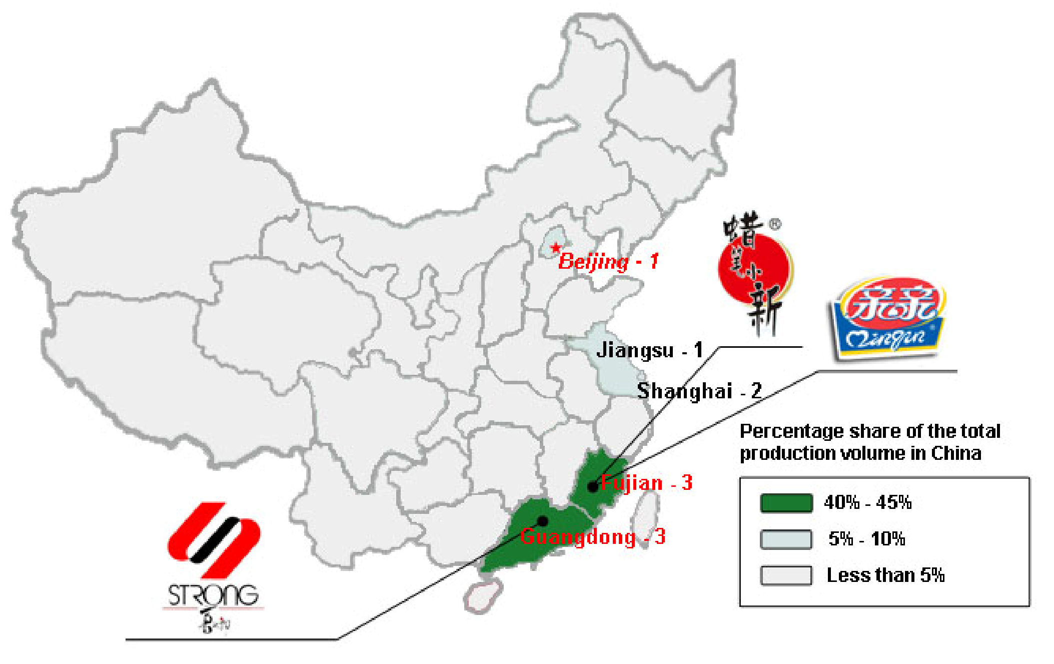
- The market has been growing at an outstanding rate, with CAGR (Compound Annual Growth Rate) of about 20% between 2000 – 2006

- The industry is highly consolidated - the top 10 manufacturers hold more than 90% market share, and in particular, the top 3 jelly manufacturers hold about 50% of share

- In addition, there are also hundreds of very small manufacturers, which serve mainly the rural markets; the quality and technology of these small manufacturers are very low

- Government regulations introduced in 2006 require jelly products to be larger than 3.5cm in diameter; this was in response to a high frequency of accident cases involving young children consuming jelly

Distribution of Top 10 jelly manufacturers in China



Source: JLJ

- The new regulations forced jelly manufacturers to change facilities and type and composition of raw materials used – many small manufacturers could not meet the new requirements and closed, thus strengthening consolidation of the industry

- Production is mainly concentrated in *Guangdong* and *Fujian* provinces, which together account for about 80-85% of the market

- The top few brands, such as *Strong food, QinQin,* and *Labixiaoxin,* are also located in *Guangdong* and *Fujian* province

Table: Top 3 jelly manufacturers in China

	Company name	Key products	Year established	Province	City	Sales revenue, 2006 (RMB B)	Annual production capacity (tons/year)
1	**Guangdong Strong Group**	Jelly, pudding, other snacks	1993	Guangdong	Shenzhen	~ 1.6	~ 180,000
2	**QinQin**	Jelly, pudding, other snacks	1985	Fujian	JinJiang	~ 0.7	~ 150,000
3	**Labixiaoxin (Fujian) Food Industry**	Jelly, pudding, other snacks	1994	Fujian	Quanzhou	~ 0.6	~ 100,000

Source: JLJ

1. Guangdong Strong Group Co., Ltd

- Established in 1993, *Strong Group* is the largest jelly and pudding manufacturer in China
- Its products contain packaged jelly, pudding, seasoned seaweed and other snacks
- Strong group hold more than 30% share of the domestic jelly and pudding market, and has 2 production facilities locate in the cities of *Yangjiang* in the South and *Nanjing* in the East
- The company has over 40 sales offices across mainland China, with an international distribution network covering North America, South America, Europe, Russia, Southeast Asia, Australia and the Middle East

2. QinQin Incorporated Co., Ltd

- The company was originally established in 1985 but was converted into a sino-foreign joint venture in 1998
- Products are mainly leisure snacks such as fruit jelly, cotton candy, cookies, seasoned seaweed, etc.
- Currently, *Qin Qin* has about 4000 employees, seven subsidiary companies in China (in Fujian, Liaoning, Henan, Chengdu Sichuan, Shandong, Hubei, and Shanxi) and two international trading companies (in HongKong and in the US)
- Exported products are mainly targeted at the US, Russia and Southeast Asia

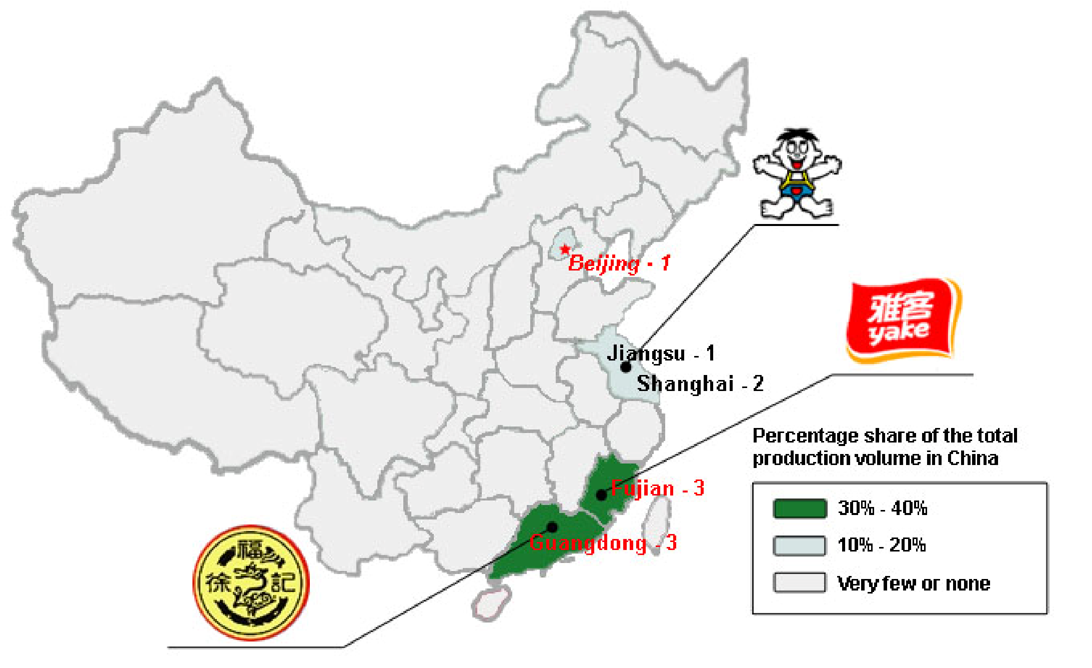
3. Labixiaoxin (Fujian) Foods Industry Co., Ltd

- *Labixiaoxin* is a highly popular and well-known jelly manufacturer in China, due to a large product offering, good taste, and attractive packaging
- It produces many types of jelly, including “jelly juice”, jelly bar, fruit pulp jelly, pudding and marshmallow
- The company is located in *Quanzhou Wuli Technology Industrial Zone* in *Fujian* province. The factory covers an area of more than 40,000 square meters.

Soft sweets manufacturers

- China is Asia’s largest sweet market, with annual production volume of 1.4 million tons and sales revenue of about 20 billion RMB in 2005
- The industry has also been growing at a relatively high growth rate of about 13% annually
- The soft sweets market takes up about 10% of the total sweet market, and main consumer groups are children
- Currently, the existing technology used in the soft sweets industry is still low and the value-added is also low
- Like many other industries in China, the industry is undergoing consolidation, with small factories which closing due to small production volumes and inability to compete

Distribution of Top 10 soft sweets manufacturers in China



Source: JLJ

- *Fujian* and *Guangzhou* are the largest production base, accounting for more than 60% of total volume

- The following table show the top three soft sweets manufacturers in China

Table: Top 3 jelly manufacturers in China

	Company name	Key products	Year established	Province	City	Sales revenue, 2006 (RMB B)
1	**Want Want Group**	Confectionery, rice cracker, other snacks	1962	Jiangsu	Nanjing	> 4
2	**Hsu Fu Chi International**	Confectionery, other snacks	1976	Guangdong	Dongguan	~ 2
3	**Fujian Yake Food**	Confectionery, other snacks	1993	Fujian	JinJiang	~ 0.5

Source: JLJ

1. *Want Want Group*

- Want Want is a Taiwanese company established in 1962, originally manufacturing canned agricultural products for export

- In 1983, company collaborated with one of the top three Japanese rice cracker makers, Iwatsuka Confectionary Co.,Ltd, by signing a technical corporation agreement to jointly develop the rice cracker market in Taiwan. Within a short span of time, *Want Want* became the market leader in the Taiwanese rice cracker market
- In 1987, it became the first Taiwanese company to register its trademark in China
- The company formally entered the Chinese market in 1992 through export, with heavy advertising on Chinese television stations
- *Want Want's* first facility in China started operation in *Hunan* province in 1994

2. *Hsu Fu Chi International Ltd*

- *Hsu Fu Chi* was originally founded in Taiwan in 1976. In 1992, the company entered the Chinese market and sold premium confectionery
- The company embarked on major expansion plans in 2000 to strengthen its market share in China
- By October 2006, the group had established 56 operating sales offices and more than 12,000 directly controlled retail points, making it one of the leading confectionery companies in China

3. *Fujian Yake Food Co. Ltd*

- *Fujian Yake* is a private Chinese company founded in 1993 in *Jinjiang* city, *Fujian* province

- The company's core brand is "*Yake*", and it also has many sub-brands such as *Yake V9*, *Yake DiDaDi* milk candy, *Yake Xylitol* chewing gum, *Yake vanilla* herb candy, etc.

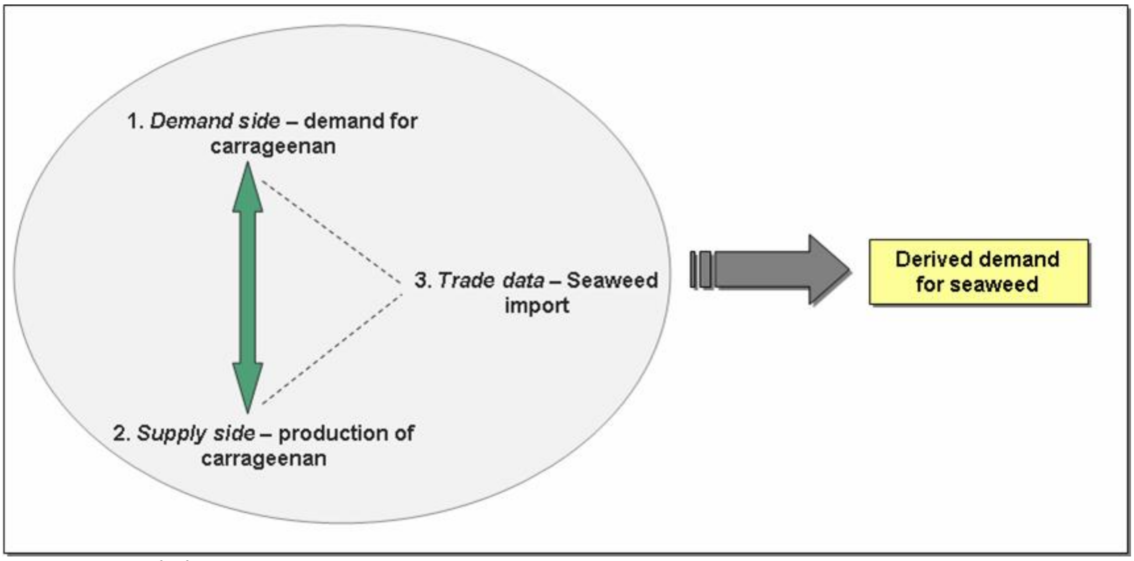
- Products include candy, chocolate, jelly, cakes and other snacks; total annual production capacity is more than 50,000 tons

- *Yake* has 4 factories and 9 branch companies in China

CHINA DERIVED DEMAND FOR SEAWEED

Overview of model

- An economic model was built to estimate the derived demand for seaweed in China. The model considers three angles - the supply side, demand side, and trade data, as shown in the figure below



Source: JLJ analysis

- The derived demand for seaweed is estimated based on triangulation and cross-checking of data from the three angels:

1. ***The demand side* –** Top-down approach which estimates the demand of carrageenan in the end-user industries. This is done through estimating the number of companies, production capacity, total production volume, and average percentage of carrageenan use in each of the three key industries (meat, jelly and soft sweets)

2. ***The supply side* –** Bottom-up approach which estimates carrageenan supply by considering the number of carrageenan producers in China and their relative production capacities

   - *Both the demand and supply side result in estimates of carrageenan demand and supply. The derived demand for seaweed is then estimated using an assumption on the ratio of seaweed to carrageenan use*

3. ***Trade data*** – shows actual and forecast actual seaweed import. This serves as a way to cross-check that the estimates of seaweed demand derived from both the supply and demand side are within the expected order of magnitude

Key assumptions

- As with any economic model, key assumptions are made in order to estimate the derived demand for seaweed
- The following table show some of the key assumptions in the model, as well as the sources and rationale for making the assumptions

[Note: Details of the model can be found in the appendix. The actual excel model is also provided together with this report]

Table: key assumptions of model

Category	Assumption	Assumed value	Source and rational for assumption
Overall	**Ratio of seaweed to carrageenan**	**5**	This means that 1 ton of carrageenan can be extracted from 5 tons of seaweed; derived from multiple sources including IFC and interviews of carrageenan manufacturers
	Percentage cottonii demand out of total demand	**90%**	From IFC-Pensa, SEAPlant.Net report
Demand side	**Total number of manufacturers by industry**	**Meat - 1,263** **Jelly – 525** **Soft sweets – 251**	Sum of total number of small, medium and large manufacturers, based on industry reports and primary research
	Average production capacity of manufacturers by industry by size	***Example for meat (T/year):*** **Small – 300** **Medium – 6,000** **Large – 30,000** *All other data in appendix*	JLJ estimates based on industry reports and primary research
	Average percentage of carrageenan	**Meat – 0.1%** **Jelly – 0.7%** **Soft sweets – 0.2%**	Refers to the amount of carrageenan needed in the product. E.g., 1% carrageenan means that for 1 ton of meat, 0.01 tons of carrageenan is required; based on carrageenan usage recommendations from carrageenan manufacturers
	Forecast CAGR (2007- 12)	**Meat – 9%** **Jelly – 20%** **Soft sweets – 13%** **Others - 8%**	Based on industry reports, news reports, and interviews
	Export percentage of carrageenan out of total supply	**30%**	Means that about 30% of carrageenan produced in China is exported. Assumption is derived from field research
Supply side	**Total number of carrageenan manufacturers**	**57**	Sum of number of manufacturers by province, based on field research
	Average production capacity of manufacturers by size	***(T/year):*** **Small – 60** **Medium – 200** **Large – 500** **Top 5 – 1,000**	JLJ analysis based on field research
	Forecast CAGR (2007-12) for carrageenan supply	**13%**	Based on historical growth rate and demand trends
Trade data	**Forecast seaweed import**	**15%**	JLJ analysis based on historical CAGR and the past trends vs. estimated future trends in seaweed import

Derived demand for seaweed

Seaweed demand derived from three angles of the model

- Figure D1 on the following page shows the seaweed demand estimated from the three angles of the model – the supply side, demand side, and trade data
- As the graph shows, seaweed demand derived from the demand and supply side are very close, and also similar to historical seaweed import data
- The historical import data, being an "actual" value, serves to cross-check if the estimates from the supply and demand side are in the right order of magnitude
- In 2006, demand of seaweed estimated from the *demand side* was 56,050 tons, while that estimated from the *supply side was* 55,500 tons. Deduced "spinosum" and "cottonii" import in 2006 was 54,063 tons.

Final estimate of seaweed derived demand

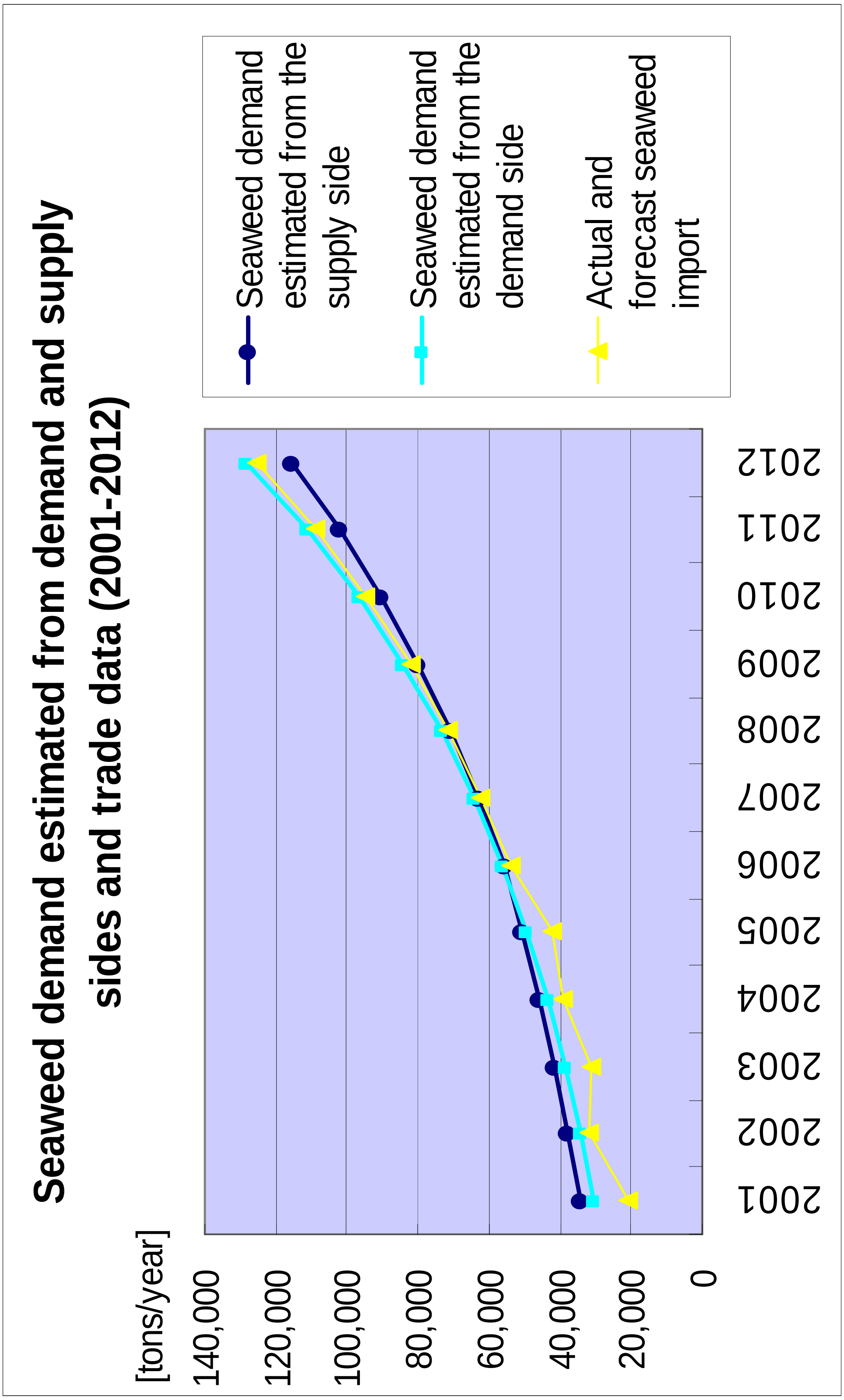
- The final estimated seaweed derived demand is then calculated using the average of all three estimates from the demand side, supply side, and trade data
- Figure D2 shows the historical and forecast seaweed derived demand. The estimated demand in 2006 was about 55,000 tons
- This is expected to increase at a CAGR of about 12.8% between 2007-2012, to reach a total demand of about 113,000 tons in 2012

Breakdown in seaweed demand by type

- Based on previous IFC estimates and from field interviews, the "cottonii" type accounts for about 90% of total demand, and "spinosum" accounts for 10%
- Using this assumption, Figure D3 shows the breakdown in seaweed demand between the two types of seaweed
- In 2006, the estimated demand for "cottonii" was 49,684 tons, and 4,652 tons for "spinosum"

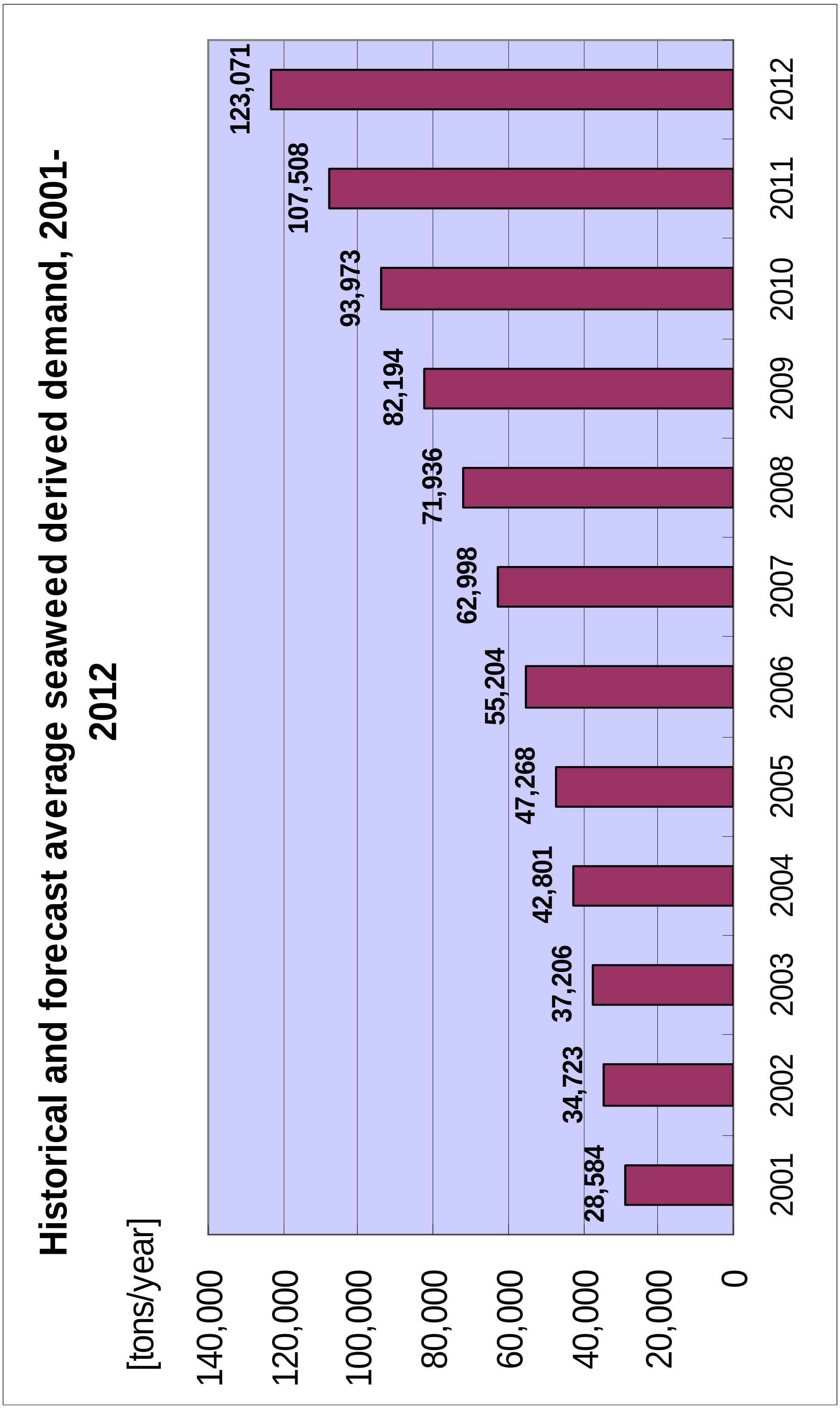
[Note: snapshots of the model are provided in the appendix]

Figure D1: Seaweed demand derived from the three angles of the model



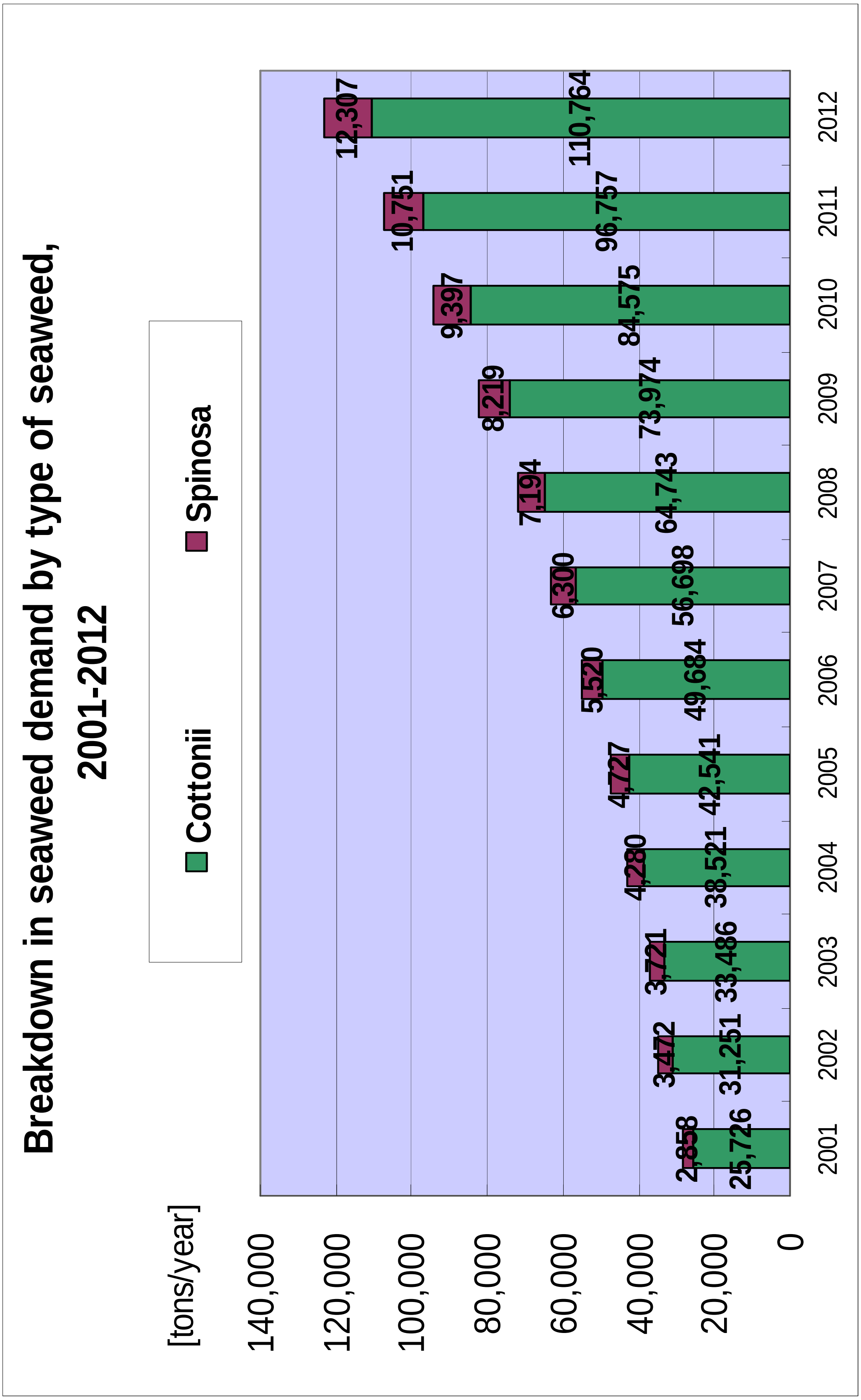
Source: Seaweed demand estimated from the demand and supply side are based on the economic model. Historical import data is obtained from IFC-Pensa; forecast import data is estimated based on the model

Figure D2: Final estimate of seaweed derived demand



Source: JLJ analysis

Figure D3: Breakdown in seaweed demand by type



Source: JLJ analysis

OVERALL ASSESSMENT

Key challenges in the carrageenan industry

- There is considerable market potential in the carrageenan industry, especially considering the rise in domestic demand in the key food end-user industries, as well as rise in export demand

- However despite growth potential, the industry is still at a low level of development and is highly influenced by trends in the food industry

- As most food manufacturers are still concentrated in the low-mid end, the requirements on suppliers are consequently low

- The low standards of domestic demand is also reflected by the lack of international players in the carrageenan and carrageenan-blended solution industries

- However, the situation is improving with increasing government supervision on food quality standards, as well as rising consumer sophistication and demand for food

- Export demand is also driving the overall growth of the carrageenan industry – currently the top few manufacturers are raising their own standards and producing better quality products in order to meet the demands of international buyers

- The following are the key challenges in the carrageenan industry

  1. *Intense price competition*

     – As the industry undergoes consolidation, there is also intense price competition among carrageenan manufacturers

     – Lower prices is achieved through mainly economies of scale, with larger manufacturers forcing small players out of the market

     – However there needs to be a shift into competition based on technology and quality, rather than solely on price

  2. *Predominantly low technology level*

     – In line with price competition, most manufacturers are currently in the low-mid end with low technology, and consequently, quality levels

     – Only the top few companies have higher technology and relatively higher efficiency (which also adds to their price advantage)

- Like many other processing industries for agricultural products, the carrageenan industry remains at a overall low level of development

3. *Limited R&D capabilities*

- There is very limited Research & Development capabilities in carrageenan-blended solutions, which explains why majority of carrageenan produced is sold in the form of pure carrageenan directly to food companies, which process their own solutions
- Currently, most of research in solutions is undertaken by food companies, and both carrageenan manufacturers and solution providers are "passive" – they respond to demands from customers (food companies), instead of proactively developing solutions to work with food companies
- One of the key reasons for this is the lack of skilled R&D personnel. Also, food companies are not sophisticated and generally do not demand complex solutions

Potential opportunities for IFC-Pensa for further studies

- This study, which focused carrageenan and carrageenan-blended solutions, has shown that there is future potential in the carrageenan industry

- There are several areas where there may be opportunities for further studies:

➢ *Further study on end-users*

  - This report only looks at the end-user industries at the high-level, giving broad overview and trends
  - A further study could be done on the end-user industries in greater detail, looking at more specific product types, volumes and future trends, thus providing more detailed outlook on future seaweed demand

➢ *In-depth study on top carrageenan manufacturers*

  - There are several top private Chinese carrageenan manufacturers mostly established after 2000, which currently take up more than 50% market share
  - There may be opportunity for an in-depth study on these manufacturers to identify potential investment or partnership opportunities

➢ *Study on other types of blended solutions*

  - However, besides the top few companies, the overall industry is still not sophisticated, and this is reflected by the lack of international players
  - Currently, the international players in China are focused in other solutions, such as *xantham gum* and related products
  - Thus there may be opportunities for further studies in other types of solutions besides carrageenan-blended solutions

➢ *Other opportunities for further study may also come from IFC after studying this report, based on the current understanding of the Chinese carrageenan market*

GLOSSARY OF TERMS

FOB	A commercial term commonly used in a sales contract. The seller's obligations are fulfilled when the goods reach a point specified in the contract. For example, FOB at a named port of export means that the seller quotes the buyer a price that covers all costs up to and including the loading of goods aboard a vessel
JV	A Joint Venture is typically a partnership between a foreign company and a Chinese one. A JV may take the form of either Equity Joint Venture (EJV) or Cooperative Joint Venture (CJV). EJV companies have capital investments from both local and foreign firms. The percentage of the capital investment determines the amount of profit and risk that both the foreign and local company assumes. CJVs are also partnerships with a local company; however, the amount of risk and profit shared by each party is not determined by capital investment but rather agreed upon at the beginning of the partnership
MFN	Refers to Most Favored Nation tariff. All member countries of the WTO agreement accord MFN tariffs rates to each other
RC	Refined carrageenan
SPT	Refers to Special Preferential Tariff. This tariff rate is lower than the rate for other WTO members. This is accorded to all 10 ASEAN countries: *Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar (Burma), Philippines, Singapore, Thailand,* and *Vietnam*
SRC	Semi-refined carrageenan
WOFE	A Wholly Owned Foreign Enterprise (WOFE) is a company fully invested by foreign entities. Along with the rights afforded to a Rep. Office, a WOFE may also legally conduct business transactions within China and hire local employees on its own accord. However, a WOFE has a minimum investment requirement that is dependent upon the locality and nature of the business

APPENDIX

- **Snapshot of economic model**
    1. ***Summary sheet***
    2. ***Demand side***
    3. ***Supply side***
    4. ***Trade data***

- **Interview notes and information**

- **Database of key players (in excel)**

APPENDIX – SNAPSHOT OF ECONOMIC MODEL 1 *(summary sheet)*

Summary sheet - overview of seaweed demand

Legend

Changeable assumptions
Intermediate calculations
Results
Final results

Total carrageenan supply and demand (tons/year)

Carrageenan	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Carrageenan supply	6,892	7,581	8,340	9,174	10,091	11,100	12,543	14,174	16,016	18,098	20,451	23,110
Domestic demand	4,023	4,582	5,229	5,982	6,858	7,880	9,058	10,436	12,051	13,945	16,170	18,790
Export demand	2,068	2,274	2,502	2,752	3,027	3,330	3,763	4,252	4,805	5,429	6,135	6,933
Total demand	6,091	6,856	7,731	8,734	9,885	11,210	12,821	14,688	16,855	19,374	22,306	25,723

Ratio of seaweed to carrageenan	5

Source: multiple sources including IFC, and from field interviews of carrageenan manufacturers

Seaweed derived demand (tons/year)

Seaweed	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Seaweed demand estimated from the supply side	34,461	37,907	41,698	45,868	50,455	55,500	62,715	70,868	80,081	90,491	102,255	115,548
Seaweed demand estimated from the demand side	30,453	34,280	38,656	43,670	49,427	56,050	64,107	73,442	84,277	96,870	111,529	128,615
Actual and forecast seaweed import	20,838	31,982	31,265	38,865	41,921	54,063	62,172	71,498	82,223	94,557	108,740	125,051
Estimated average seaweed derived demand (tons/year)	28,584	34,723	37,206	42,801	47,268	55,204	62,998	71,936	82,194	93,973	107,508	123,071

CAGR (2007-2012)	14.3%

Breakdown in seaweed demand

% cottonii demand	90%	% spinosa demand	10%

Source: SEAPlant.Net, Trade Data Summary for Agar and Carrageenan Seaweed Products of Indonesia and the Philippiness

Seaweed derived demand by species (tons/year)

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Cottonii	25,726	31,251	33,486	38,521	42,541	49,684	56,698	64,743	73,974	84,575	96,757	110,764
Spinosa	2,858	3,472	3,721	4,280	4,727	5,520	6,300	7,194	8,219	9,397	10,751	12,307

APPENDIX – SNAPSHOT OF ECONOMIC MODEL 2 *(demand side)*

Demand side - end-users

Legend

Raw data
Changeable assumptions
Intermediate calculations
Assumptions made somewhere else
Results

Carrageenan DOMESTIC demand by end-user industry (2006)

1.Meat

Company size	Small	Medium	Large (excluding Top 3)	Top 3
Production capacity range (Tons/year)	0 - 5,000	5,000 - 10,000	10,000 - 100,000	100,000 - 900,000
Average production capacity (Ton/year)	300	6,000	30,000	600,000
No. of companies	1,200	40	20	3
Production capacity (Tons/year)	360,000	240,000	600,000	1,800,000
Total No. of companies				1,263
Total production volume (Ton/year)				3,000,000

Source: the assumptions on average production capacity and number of companies are JLJ analysis based on industry reports and information gathered through primary research

2. Jelly

Company size	Small	Medium	Large (excluding Top 3)	Top 3
Production capacity range (Tons/year)	0 - 1,000	1,000 - 5,000	5,000 - 30,000	30,000 - 180,000
Average production capacity (Ton/year)	100	2,000	20,000	120,000
No. of companies	480	36	6	3
Production capacity (Tons/year)	48,000	72,000	120,000	360,000
Total No. of companies				525
Total production volume (Ton/year)				600,000

Source: the assumptions on average production capacity and number of companies are JLJ analysis based on industry reports and information gathered through primary research

3. Soft sweets

Manufacturer production scale	Small	Medium	Large (excluding Top 3)	Top 3
Production capacity range (Tons/year)	0 - 300	300 - 1,000	1,000 - 10,000	10,000 - 40,000
Average production capacity (Ton/year)	100	500	5,000	20,000
No. of companies	200	40	8	3
Production capacity (Tons/year)	20,000	20,000	40,000	60,000
Total No. of companies				251
Total production volume (Ton/year)				140,000

Source: the assumptions on average production capacity and number of companies are JLJ analysis based on industry reports and information gathered through primary research

Total DOMESTIC end-user carrageenan demand (2006)

End-users	Meat products	Jelly	Soft sweets	Other uses	Total carrageenan demand (2006)
Production volume (Tons/year)	3,000,000	600,000	140,000	N/A	
Average percentage of carrageenan* (%)	0.1%	0.7%	0.2%	N/A	
Carrageenan demand (Tons/year)	3,000	4,200	280	400	7,880

****Note: the average percentage of carrageenan refers to the amount of carrageenan needed in the product. E.g., 1% carrageenan means that for 1 ton of meat, 0.01 tons of carrageenan is required. This is an average, and actual values will differ depending on specifications of both the end-product and carrageenan***

Source: based on carrageenan usage recommendations from carrageenan manufacturers

Historical and forecast DOMESTIC end-user carrageenan demand (2001-2012)

End-users	Meat products	Jelly	Soft sweets	Other uses
Estimated historical CAGR (2001 - 2006)	10%	20%	12%	5%
Forecast CAGR (2007-2012)	9%	20%	13%	8%

Source: based on industry reports, news reports, and interviews

Historical and forecast carrageenan demand (tons/year)

End-user	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Meat	1,863	2,049	2,254	2,479	2,727	3,000	3,270	3,564	3,885	4,235	4,616	5,031
Jelly	1,688	2,025	2,431	2,917	3,500	4,200	5,040	6,048	7,258	8,709	10,451	12,541
Soft sweets	159	178	199	223	250	280	316	358	404	457	516	583
Others	313	329	346	363	381	400	432	467	504	544	588	635
Total	**4,023**	**4,582**	**5,229**	**5,982**	**6,858**	**7,880**	**9,058**	**10,436**	**12,051**	**13,945**	**16,170**	**18,790**

Average historical CAGR (2001-2006)	14.39%

Average forecast CAGR	15.71%

EXPORT DEMAND

Export of carrageenan produced in China (2001-2012)

% of carrageenan exported	30%

Source: based on field interviews

Export demand of carrageenan (tons/year)

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2,068	2,274	2,502	2,752	3,027	3,330	3,763	4,252	4,805	5,429	6,135	6,933

APPENDIX – SNAPSHOT OF ECONOMIC MODEL 3 *(supply side)*

Supply side - carrageenan producers

Legend

Raw data
Changeable assumptions
Intermediate calculations
Results

Carrageenan production (2006)

Company size	Small	Medium	Large (excluding Top 5)	Top 5
Production capacity range (Tons/year)	0 - 100	100 - 400	400 - 800	800 - 1500
Average production capacity (Tons/year)	60	200	500	1000

Source: the average production capacity assumptions are JLJ analysis based on information gathered in the course of field research

Cluster		No. of companies	No. of companies	No. of companies	No. of companies	Total No. of companies
Province	City					
Hainan	*Qionghai*	8	2	1	2	22
	Wenchang	6	3	0	0	
Guangdong	*Guangzhou*	3	1	0	0	4
Fujian	*Shishi*	6	3	1	0	21
	Quanzhou	7	3	0	1	
Sichuan	*Chengdu*	2	1	0	0	3
Shanghai	*Shanghai*	0	0	0	1	1
Jiangsu	*Changzhou*	0	0	0	1	1
Shandong	*Tengzhou*	3	2	0	0	5

Source: the number of companies was obtained from field research

Total number of companies	35	15	2	5	**57**
Total production capacity	2100	3000	1000	5000	**11100**

Historical and forecast carrageenan production (2001 - 2012)

Estimated historical CAGR (2001-2006)	10%	Source: multiple sources including news reports and field interviews of carrageenan manufacturers
Forecast CAGR (2007-2012)	**13%**	Source: JLJ estimate based on historical growth rate and demand trends

Historical and forecast carrageenan production (tons/year)

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
6,892	**7,581**	**8,340**	**9,174**	**10,091**	**11,100**	**12,543**	**14,174**	**16,016**	**18,098**	**20,451**	**23,110**

APPENDIX – SNAPSHOT OF ECONOMIC MODEL 4 *(trade data)*

Import data

Raw data
Changeable assumptions
Intermediate calculations
Results

Seaweed imports (2001-2005 actual data, 2006 estimate)

Deduced import of cottonii and spinosum

DISTRICT	2001	2002	2003	2004	2005	*2006 estimate*
Shenzhen	9,637	6,715	4,387	11,232	9,809	
Xiamen	1,563	3,700	7,712	8,703	10,887	
Shantou	2,632	3,667	4,854	4,473	7,784	
Gongbei	1	3,015	8,057	5,992	1,607	
Guangzhou	3,642	7,486	2,097	1,575	1,231	
Shanghai	58	192	1,789	4,963	6,307	
Nanning	1,547	4,535	18	24	25	
Qingdao	575	297	555	1,203	2,223	
Haikou	0	488	1,597	466	644	
Zhanjiang	847	655	0	16	25	
Jiangmen	73	313	60	185	208	
Fuzhou	92	169	0	18	1,156	
Ningbo	59	631	39	0	0	
Huangpu	112	102	99	0	0	
Dalian	0	0	0	11	15	
Tianjin	0	16	0	0	0	
Kunming	0	0	0	4	0	
Total	20,838	31,982	31,265	38,865	41,921	**54,063**

Source: IFC-Pensa. Note: the data are deduced figures.

Actual import figures based on HS 12122090

Total import	2001	2002	2003	2004	2005	*2006*
Total HS 12122090 imports (tons/year)	30,468	41,991	45,720	58,521	61,771	77,852
% cottonii and spinosum out of HS 12122090 total imports	68.39%	76.16%	68.38%	66.41%	67.87%	**69.44%**

Explanation for estimating 2006 spinosum/cottonii import: The deduced estimates of spinosum and cottonii imports from 2001-05 is compared to actual import data as recorded by China customs. The ratio of spinosum/cottonii imports out of total HS 12122090 imports is calculated for the five years, and the average for 2001-2005 is taken. This ratio is then applied to actual HS122020 imports for 2006, to estimate spinosum/cottonii import for 2006

Note: HS 12122090 is the official HS code for seaweed imports and the HS code description is: *Other locust beans, seaweed and other algae, sugar beet and sugar cane, fresh, chilled, frozen or dried, whether or not* ground

Source for HS 12122090 import: World Trade Atlas

Imported seaweed (2001 - 2005)	
CAGR	19.10%

Forecast of seaweed import (2007 - 2012)

Forecast CAGR (2007-2012)	15%

Source: JLJ analysis,the forecast rate is slightly lower than the historical CAGR. This is because several large carrageenan manufacturers built significant market share in the period of 2001-2005, at the same time forcing out small players. Large manufacturers typically import most seaweed, while small players may use some domestic seaweed. Thus there was a jump in seaweed import rate between 2001-05 because of switching from domestic seaweed supply to import. Future seaweed import growth will be driven by growth of carrageenan industry, while the "substitution" effect between domestic supply and import should

Forecast of seaweed import (tons/year)

2007	2008	2009	2010	2011	2012
62,172	**71,498**	**82,223**	**94,557**	**108,740**	**125,051**

APPENDIX – INTERVIEW NOTES AND INFORMATION

- This appendix provides all interview notes and information collected throughout the course of field research

- A separate excel database, listing all key players, company information and contact details is also provided

- The primary research for this project covered:

    - Factory visits to about 20 carrageenan manufacturers and solution providers
    - Visit to food additives exposition and conducted face-to-face interviews with about 20 solution providers
    - Telephone interviews with nearly 200 industry players including carrageenan manufacturers and solution providers
    - About 10 interviews with end-users (food companies)

- Detailed interview notes are provided for the factory visits and face-to-face interviews, while all information collected from telephone interviews are recorded in the Excel database

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Note: All contact information (address, fax, email etc.) are provided in the Excel database

HAINAN DAZHONG OCEAN INDUSTRY CO., LTD

Company snapshot

Company Name	Hainan Dazhong Ocean Industry Co., Ltd.
Company Type	Private Chinese
Main products	Carrageenan, solution
Year established	Established in 1958, then hold by Shanghai Dazhong Public Utilities Co.,Ltd and renamed in 1998.
Number of employees	130
Annual seaweed demand (Tons)	5000
Source of seaweed	Indonesia
Price of seaweed (RMB/ton)	6,000 – 7,000
Annual production capacity (Tons)	700 RC and 500 SRC
Price of carrageenan (RMB/ton)	60,000 FOB Haikou for RC
Annual sales revenue (RMB)	45M
Export percentage	30% to EU, US and East Asia
Key customers	Large domestic food companies, such as "Labixiaoxin" and "Xizhilang" and other foreign FMCG cpmanies.

Company background

- Hainan Dazhong Ocean Industry Co.,Ltd. Is owned by Shanghai Dazhong Public Utilities Co., Ltd. It specializes in sea products including plant seaweed, shrimp feed, carrageenan and other solutions
- Hainan Dazhong is one of the earliest and biggest carrageenan manufactures in China, with about RMB 60 million in assets.
- The company has an aquafarm which has three sea administrations managing a 25 square kilometer sea area and a factory

Raw material purchasing

- The raw material (seaweed) is mainly purchased from Indonesia because the price is acceptable and the quality is good
- Purchasing is carried out through trading companies in Indonesia, and Hainan Dazhong is in direct contact with these companies. They now have 2 long term cooperative trading companies in Indonesia and seek for more.

Production and sales

- The annually production capacity is 800 tons of refined carrageenan, 1000 tons of semi-refined carrageenan and 2000 tons of carrageenan-blended products.
- Products are exported to Europe, North American and Asia.

Other information

- As food additive technology developed, carrageenan became the substitute of glutin for its better physical character and market demand increased significantly in the 1990s
- Factories of all sizes size were built because of the attractive profit margin. Inchoate carrageenan manufacturing companies were mainly founded in Hainan as Hainan was the primary growing base of eucheuma.
- However the quantity of eucheuma provided by domestic suppliers was quite small compared to demand, and processors began to import eucheuma
- Currently about 95% of carrageenan companies import raw material seaweed from Indonesia, Philippines, and Malaysia
- The company estimates that the total demand of carrageenan in the China domestic market is about 7,000 tons annually. Although carrageenan can be used in many ways as an additive, the overall demand volume is not large since only a small quantity of carrageenan is required to achieve the target effects. For example, 1 kg of carrageenan powder can act as an additive to produce 1000kg of meat products. The market growth rate is approximate 8% annually.

HAINAN QIONGHAI LONGFENG CARRAGEENAN CO., LTD.

Company snapshot

Company Name	Hainan Qionghai Longfeng Carrageenan Co., Ltd.
Company Type	Private Chinese
Main products	Carrageenan, solution
Year established	1986
Number of employees	80
Annual seaweed demand (Tons)	4,000
Source of seaweed	Philippines 60%, Indonesia 30%, Malaysia 10%
Price of seaweed (RMB/ton)	7,000 – 8,000
Annual production capacity (Tons)	800RC
Price of carrageenan (RMB/ton)	82,000 FOB Shanghai for RC
Annual sales revenue (RMB)	30M
Export percentage	40% mainly to US and East Asia
Key customers	Large domestic food companies, Japanese FMCG companies

Company background

- The company was built in 1986 and is one of the largest producers of Kappa carrageenan in China
- The carrageenan industry is a small one and owners of companies know each other; some were former colleagues. The founder of Longfeng was a former employee of Hainan Dazhong. This is the same for the founder of Shanghai Beilian. Thus the owners of two of the top five producers, Beilian and Longfeng, were ex-colleagues.

Raw material purchasing

- Longfeng preferred seaweed suppliers from the Philippines (60%) rather than Indonesia (30%) because the quality is more consistent than seaweed from Indonesia

Production and sales

- The annually production capacity is 800 tons of refined carrageenan and 300 tons of solutions
- Products are exported to North American and Japan

Other information

- 5 - 6 tons of eucheuma (cottonii) can abstract 1 ton of carrageenan, and the price of the dry seaweed is around 7000RMB, so if a company produces 20 tons of carrageenan monthly, it needs 20 tons of dry eucheuma. Thus the cash flow for raw material monthly is about 840K RMB
- The company estimates that large carrageenan factories have a production capacity of 60 tons monthly. A medium sized company's monthly output is about 20 - 30 tons
- Small sized companies are mainly family workshops, which do not have a production line. Instead these companies usually have only 1 or 2 boilers and one disintegrator without sterilization facilities. The annual output of this type of company is about 10-15 ton annually

HAINAN QIONGHAI QISHUN CARRAGEENAN CO., LTD.

Company snapshot

Company Name	Hainan Qionghai Qishun Carrageenan Co., Ltd.
Company Type	Private Chinese
Main products	Carrageenan, solution
Year established	1998
Number of employees	80
Annual seaweed demand (Tons)	2,000
Source of seaweed	Indonesia 60%, Philippines 40%
Price of seaweed (RMB/ton)	7,000 – 8,000
Annual production capacity (Tons)	400RC
Price of carrageenan (RMB/ton)	70,000 FOB Shanghai for RC
Annual sales revenue (RMB)	40M
Export percentage	30% mainly to East Asia
Key customers	Domestic food companies.

Company background

- The company was built in 1998 and is not a particularly famous company in *Hainan*

Raw material purchasing

- The general manager personally manages relationships with traders in Indonesia and he goes to Indonesia annually to check on the raw materials
- The deals are not case by case but a long term relationship. Each factory always has about 2 or 3 steady suppliers from which they purchase seaweed

Production and sales

- The annual production capacity is 600 tons of refined carrageenan and 100 tons of solutions
- Products are exported to Southeast Asia countries

Other information

- It is difficult to take photos of the plant, including photos of the exterior. This is common for Chinese local companies especially when the product is related to food
- Almost all companies claim to be able to produce 80 ton carrageenan per month, but in actual fact most do not have that capacity

- The factories which have good reputation in the market have steady clients but the production capacity is fixed. Thus when there is a new order, they would purchase products from smaller or newer companies

HAINAN QIONGHAI CHANGQING AGAR INDUSTRY CO., LTD.

Company snapshot

Company Name	Hainan Qionghai Changqing Agar Industry Co., Ltd.
Company Type	Private Chinese
Main products	Carrageenan, solution, agar-agar
Year established	1982
Number of employees	50
Annual seaweed demand (Tons)	1,000
Source of seaweed	Indonesia, Hainan
Price of seaweed (RMB/ton)	N/A
Annual production capacity (Tons)	200RC, 100SRC
Price of carrageenan (RMB/ton)	73,000 FOB Shanghai for RC
Annual sales revenue (RMB)	15M
Export percentage	10% mainly to East Asia
Key customers	Food companies in Hainan province and South China

Company background

- The primary product of *Changqing Agar Industry Co., Ltd* is Agar, and it is one of the earliest companies to have colloid separating technology. It was founded in 1982.
- The machinery are all domestically produced in China since the technology of extracting carrageenan is not complicated. It is also too costly to purchase imported machines

Raw material purchasing

- The seaweeds are mainly purchased from Indonesia. The manager of the company obtains contacts of Indonesian traders through family relationships with Indonesian Chinese and friends
- Companies like *Changqing* which do not have the import rights need to work with trading companies to import the seaweed
- The company also buys seaweed grown in *Hainan*, but the volume is small as the quality and the extraction rate is less than desirable

Production and sales

- The annual production capacity is 200 tons of refined carrageenan and 100 tons of SRC and several tons of solutions
- The solution is blended according to client demands, but the company has limited technology, it only provides basic solutions

Other information

- Carrageenan is a type of food additive, thus according to the food security standards the control of bacteria levels is crucial in the manufacturing process. Each company has its own sterilization method, and this technology becomes one of the core areas in which companies compete

HAINAN QIONGHAI HAITIAN CARRAGEENAN CO., LTD.

Company snapshot

Company Name	Hainan Qionghai Haitian Carrageenan Co., Ltd.
Company Type	Private Chinese
Main products	Carrageenan, agar-agar, solution
Year established	1989
Number of employees	90
Annual seaweed demand (Tons)	3,000
Source of seaweed	Philippines 70%, Indonesia 30%,
Price of seaweed (RMB/ton)	8,000
Annual production capacity (Tons)	400RC, 300SRC, 100Agar
Price of carrageenan (RMB/ton)	69,000FOB Shanghai for RC
Annual sales revenue (RMB)	30M
Export percentage	30% mainly to Southeast Asia countries
Key customers	Domestic soft candy factories, Southeast Asia solution providers and European FMCG companies

Company background

- The company was established in 1989 with investment of 20 million RMB
- The company has a drying square of approximately 30,000 square meters and the machinery are all domestically produced

Raw material purchasing

- Import of seaweed is mainly carried out by medium and large factories; most of them have import rights and the resources to connect with trade companies in Indonesia directly
- Small factories such as family workshops do not have import rights, so many use domestic seaweed grown in *Hainan*
- Some small factories also use illegal means to obtain seaweed from Indonesia or Philippines

Production and sales

- The annually production capacity is 400 tons of refined carrageenan and 300 tons of SRC, 100 tons of Agar and several tons of solutions
- Most of the products are purchased by the soft candy factories in *Hainan* and 30% products are exported to East Asian and European countries

Other information

- The main cost besides the raw material is the energy cost, such as coal and water
- The price of coal in *Hainan* is around 600 - 700RMB/ ton, this price is higher than in Mainland China.
- For water, the primary cost is in the treatment of polluted water, since the alkaline water is used in the process of producing carrageenan, and contains a lot of bacteria
- The growth of the carrageenan industry is about 8% - 10% annually
- Market growth has slowed in recent years, primarily due to issues with energy consumption and water pollution.
- The government has issued some limits and environmental protection policies which has increased the cost for the factories. Accompanied with the markup of energy cost, total cost for factory operation has increased rapidly in the last few years

HAINAN WENCHANG NANGANG CARRAGEENAN CO., LTD.

Company snapshot

Company Name	Hainan Wenchang Nangang Carrageenan Co., Ltd.
Company Type	Private Chinese
Main products	Carrageenan, solution
Year established	1988
Number of employees	50
Annual seaweed demand (Tons)	1,500
Source of seaweed	Philippines 30%, Indonesia 70%,
Price of seaweed (RMB/ton)	7,000
Annual production capacity (Tons)	300RC
Price of carrageenan (RMB/ton)	65,000FOB Shanghai for RC
Annual sales revenue (RMB)	20M
Export percentage	10% mainly to Southeast Asia
Key customers	Domestic jelly food factories and soft candy manufacturers in Hainan

Company background

- This is the brother company of *Hainan Wenchang City Carrageenan Co., Ltd*. The general managers of both company are relatives

Raw material purchasing

- The company chooses suppliers in Indonesia by standard benchmarks and they also traveled to Indonesia annually to check the quality of the seaweed and develop relationships with local traders
- The traders are recommended by local businessmen who are overseas Chinese in Indonesia. Some of these businessman also help buyers negotiate with traders and follow the sales process from order placement to product shipment

Production and sales

- The annually production capacity is 300 tons of refined carrageenan and several tons of solutions
- 40% of the products are sold to solution providers in China, and the rest are purchased by local soft candy and jelly manufacturers in Hainan and Fujian
- The profit rate is around 13%, but if companies use some tax evasion methods, the raw profit number could meet 25 - 30%

Other information

- Factories may be willing to choose raw materials (seaweed) which are higher in price if the quality is consistent. This could decrease the material consumption from 6:1 (i.e. 6 tons of seaweed to produce 1 ton of carrageenan) to 5:1. A long term cooperative relationship with suppliers is also needed.

HAINAN WENCHANG CITY CARRAGEENAN CO., LTD.

Company snapshot

Company Name	Hainan Wenchang City Carrageenan Co., Ltd.
Company Type	Private Chinese
Main products	Carrageenan, solution
Year established	1984
Number of employees	50
Annual seaweed demand (Tons)	1,500
Source of seaweed	Philippines 50%, Indonesia 50%,
Price of seaweed (RMB/ton)	7,000
Annual production capacity (Tons)	300RC
Price of carrageenan (RMB/ton)	65,000 FOB Shanghai for RC
Annual sales revenue (RMB)	20M
Export percentage	10% mainly to Southeast Asia
Key customers	Domestic soft candy factories and meat factories

Company background

- The company was founded in 1984 and the general manger of the company, Mr. Chen, is one of the senior engineers in the seaweed processing industry in China who was in charge of designing the production lines for several factories

Raw material purchasing

- Competition also exists between the suppliers from Indonesia and Philippines. But generally speaking, the price of Philippines is higher than Indonesia and the quality is also generally better
- The company expressed that it was difficult to deal with traders in Indonesia because of poor credit standing
- It is also difficult for Chinese companies to set a company in Indonesia in order to purchase seaweed. Currently, no Chinese carrageenan manufacturer has a subsidiary company in Indonesia

Production and sales

- The annual production capacity is 300 tons of refined carrageenan and 100 tons of solutions
- As the company does not have export rights, it exports through a trading company

Other information

- The current use of carrageenan in China is not mature since it is primarily used in the food processing industry. Thus the domestic market volume is not large, and the company estimates it at about 6,000 – 7,000 tons annually
- In developed countries such as US and Japan, carrageenan is also widely used widely in the medicine processing industry, commodity industry, air-condition industry and other of industries besides food processing
- As the quality and technology of Chinese carrageenan factories improve, they also could increasingly higher share in the world wide market
- The overseas demand for carrageenan is increasing and Chinese export is about 3,000 tons annually. The total production volume of China is about 10,000 ton a year
- It is not easy for new factories to enter the carrageenan manufacturing industry as the profit has been decreasing after year 2000. Production technique is also more complicated than in the 1990s since the requirements of end-users are continually rising
- The number of factories is decreasing and some of factories have become solution providers because profit margins are higher than for producing pure carrageenan

QUANZHOU LUBAO BIOCHEMISTRY CO., LTD

Company snapshot

Company Name	Quanzhou Lubao Biochemistry Co., Ltd
Company Type	WOFE (Hong Kong)
Main products	Carrageenan, solution
Year established	1999
Number of employees	100
Annual seaweed demand (Tons)	6,000
Source of seaweed	Philippines 30%, Indonesia 70%,
Price of seaweed (RMB/ton)	5,000
Annual production capacity (Tons)	700RC, 400SRC
Price of carrageenan (RMB/ton)	62,000 FOB Shanghai for RC
Annual sales revenue (RMB)	55M
Export percentage	50% mainly to European countries and US and East Asia
Key customers	Large jelly and soft candy manufacturers in Fujian and meat food companies in UK and US

Company background

- It is a WOFE company invested by *Long Green (Hong Kong) Development Co., Ltd* with a starting capital of USD$2.16 million. The company mainly provides carrageenan and food additives
- Since founding in 1999, the business has developed rapidly. In order to meet the increasing demand, the company added an investment of USD$1.28 million for expanding the factory and facilities at the beginning of year 2003

Raw material purchasing

- Seaweed is mainly purchased from Indonesia since the price is lower than the Philippines
- 30% of seaweeds are bought from Philippines because the general manager Mr. Chen (a Hong Kong native) used to work there. He also has friends and acquaintances in Indonesia

Production and sales

- The annually production capacity is 700 tons of refined carrageenan and 400 tons of SRC and a few hundred tons of solutions

- The company's strategy is to improve the technology and capacity to meet the growing demand of the international market, and to develop new solutions to occupy the domestic food market

Other information

- The carrageenan industry circle is a very small one. Managers of famous companies all know each other
- Carrageenan manufacturing could be divided into "low season" and "high season"
- The low season for soft candy is from June to September and this period is also the low season for carrageenan
- Most of the carrageenan manufactures also do not have drying facilities, and the way of drying carrageenan is to use sunlight. Thus many factories stop production in the rainy season of March to May
- The high season is between August to February, and during this period most factories continue production 24 hours per day
- Seaweed price could be influenced by temperature changes, but this does not have a large effect as large factories all have at least 1 or 2 months of raw material stock. It is only in cases of natural disasters such as tsunami and hurricane that prices will change

QUANZHOU LULIN BIOCHEMISTRY CO., LTD

Company snapshot

Company Name	Quanzhou Lulin Biochemistry Co., Ltd
Company Type	Private Chinese
Main products	Carrageenan, solution
Year established	1998
Number of employees	60
Annual seaweed demand (Tons)	1,000
Source of seaweed	Indonesia
Price of seaweed (RMB/ton)	7,000
Annual production capacity (Tons)	200RC
Price of carrageenan (RMB/ton)	65,000 FOB Shanghai for RC
Annual sales revenue (RMB)	13M
Export percentage	10% mainly to East Asia
Key customers	Domestic country market, low-end buyers

Company background

- The Agar processing facility of *LuLin Bioengineering Co., Ltd.* is a joint venture established by *Luqing Food Engineering Co., Ltd* of *Quanzhou* and *Pacific Co., Ltd.* of *Hong Kong*
- It combines manufacturing and sales functions with R&D division

Raw material purchasing

- Seaweeds are purchased from Chinese traders, since the production capacity is low in Lulin
- The cost is higher and quality is hard to control through dealing with traders in China. But companies like *Lulin* have no other choice because they do not have any relationships or acquaintances overseas that can enable them to find traders in Indonesia or the Philippines

Production and sales

- The annually production capacity is about 200 ton RC. Most of the medium factories in China are of this capacity
- The primary market of *Lulin* is low-end buyers (food companies) which aim at the rural market

Other information

- The carrageenan industry is small because the use of carrageenan is very narrow in China. Also factory standards are not high in general
- *Quanzhou* and *Shishi* are the main production bases in *Fujian* which take up approximately 30 - 40% share of total production in China
- With intense competition, the price of carrageenan has been decreasing in recent years
- The growth rate of carrageenan factories will be slower than in previous years. More small factories with low production standards will close or merge into larger factories. Nevertheless there is still good prospects if industry standards rise

SHISHI XIELI OCEAN BIOCHEMISTRY CO., LTD

Company snapshot

Company Name	Shishi Xieli Ocean Biochemistry Co., Ltd
Company Type	Private Chinese
Main products	Agar-agar, carrageenan, solution
Year established	1985
Number of employees	60
Annual seaweed demand (Tons)	1,500
Source of seaweed	Philippines 60%, Indonesia 40%
Price of seaweed (RMB/ton)	N/A
Annual production capacity (Tons)	300RC
Price of carrageenan (RMB/ton)	62,000 FOB Shanghai for RC
Annual sales revenue (RMB)	10M
Export percentage	20%, mainly to Southeast Asia
Key customers	Food companies in Fujian and Southeast Asia

Company background

- The company was founded in 1985. The main products are agar and carrageenan
- It was the first carrageenan manufacturer in *Fujian* province

Raw material purchasing

- With a long history in the carrageenan industry, the company has established good relationships with overseas Chinese businessman who are in Indonesia and Philippines, through which they obtain contacts of seaweed traders

Production and sales

- The annual production capacity is approximately 300 tons RC and 300 tons SRC annually
- About 20% of products is bought by distributors who re-sell to pure solution providers or food companies
- The sales revenue is approximate 10M RMB annually

Other information

- There are about 6 or 7 large traders in Indonesia which the company is aware of. The company estimates that there could be dozens of traders in Indonesia
- The company selected the traders personally, and the key factors in selecting traders are reasonable price, quality, steady volume and good relationship
- Some of the large traders in Indonesia have their own factory to sort the seaweed which are collected from farmers. The traders will re-dry the wet seaweed to control the moisture rate to around 35% in order to meet the requirement of buyers

SHISHI GLOBAL AGAR INDUSTRIES CO., LTD

Company snapshot

Company Name	Shishi Global Agar Industries Co., Ltd
Company Type	Private Chinese
Main products	Agar-agar, carrageenan, solution
Year established	1998
Number of employees	120
Annual seaweed demand (Tons)	2,000
Source of seaweed	Philippines 50%, Indonesia 50%
Price of seaweed (RMB/ton)	7,000
Annual production capacity (Tons)	400RC
Price of carrageenan (RMB/ton)	62,000 FOB Shanghai for RC
Annual sales revenue (RMB)	25M
Export percentage	40%, mainly to North US, European countries and Southeast countries.
Key customers	Market of Fujian and Henan province, North US, Europe and Southeast Asian countries

Company background

- The company was established as a three-way merger between *Shishi Shitou Agar Co., Ltd. Xiongsheng Seaweed Products Factory* and *Xiazhai Seaweed Processing Factory*
- The factory possesses 15M RMB in fixed capital and 4500 square meter plant. It has two agar and carrageenan processing lines which utilize imported technology and equipment. The company also has an R&D division

Raw material purchasing

- The company has 4 primary seaweed suppliers who are overseas Chinese businessmen - 2 are in the Philippines and 2 are in Indonesia
- Credit standing is the most important factor for the company, which has encountered several fraudulent traders in the past. However as the market develops, the occurrence of fraudulent traders is diminishing

Production and sales

- After the merger, the production capacity of the company increased 2.5 times to 600 tons of RC and 400 tons of SRC annually; the export percentage also increased to 40%

Other information

- A key trend in the Chinese carrageenan industry is that small companies are merging to form larger companies in order to compete for more market share

SHISHI ZHONGKE SEAWEED INDUSTRIES CO., LTD

Company snapshot

Company Name	Shishi Zhongke Seaweed Industries Co., Ltd
Company Type	Private Chinese
Main products	Carrageenan, solution
Year established	1998
Number of employees	45
Annual seaweed demand (Tons)	800
Source of seaweed	Indonesia
Price of seaweed (RMB/ton)	N/A
Annual production capacity (Tons)	150RC
Price of carrageenan (RMB/ton)	70,000 FOB Shanghai for RC
Annual sales revenue (RMB)	6M
Export percentage	5%, all are exported through trading companies
Key customers	Domestic market, mainly the food companies in Fujian

Company background

- Shishi Zhongke Seaweed Industries Co., Ltd was founded in 1998, and is a relatively small-mid sized operation

Raw material purchasing

- The seaweeds are mainly purchased from Chinese traders, as the company does not have import/export rights
- This is typical for small companies. Small companies also do not have resources to connect directly with overseas traders

Production and sales

- The primary buyers are local food companies in Fujian province
- A small percentage (5%) of products are exported to Southeast Asia countries through trading companies

Other information

- The import tax of seaweed was 15% previously. However with a new policy, seaweed imported from Southeast Asian countries such as Indonesia and Philippines will be taxed at a rate of 8%
- Companies exporting carrageenan can also claim a 13% VAT refund. This applies to export of all goods manufactured in China.
- However, the import-export policy changes frequently and may be hard to predict

SHISHI XINMING FOODSTUFF SCIENCE & TECHNOLOGY Co,. LTD.

Company snapshot

Company Name	Shishi Xinming Foodstuff Science & Technology Co,. Ltd
Company Type	Private Chinese
Main products	Agar-agar, carrageenan, solution
Year established	1998
Number of employees	50
Annual seaweed demand (Tons)	800
Source of seaweed	Philippines 30%, Indonesia 70%,
Price of seaweed (RMB/ton)	7,000
Annual production capacity (Tons)	150RC, 100SRC
Price of carrageenan (RMB/ton)	65,000 FOB Shanghai for RC
Annual sales revenue (RMB)	8M
Export percentage	10% through trading companies
Key customers	Domestic food companies

Company background

- *Shishi Xinming* was founded in 1998 with a total investment of US$1.5 million. The company has 2 senior engineers and 6 senior technicians, who are engaged in researching and developing food additive solutions
- The main products include: carrageenan, agar, stabilizers for various soft candy, jelly, meat products, ice cream, beverage etc., and all other solutions blended primarily using carrageenan and agar.

Raw material purchasing

- The company directly imports seaweed primarily from Indonesia
- The suppliers were found through personal contacts and chosen by the company itself

Production and sales

- The factory is a medium size facility producing about 150 tons RC and 100 tons SRC annually. The annual revenue is about RMB 8M

Other information

- Small carrageenan manufactures in China are not doing well. As the industry is easily influenced by the low and rainy seasons, most small factories have other secondary business such as fruit-growing or aquaculture
- In most cases, small manufacturers take orders from large carrageenan manufacturers who cannot fulfill their sales orders internally. These companies also do not import raw materials and make profit only from processing

SHANGHAI BRILLIANT (BEILIAN) GUM CO., LTD

Company snapshot

Company Name	SHANGHAI BRILLIANT (BEILIAN) GUM CO., LTD
Company Type	Private Chinese
Main products	Carrageenan, solution, konjac gum
Year established	1998
Number of employees	180
Annual seaweed demand (Tons)	6,000
Source of seaweed	Indonesia
Price of seaweed (RMB/ton)	N/A
Annual production capacity (Tons)	1,000RC, 500SRC
Price of carrageenan (RMB/ton)	65,000 FOB Shanghai for RC
Annual sales revenue (RMB)	80M
Export percentage	60% mainly to Europe, US and Southeast Asia
Key customers	Foreign food companies and large well-known food companies in Mainland China (e.g. *Xizhiliang, LaBiXiaoXin* etc.)

Company background

- *Shanghai Brilliant* is one of the largest carrageenan manufacturers in China. The Company maintains cooperation with scientific research institutions in China and serves several large food companies
- The founder and general manager was an ex-employee of *Hainan Dazhong*, one of the oldest carrageenan factories in China
- The company has a Konjac gum plant which is also the largest of its kind in East China and a carrageenan plant focused on serving the export market

Raw material purchasing

- Seaweed is purchased directly from traders in Indonesia. The general manager travels to Indonesia several times a year to check on the raw materials and to source for new suppliers
- *Shanghai* is a key port in China, and one of the advantage of the company is that its shipping costs is lower than companies in other cities

Production and sales

- The company has the largest production capacity of carrageenan in China, producing approximate 1000RC and 500SRC annually
- Key products include carrageenan, konjac gum and solutions blended from these two products. These include meat carrageenan, jelly powder, wheat juice clarificant, beverage stabilizers etc.
- Key sales channels are export to foreign food companies which account for 60% of production. The rest are supplied to large domestic food manufacturers such as *Xizhilang Strongfood* (jelly and soft candy), *Labixiaoxin* (jelly), and *Yurun* (meat products)

Other information

- The company estimates that there are about 170 – 200 solution providers in China, which are mainly located near food manufacturers
- In general, the technology used to manufacture solutions is not complicated. Basic component lists can be found through the internet or in books, and a food additive solution can be easily made after carrying out a few trials
- Carrageenan cannot be used directly as a food additive; it has to be processed and blended with other gums or chemical components
- Carrageenan manufacturers are also solution providers. Some manufacturers have subsidiary companies which are solution providers.
- Carrageenan manufacturers also sell pure carrageenan directly to food companies. Food companies blend solutions themselves because the components of the blended solution could be a technical secret
- Most solution providers do not only manufacture solutions but also supply other food additives. This include different types of gum powder.

JIANGSU CHANGHANG HYDROCOLLOID TECHNOLOGY CO., LTD

Company snapshot

Company Name	JIANGSU CHANGHANG HYDROCOLLOID TECHNOLOGY CO., LTD
Company Type	Private Chinese
Main products	Carrageenan, solution
Year established	2006
Number of employees	150
Annual seaweed demand (Tons)	5,000
Source of seaweed	Indonesia
Price of seaweed (RMB/ton)	N/A
Annual production capacity (Tons)	500RC, 500SRC
Price of carrageenan (RMB/ton)	70,000 FOB Shanghai for RC
Annual sales revenue (RMB)	60M
Export percentage	30% mainly to Europe, US and Southeast Asia
Key customers	Large food companies in mainland China.

Company background

- Jiangsu Changhang was formed in 2006 with about RMB 35 million in capital assets
- The factory covers an area of about 50,000 square meters with a 30,000 square meter building area. The company also has two large production lines and a konjac gum blending line
- The annual capacity of refined and semi-refined carrageenan is about 1300 tons
- The company also provides solutions which are made from carrageenan and konjac colloid products

Raw material purchasing

- All seaweed is purchased from Indonesia. As production increases, the company is currently seeking for more suppliers in Indonesia

Production and sales

- Since the company only started producing formally in July 2006, it is still in the stage of seeking new clients, especially foreign customers

Other information

- Jiangsu Changhang was previously a manufacturer of the carrageenan processing machinery; Machinery used in Shanghai Brilliant factory are also from Changhang
- There are more solution providers than carrageenan manufacturers, since the technical demands and energy consumption is less than for producing carrageenan. The company estimates that there could be as many as 180 solution providers in China
- A solution provider factory only requires two or three containers to blend different components. Many companies which claim to be solution providers are actually carrageenan distributors
- R&D is the core competency of solution providers. Carrageenan is sometimes blended with low-cost components or gums, bringing the cost of the solution to less than half or one-third the price of carrageenan
- The raw profit rate of solution providers could reach 25% - 30% because of the higher value-added provided through R&D

SUMMARY OF FOOD ADDITIVE EXHIBITION

Exhibition overview

- Food Ingredients China 2007 was held between 28 – 30 March. This is one of the largest food ingredients exhibition in China
- 1300 companies exhibited at the event in 2006, which saw about 40,000 visitors
- The exhibition covers all types of food ingredients and additives

Interview notes

➢ FMC BioPolymer

- FMC is one of the largest manufacturers of hydrophilic gum around the world with leading technology and production of carrageenan and solutions
- FMC has 5 production bases with R&D centre in US, Ireland, Denmark, Norway, and the Philippines
- Carrageenan is mainly processed in the Philippines and blended using FMC technology. The company has an Asia Pacific R&D centre in Shanghai and distributors in Guangzhou and Beijing
- The products are mainly targeted at mid-high end customers. The company is aware of the intense competition between solution providers in China, and the key competitive advantage is on high product quality
- The company has no plans to develop a plant in China in the near future

➢ Danisco

- Danisco is one of the world's leading producers of ingredients for food and other consumer products. Founded in 1924 and headquartered in Copenhagen, Danisco has presence in over 40 countries and sells products to over 100 countries, along with innovation centers in some 30 countries.
- The group employs about 10,600 employees, and has a reported revenue of DKK 20.9B in 2006/06
- Danisco food ingredients entered the China market in 1995, In 1995, *Danisco* established a wholly-owned factory to produce food ingredients, including emulsifiers and functional systems
- In 1999, the company launched an innovation center

- In 2002, a trading company, *Danisco Ingredients (Shanghai) Co., Ltd*. was established in Shanghai Waigaoqiao Free Trade Zone. Also in 2002, the company opened a flavor plant in Kunshan, Jiangsu province
- In 2004, *Danisco* established two joint ventures in Henan: 1) *Danisco Tianguan*, which produces Xantham gum and 2) *Danisco Tangyin Yuxin*, which produces Xylitol and Xylose
- Another JV, *Genencor (Wuxi) Bio-Products* is Danisco's enzyme production base for the China and Asia-Pacific market
- Besides selling finished products in China, the company also holds technical seminars, provide training and onsite service to customers

➢ **Cp Kelco Group**

- CP Kelco is a leading global producer of specialty hydrocolloids with facilities in North America, Europe, Asia and Latin America. CP Kelco serves a wide variety of applications, including food, pharmaceutical, oral care, personal care, household and consumer, specialty industrial and oil field drilling. Product lines include: carrageenan, pectin, locust bean gum, gellan gum, Xanthan gum, diutan gum, welan gum, microparticulated whey protein concentrate and other novel biopolymers
- The carrageenan manufacturing plant is located in Sibonga, the Philippines with about 150 employees
- In China, the company has a wholly-owned factory in Wulian, Shandong, China, manufacturing Xanthan gum. The carrageenan-blended solutions which the company sells in China are imported

➢ **TIC Gums**

- Established in 1909, TIC Gums is America's oldest supplier of hydrocolloids. Its products include agar, alginates, carrageenan, colloids, dairyblend dairy stabilizers, guar, locust bean gum, pectin, xanthan and emulsifiers. The company serves the food, pharmaceutical, and cosmetic industries as well as industrial companies
- Besides other types of gums, the company is currently developing the carrageenan market in China by selling pure carrageenan products and carrageenan-blended solutions in China
- The company’s main strategy for competing in the Chinese market is to price at a reasonable cost, but with good products effect and technology

- **Shemberg Corporation**
  - Established in 1966 in the Philippines, Shemberg Corporation began by supplying raw material to the carrageenan industry
  - The company sources seaweed for carrageenan manufacturers and also manufacturers carrageenan
  - Currently the company has no sales office or plant in China. However it is starting to develop the Chinese market because of the significant market potential - China is a large meat provider and there is also significant potential demand in jelly market

- **Shanghai Dazhong Ocean Industry**
  - We also visited the factory prior to the exhibition. The company's purpose of attending the exhibition is to display the capacity of the company and to build relationships with old and new clients and contacts in the industry

- **Shishi Globe Agar industries**
  - This is the third time the company is attending this exhibition
  - The company has noticed that client requirements are increasing. Market demand has also grown rapidly in recent years

- **Tengzhou Tongda Carrageenan**
  - The company mainly serves domestic clients, and focuses more on blended-solutions than on pure carrageenan, since profit margins are higher
  - Raw materials are purchased from Indonesia as the price is cheaper than the Philippines and the quality is satisfactory

- **Shantou Jie Cheng Food Additive**
  - The primary products of the company are jelly powder and soft candy powder. The company also manufactures carrageenan and konjac gum which are the main material of the jelly powders
  - The company estimates that there are about 150 – 180 carrageenan-related solution providers. These companies vary in terms of scale, and most are very small with low technology

- Low technology, low price and low quality products still hold a dominant market share in China. However there is an improving trend as the government is increasing supervision of food companies.
- Small food companies with low sanitary standards will be forced to close down, and solutions with higher standards is increasingly dominating the market

➢ **Chengdu Xieli Konjac Scientific Planting & Processing Community Company**

- Largest Konjac gum manufacturer in West China
- The carrageenan plant is located in Yantai, Shandong with a capacity of about 200 tons annually

➢ **Guangzhou Tangshifa Healthcare Food**

- One of the earliest solution providers in China with relatively advanced technology
- Competition in the solution manufacturing industry is intense, since large food companies have worked with their solution providers for many years. The solution provider business focuses on long term relationships and not case-by-case sales
- However, with increasing income and purchasing power in general, there is an increasing number of new food companies which are often smaller. Thus the company expects good future prospects in the market

➢ **Lubao (Quanzhou) Biochemistry**

- The company will focus on the production of carrageenan in order to meet the high requirement and the growing purchasing volume of foreign clients
- Solutions with high value-add will be developed in order to gain/maintain domestic market share

➢ **Golden Phoenix Carrageenan**

- This is a relatively small company serving domestic clients, which are mainly mid-low end
- The company mainly focuses on jelly solution products

- **Guangzhou Kaixing Food Industry**
  - This company is a pure solution provider in Guangdong
  - Although there are few carrageenan manufacturers in Guangdong, there are many solution providers and distributors. This is because solution manufacturing is less polluting than carrageenan, and Guangzhou is also a developed city with better business environment conducive to sale of solution providers
  - Guangdong is also a base for manufacturing of sweets and jelly

- **Guangzhou KeCheng Food Industry**
  - Pure solution provider with own R&D capacity

- **ZhongKe Seaweed Products Development**
  - We visited the factory prior to the exhibition, more details can be found in the interview notes of the factory visit

- **Tengzhou Enpute Biological Technical**
  - This is a very small solution provider which only provides very simple blended solutions; limited R&D capabilities

- **Rechy Food Technology**
  - Solution provider located in Pudong, Shanghai with imported solution manufacturing technology
  - The company is relatively new and has only just started developing the market. The main purpose of attending the exhibition is to showcase the company's new products and technology. On the other hand, they company is also interested in attracting investment in order to strengthen research capability

- **Xuzhou Head Business Enterprise**
  - The subsidiary company named Xuzhou Light Food Industry Co., Ltd is an American invested WOFE company with initial investment of US$3 million
  - The raw carrageenan is imported from the factory in Vietnam and processed in China

- Many suppliers of the food industry (e.g. solution providers) face problem of delayed payment from customers (food companies). Some large food companies make payment only 6 – 12 months after the deadline, and this particularly affects smaller suppliers who will face cash flow problems. However, some predict that this could accelerate the overall development of the industry since only competent/efficient companies can survive

➢ **Shanghai Brilliant Gum**

- The main current focus of the company is export. As the largest carrageenan manufacturer in China, Shanghai Brilliant mainly focuses on mid-high end customers
- A trading business benefits from better cash flow and accompanied with improvement of manufacturing technology, export becomes the best way to expand the company. Currently 60% of its products are exported to US and Europe