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Market Study on Cold Chain Logistics in China

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Market Study on Cold Chain Logistics in China

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Summary

This assignment is based on the requirement of Mr. Bart Pauwels who is the Counsellor Infrastructure, Water Management, and Environment from the Embassy of the Kingdom of the Netherlands in China. Mr. Pauwels would like to conduct a market study on the Chinese cold chain logistics market to help Dutch companies and knowledge institutes active in cold chain logistics by outlining key developments in China where Dutch technologies could be applied to improve the current situation. Mr. Emiel Mulder, Business Development Coach China at Netherlands Enterprise Agency (RVO), and Mr. Wouter Verhey, Agricultural Counsellor of the Embassy of the Kingdom of the Netherlands were working together with Mr. Pauwels to co-develop this project.

Cold chain logistics is developing apace in China as the cold chain for food is increasingly needed due to the accelerating process of urbanization, increased awareness & focus on food safety, and the changes in residents' diet structure, whilst both central and local Chinese governments are sparing no efforts in constructing cold chain infrastructure. Chinese cold chain logistics market was worth RMB295.6 billion in 2018 with an upsurge of 18.8% from a year earlier, and it will keep expanding and soar to RMB522.5 billion in 2025 with an expected CAGR of 8.5% between 2018 and 2025 as the cold chain standards and policies grow clear, the fresh food e-Commerce burgeons and financial innovations continue. This market increase is expected to accelerate even further because of the COVID-19 situation.

Despite the fast-growing Chinese cold chain logistics market, the current cold chain infrastructure and technologies in China are still largely lagging behind the demand for high-quality food by Chinese consumers with increased incomes. This leaves a significant gap to fill for Dutch companies and knowledge institutes, which lays the foundation for this research conducted by Wageningen Food & Biobased Research (WFBR) and facilitated by NVKL - Branchevereniging Koudetechniek & Luchtbehandeling.

This report focused on finding out the opportunities and challenges to get Dutch companies and knowledge institutes connected to the fast-growing Chinese cold chain logistics market. It will provide the basis for a meeting with relevant Dutch players identified in this study during the China Business Week (in September 2020) in the Netherlands.

The main conclusions of this research are:

- The horticultural sector (fruits and vegetables) in the first-miles is the focal point that Dutch players should focus on from both the market potential and Dutch USP perspective.
- Teaming up with local partners is essential for connecting to the Chinese policy-makers, local politics, and for providing good services.
- Successful Business cases that can demonstrate the added values of the Dutch high-tech cold chain solutions must be developed.
- Alignment with the horticultural sector which has already built a reputation in China is important because the cold chain logistics sector is not as visible as the horticultural sector.

1 General introduction

1.1 The current status of China perishable food sector

China is a big country with the largest population in the world. Therefore, the total production and consumption of the food items are enormous. To map the current status of China perishable food sector, we used the FAOSTAT database “New Food Balance Sheets” which was just published in 2020 to conduct trend analysis on the important metrics based on the records from 2014 to 2017. The mapped food items are in line with the targeted food sectors that we are interested in except for the fast-frozen food because there is such no food category in the “New Food Balance Sheets”.

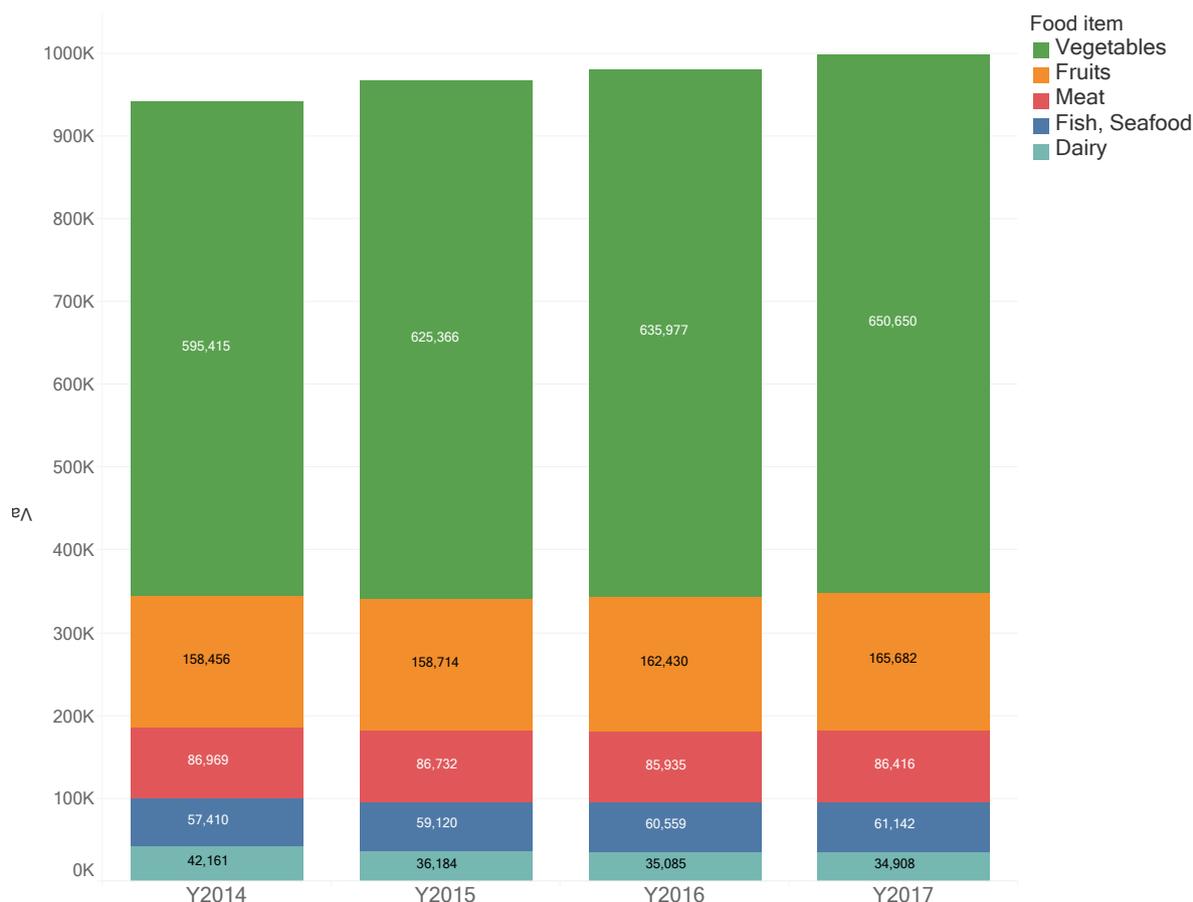


Figure 1. Production of the targeted food items in China between 2014 and 2017

Source: FAOSTAT New Food Balance Sheets

Figure 1 shows the production of the targeted food items in China from 2014 to 2017. According to the total mass of outputs, vegetables are the dominating fresh food sector in China followed by fruits. We observed an increasing trend in fruit, vegetable, and fish, seafood production between 2014 and 2017. For meat, its production in this period is quite stable. What is quite surprising is that dairy production had dropped substantially in the same period from 42,161 to 34,908 kilotons.

Compared to the production of the targeted items, the import and export of those items are marginal with a generally increasing trend (Figure 2 and Figure 3). The largest imported item is fish, seafood while the most exported item is vegetables.

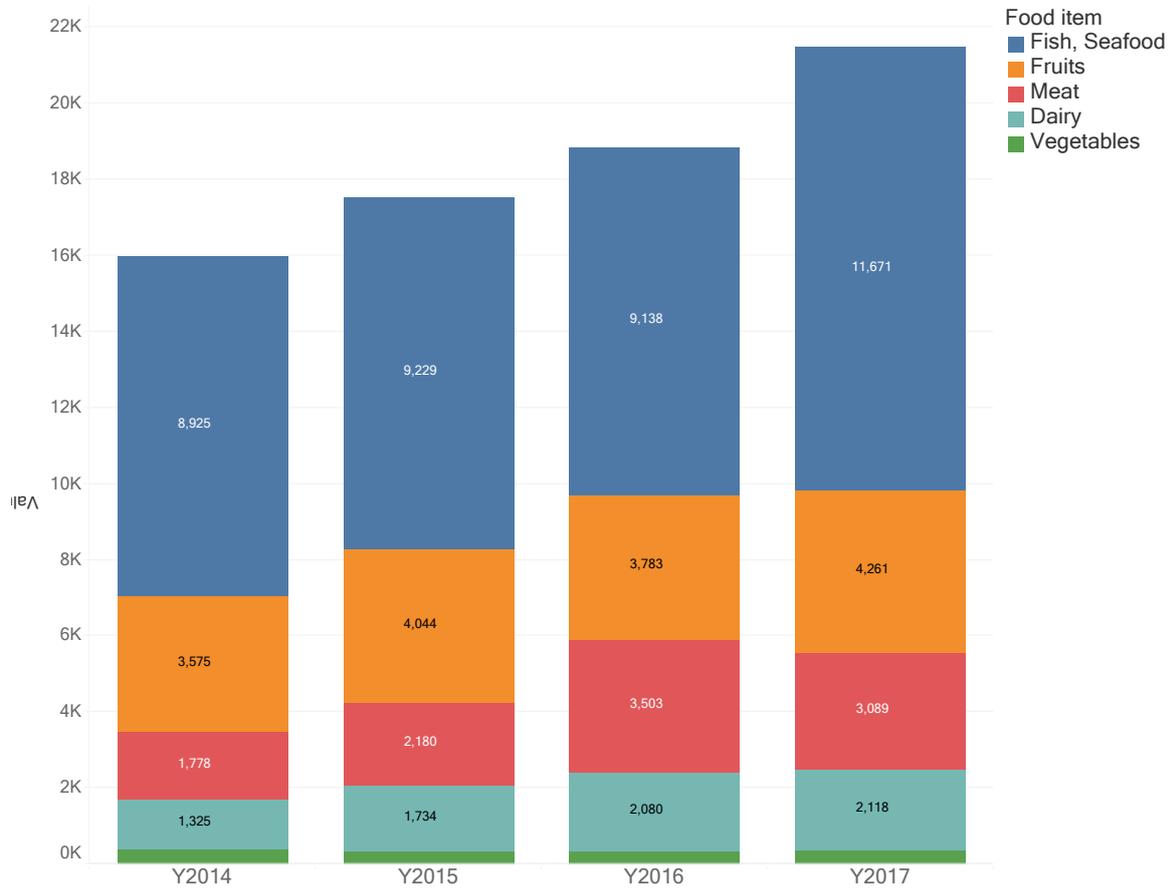


Figure 2. Import of the targeted food items in China between 2014 and 2017
Source: FAOSTAT New Food Balance Sheets

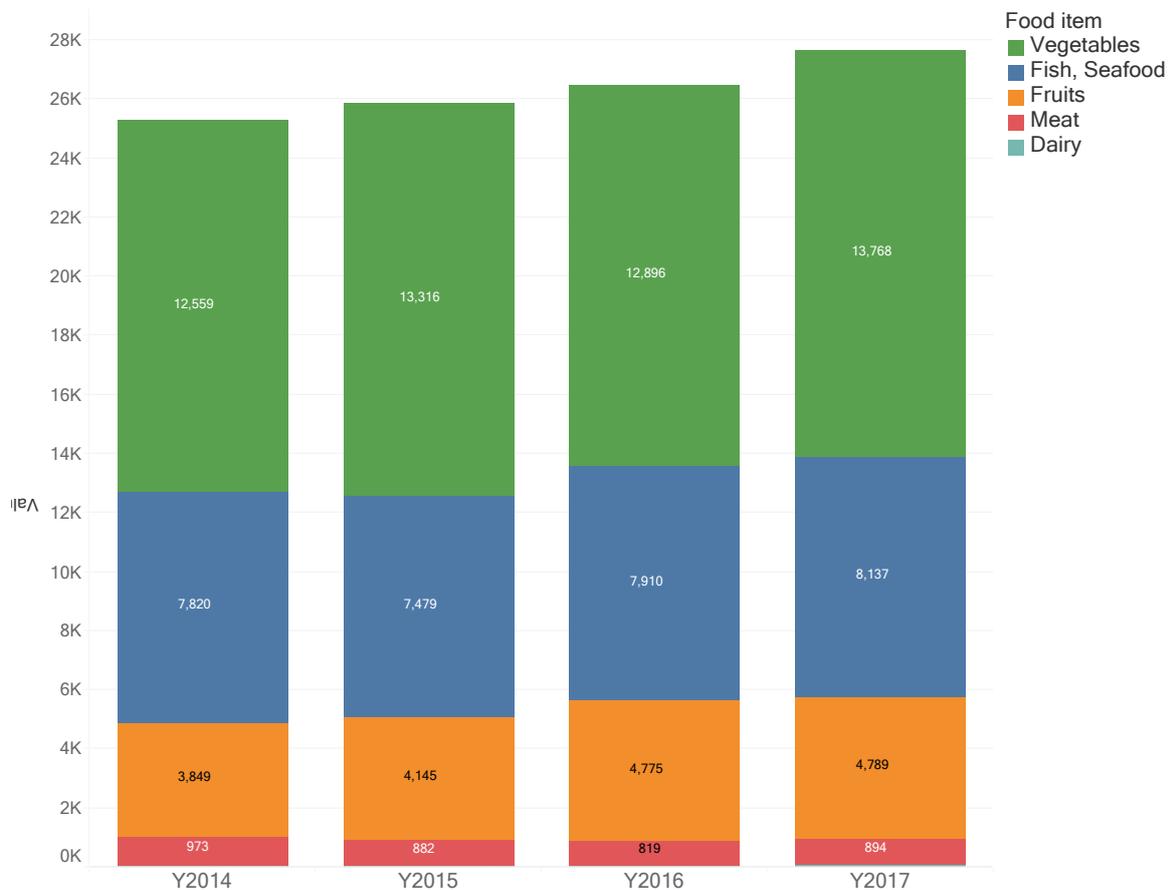


Figure 3. Export of the targeted food items in China between 2014 and 2017
Source: FAOSTAT New Food Balance Sheets

The net supply of the targeted food items for consumption is provided in Figure 4. The graph shows that it follows the same pattern as the food production partly due to the relatively low import and export which are too small to change the overall picture. Again all items show either an increasing trend or a steady-state except for dairy with a decreasing trend in the same period.

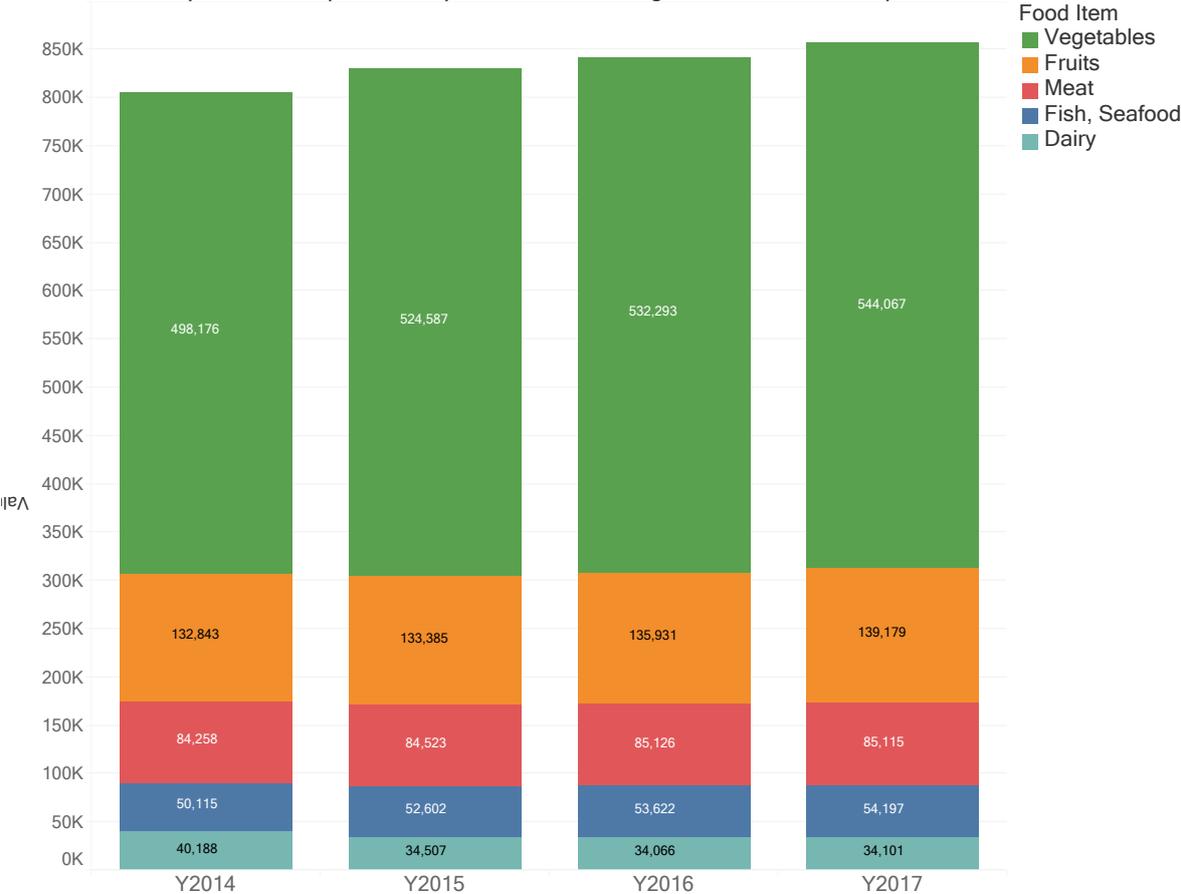


Figure 4. Supply of the targeted food items in China between 2014 and 2017
Source: FAOSTAT New Food Balance Sheets

Food losses are a significant issue for perishable products. The food losses registered in the FAO “new Food Balance Sheets” include the postharvest losses during storage and transportation. The loss overview of the targeted items is presented in Figure 5. Since FAO did not record the losses of Fish, Seafood in China during the period of 2014 and 2017, there are only four items presented in the graph.

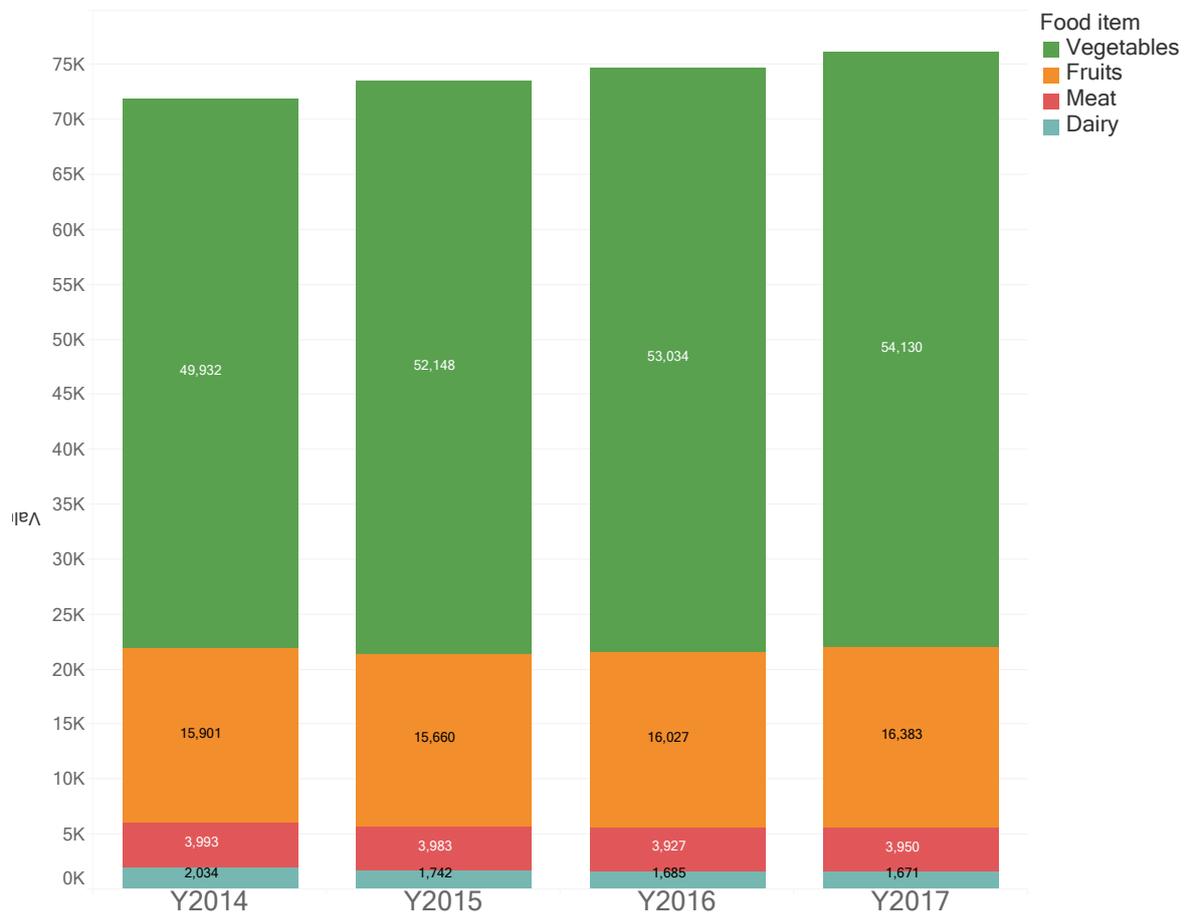


Figure 5. Losses of the targeted food items in China between 2014 and 2017
Source: FAOSTAT New Food Balance Sheets

If we compare the total supply (Figure 4) with the postharvest losses (Figure 5), the losses of the vegetables and fruits are above 10% of the supply that is available for human consumption. On the contrary, the loss percentages for meat and dairy products are much smaller. Here it is necessary to point out that the 10% for fruits and vegetables only includes the losses during the storage and transportation between the farm and consumer levels. Based on the results from the CCAFS project¹ conducted by WFBR, the whole-chain losses for fruits and vegetables account for roughly one-third of the total fruit and vegetable production in China.

Since the quick-frozen food data are not available from the FAO databases, we, therefore, referred to the report of "China Cold Chain Logistics Development 2019"² to show the overview of this sector (Figure 6).

¹ <https://ccafs.cgiar.org/research/projects>

² <https://data.cnki.net/Trade/yearbook/single/N2019120048?z=Z014>

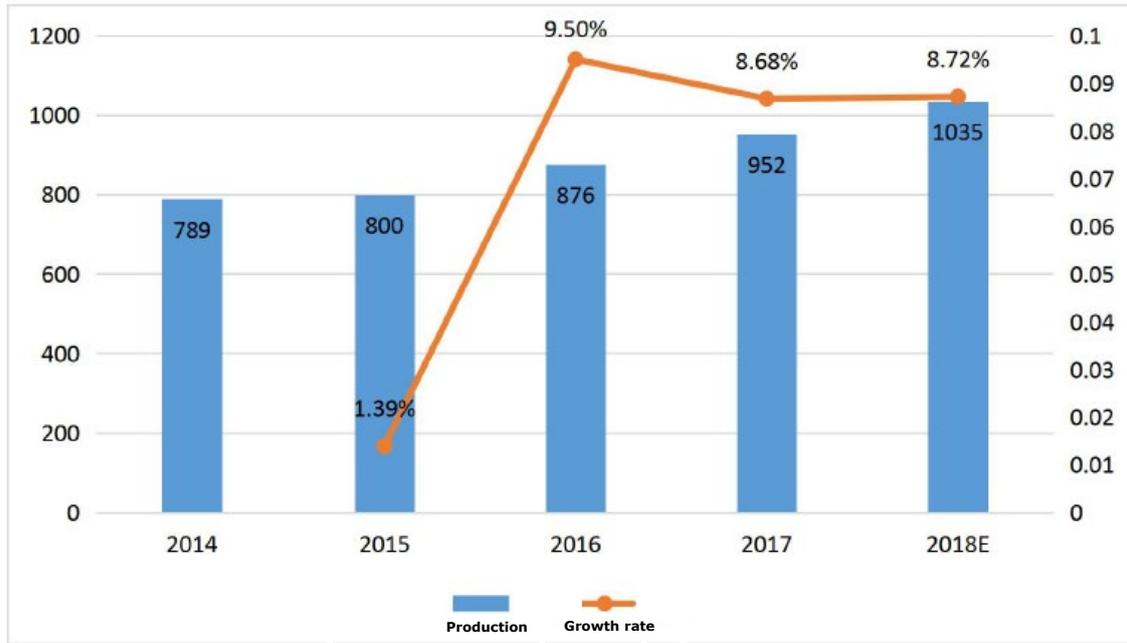


Figure 6. Production of the quick-frozen food in China between 2014 and 2018 (Unit: 10,000 tonnes). Source: China Cold Chain Logistics Development report 2019.

Figure 6 shows that the production of quick-frozen food is relatively small compared to that of the other five targeted items, but its growth rates during the period of 2014-2018 were comparably high.

By integrating all the information above, it seems that fruits and vegetables are the most interesting perishable food sectors in terms of the size of production and consumption as well as the potential to reduce food losses. Due to the fast-growing rate for quick-frozen food production, it may be an attractive sector in the future.

1.2 The current status of China's cold chain logistics sector

China's cold chain logistics sector is still in its initial development phase but at a fast-growth rate during the last years. The total demand for cold chain logistics application is demonstrated in Figure 7.

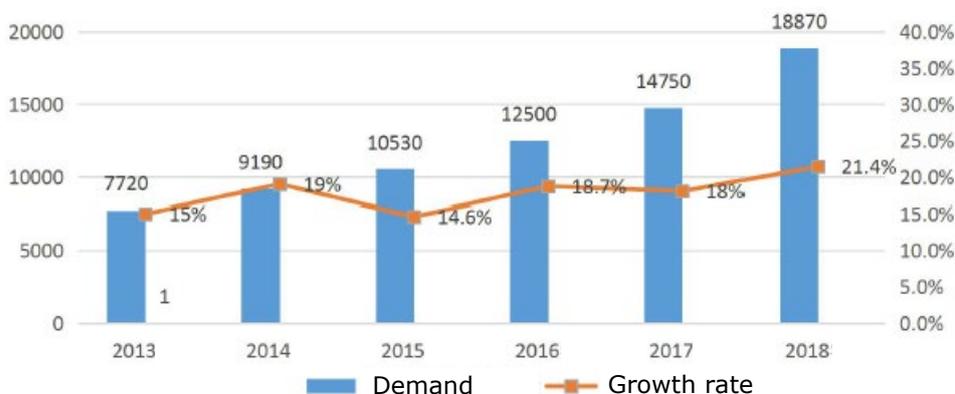


Figure 7. The total demand for cold chain logistics in China between 2013 and 2018 (unit: 10,000 tonnes). Source: China Cold Chain Logistics Development report 2019.

The yearly growth rates for the cold chain logistics were between 14.6% and 21.4% from 2013 to 2018, which is a quite astonishing speed. Among the total demand, the demand profile of the targeted food items is presented in Figure 8.

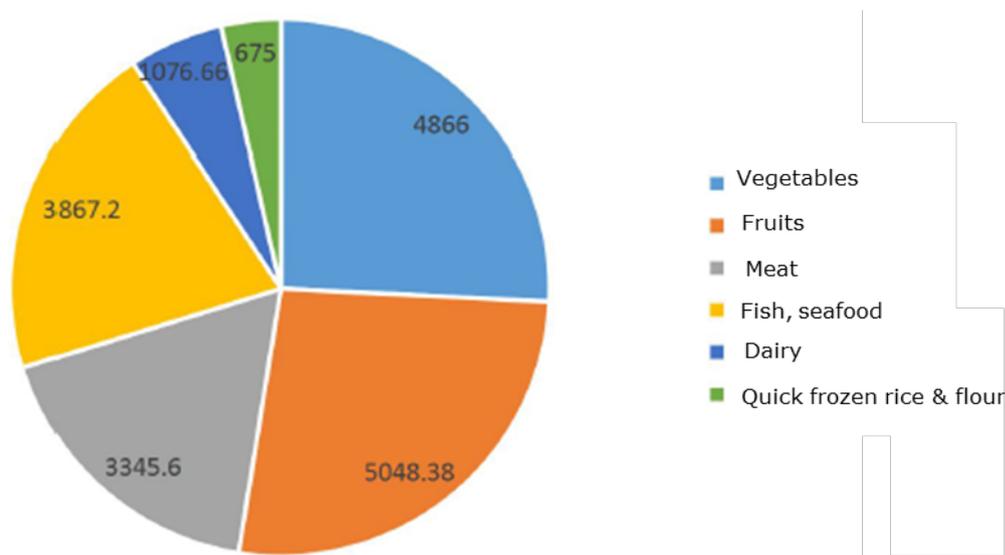


Figure 8. The demand profile of the targeted food items for cold chain logistics in 2018 (10,000 tonnes). Source: China Cold Chain Logistics Development report 2019.

As we can see, fruits and vegetables are the top 2 items that required more than 50% of the total cold chain logistics application in 2018. This again highlights the prominent position of those two sectors in the China cold chain logistics market.

According to the "China Cold Chain Logistics Development report 2019", in 2018, progress had been made in the area of cold chain logistics development. The cold chain infrastructure had been further improved, both central and local governments issued supportive policies, cold chain standards had been further updated, and leading companies that can provide nation-wide cold chain logistics service had appeared.

Although progress had been made, there are still many major issues remaining with China cold chain logistics industry including low application rate of cold chain technologies in the food chain, lack of

refrigerated warehouses and trucks, increased land use costs, low technology level, low sectoral profitability, low trust, shortage of skilled personnel, etc. Therefore, in general, there are still many business opportunities in this sector to be exploited by both domestic and foreign cold chain logistics players including Dutch companies.

To help relevant Dutch companies to formulate their appropriate China cold chain logistics strategies, both China's market situation and Dutch players' willingness & competitiveness will be explored in this study.

The remainder of this report will be divided into four chapters. In Chapter 2, the methodology that is adopted in this study will be illustrated. In Chapter 3, we will conduct a market analysis of the China cold chain logistics sector using a supply chain perspective. Both the opportunities and barriers will be identified. Chapter 4 presents the stakeholder analysis with the Dutch cold chain logistics players who want to extend their business in China. Based on the analyses on both the Chinese and Dutch situations, in Chapter 5 the main conclusions of this study will be drawn as the basis to connect Dutch cold chain players with the local cold chain logistics market in China.

2 Methodology

The research is split into two parts: the China market analysis and Dutch player analysis. The former is conducted by Wageningen Food & Biobased Research (WFBR) and the latter is by NVKL. In the initial stage, the two parts are carried out separately. In the end, Wageningen Food & Biobased Research integrates the two parts into one report.

2.1 China market

To conduct the market analysis of the China cold chain logistics, two approaches are employed. The first is to conduct comprehensive desk research to collect relevant information on the current situation of the industry in terms of market potentials, development phases, policy tendencies, important projects, major barriers, etc. by following an integrated chain approach. The desk research is carried out by WFBR.

The desk research is accompanied by the interviews performed by WFBR which has interviewed the high-ranking managers from 19 relevant companies and organizations in China. Among the 19 interviewees, 4 are from the governmental agencies or sector associations, e.g. the China Cold Chain Logistics Alliance. 5 are from the cold chain logistics equipment manufacturers. The remaining interviewees are from a fruit planting company, a logistics company dedicated to providing the first-mile storage and transportation service, 2 general cold chain management service providers, 1 company engaged in city fresh food logistics, 1 fresh food retailer, 1 fresh food importer, 2 cross-board railway logistics companies related to the “one belt one road” initiative, and 1 professor from a Chinese university. To facilitate the interview process, a questionnaire that lists the relevant questions ranging from the first-mile to last-mile, as well as the whole chain coordination, was made by WFBR. The questionnaire was also partly used in the interviews with the Dutch cold chain players.

After gathering the information and insights from the desk research and interviews, the main findings were summarized by WFBR in Chapter 2 of this report. The main point for this approach is to allow us to do cross-validation on the information obtained from the two sources, which improves the credibility of insights derived from the market analysis.

2.2 Dutch players

In cooperation with WFBR, a questionnaire has been set up for getting all relevant information out of interviews with Dutch companies and organizations from the cold chain logistics sector.

For clear alignment of the data, to be harvested via the questionnaire, all interviews have been done by Wil Duivenvoorden via Skype meetings. In a transparent way, all participants could share their views and opinions, to be compiled into a data overview sheet. For specific reasons several interviewees insisted on confidentiality and thus for anonymous processing of their input; for this reason, the data overview sheet does not mention any names of companies or persons.

The main focus during the interviews was to derive information from each of the participants about the way they themselves describe their market approach regarding cold chains and in which way their individual strategies and developments also could be related to the typical “Dutch integrated chain approach”.

As a result, the analyses of the interviews should offer clear insights on how mutual benefits between Chinese and Dutch partners could be identified in specific chains, in order to enhance growing future business between both nations.

So, the questionnaire intended to reveal the specific knowledge and expertise aspects of each company, to create a better overview regarding some specific chains in China, in which cooperation between partners could become the most successful start.

Also, inventory of Dutch interest and existing contacts with China are made, regarding specific chain related opportunities in bilateral cooperation (in the context of the Triple Helix Model) between companies, knowledge institutes, and governmental bodies.

2.3 Integration of the Chinese and Dutch parts

After obtaining the general insights for the China cold chain logistics market and interested Dutch players, the final step is to integrate the two pieces into one homogeneous report to draw out the main conclusions that Dutch players can follow to better connect to the China market. The matchmaking between the market and companies are guided by the identified opportunities and risks as well as the willingness of stakeholders for cooperation.

The initial integration of the two parts was made by WFBR, followed by further discussions with other colleagues to derive the ultimate conclusions of this research.

The last step, before the final report is issued, is to ask two Wageningen Food & Biobased Research colleagues to conduct the internal review on the close-to-final version of the report to make sure no obvious interesting points have been omitted.

3 China cold chain logistics market analysis

3.1 The market investigation using an integrated chain approach

3.1.1 Sectors

As is shown in Chapter 1, generally speaking, fruits and vegetables are the most interesting fresh food sectors that have large market volumes and high losses during the postharvest operations. These insights are further confirmed by the interviews. Most of the interviewees mentioned that fruits and vegetables are the most promising sectors for cold chain logistics applications. In addition to the high volumes and high losses, another reason is that fruits and vegetables are “alive products” with respiratory effects. Compared to other targeted food items which mainly use the frozen technologies to keep product quality, the technologies to preserve fruits and vegetables’ quality are much more complicated. For the frozen products (e.g., frozen meat, frozen fish), as long as one can lower the temperature below the targeted threshold, the products can be stored quite long. However, for fruits and vegetables, the temperature is only one parameter of many to be considered. The conditions on relative humidity, CO₂, and O₂ composition in the air, ethylene concentration, and even mechanical damage can also significantly affect the quality of the products on the consumer end. Even though only considering the temperature, the management of fruits and vegetables is also much more difficult due to the stricter requirement of homogeneous temperature distribution in the warehouse and container, and narrower optimal temperature ranges which are easier to be violated. Moreover, the biological variety of fruits and vegetables is very high, which makes it difficult to be standardized. Consequently compared to dairy, meat, fish products, the quality of the fruits and vegetables is harder to predict and control, leading to significant business challenges for cold chain logistics operation and supply chain coordination. As a result, the majority of the existing cold storage warehouses in China are designed for storing frozen products. The refrigerated warehouses for fruit and vegetable storage are relatively less, not even to mention the controlled atmosphere (CA) warehouses which are hardly used in practice. Due to the high complexity of postharvest management for fruits and vegetables, mature technologies, and equipment to deal with cold chain logistics in this sector may have a strong demand in the future. Moreover, the cold chain infrastructure for fruit and vegetable logistics is lagging behind, which has a large room for further improvement.

On the contrary to the fruit and vegetable products, some interviewees consider the management of the supply chains with meat, fish, dairy, and other products relatively simple. They think China has already had mature technologies and equipment to address the cold chain issues for those products even at a lower cost. In other words, the added values of foreign knowledge and equipment for those sectors are not clear. It is because the losses of meat, fish, dairy products are relatively low and the freezing technology to preserve the quality is relatively easy to master. This is different from fruits and vegetables which are alive products requiring more delicate postharvest handling technologies. Here not only temperature needs to be controlled but also relative humidity, CO₂, O₂, etc. Even though there are unfavorable views from the interviewees, we think at least the quick-frozen products deserve also some attention because of their high growth rates. Some interviewees mentioned that the Netherlands is famous for its flower logistics and they therefore also view the floriculture sector as a high potential industry where Dutch cold chain logistics companies may play a role. Similarly, the Dutch horticultural sector has already built up its reputation in China, which can provide the leverage for the promotion of Dutch cold chain logistics expertise for fruits and vegetables.

Given the significance of the fruit and vegetable sectors, the remainder of the report will mainly focus on those products.

3.1.2 First miles

The biggest challenge for China's cold chain logistics development lies in the first miles. China has a smallholder farming system in which each household only has a small piece of land to produce agricultural products. The highly fragmented agricultural production makes product standardization highly impossible because different farmers have different farming practices relying heavily on their own experience. Product standardization is essential to improve the values of food products because consumers only want to pay high prices for branded products with high and homogeneous quality. The high product price in return ensures a large margin to allow cold chain application, which is actually the prerequisite for high-end cold chain logistics development in China. Having observed the drawbacks of smallholder farming, some companies try to build large-size farms through the land transfer from smallholder farmers. However, the ambiguity of the collective land ownership heavily hampers this process. Moreover, there is a common understanding among Chinese policymakers that China cannot totally abandon the smallholder farming system. They believe that on the one hand, it may bring in food security problems, and on the other hand, cities cannot provide enough jobs to employ the farmers losing their lands. Besides the fragmented agricultural production, another issue is that the Chinese farmers are in general at high age and with low education levels. This hampers them to adopt new technologies and equipment in farming and do effective marketing for their products. In addition, individual smallholder farmers have very limited access to credits that allows them to build up the on-farm postharvest handling facilities (e.g. pre-cooling and sorting facilities), which lead to bad product quality and standardization. To improve the scale and specialization of agricultural production, the governments have heavily promoted the establishments of farmer cooperatives to better organize smallholder farmers by providing subsidies and other policy supports. However, the effectiveness of this program is not obvious. In practice, the scale of most China farmer cooperatives is too small and they were set mainly for obtaining subsidies from the government. Contract farming is another approach to let the companies have somewhat control over the quality of the products. There have been successful examples but even more failed cases are observed in reality because the quality variations among the products are usually too high and the stability of the supply is very low.

The lack of cold chain facilities in the first miles is another prominent issue. Besides the lack of on-farm postharvest facilities, the density of the refrigerated warehouses in the first miles is still very small, especially in western China. This makes it very difficult to find the nearby warehouses to put in the products, which expands the time lag between product harvesting and cold storage. Especially for the fruits and vegetables, they are the vulnerable products requiring quick movement to the cold storage to preserve the product quality as much as possible. The long-distances between the farms and the refrigerated warehouses increase the lead time between harvesting and warehousing, which can decrease the product quality significantly. Except for the low density of the cold storage, the capacity and cooling efficiency of the warehouses are also a problem. Currently, the refrigerated warehouses in the first miles are mostly small and low-tech warehouses that cannot accommodate the demands from the farms. The low-cooling efficiency results in that even though the farmers find the room to store their products, the required temperature cannot be guaranteed and therefore the product quality. One typical example that happened this year is the Korla pears in Xinjiang. Due to the corona-virus pandemic, the demands for Korla pears in the harvesting season has declined significantly. Farmers have to put large amounts of pears in the local refrigerated warehouses. However, due to the low cooling efficiency, every day a huge quantity of expired Korla pears needed to be removed from the warehouses, which lead to enormous economic losses for the pear farmers. This example reveals that without the high-efficiency refrigerated warehouses, the storability of the fruit and vegetable products will be very limited. It makes the farmers and related companies highly vulnerable to the demand and price volatilities. Another underlying fact hidden behind this kind of story is that due to the low price of the products, warehouse operators may not always turn on the refrigerators based on the temperature requirements because this will make their businesses unprofitable. For example, in practice, it is not rare that warehouses turn off the refrigerator during peak electricity consumption because the price of electricity in that period is higher. With this kind of operation, it is almost impossible to keep the temperature in the optimal range, resulting in huge quality losses. The problems are even more than that. In the best scenario, even if the warehouse owners invested in high-tech warehouses such as CA storage and would like to bear the costs, it is still very hard for them to find qualified personnel who can properly use the facilities. Taking temperature

monitoring as an example, most of the warehouse personnel in China are not aware of the large differences between the environmental temperature and product temperature and confuse themselves in temperature monitoring. Therefore, the lack of qualified refrigerated warehouse personnel is also a big issue. Since the refrigerated warehouses, especially in the first miles, are mostly located in the remote areas combined with the relatively low sectorial salaries, it is difficult to attract talented employees to work in this sector.

Next to the storage problems in the first-miles, the quality-decay of the products during transportation also needs to be mentioned. Even though the transportation time in the first miles is comparably shorter than that for linehaul transportation, bad first-mile transportation conditions can also damage the product quality severely. In fact, in the ideal situation, the close cold chain logistics must be applied at all the stages of the fresh food supply chains. Even a small period of cold chain disruptions can lead to serious quality problems for the products on consumers' hands. Unfortunately, in China, the proportion of refrigerated transportation in the first miles is extremely low. Combined with the low-tech and low-density cold storage, the initial product quality delivered by the first-mile logistics is very low, which imposes substantial challenges for the remaining operations in the supply chain due to the "rubbish-in-rubbish-out" effects.

3.1.3 Fresh logistics and distribution

Compared to the first-miles, the stage of fresh logistics and distribution has been comparably further developed. That means cold storage and refrigerated trucks as well as other cold chain equipment are more widely used in this stage. However, there is a structural problem for fresh food distribution in China. The agricultural wholesale markets are still the central channel for fresh food distribution. In China, more than 50% of the total agricultural products are distributed by the multi-layer wholesale markets. This is totally different from the situation in the developed countries where fresh food is mainly distributed via the supermarket channel. The drawbacks of the multi-layer wholesaling system³ with respect to cold chain logistics applications are multiple folds. First of all, during the transitions, the ownership of the products is transferred several times before they reach the outlets where consumers can buy them. The middlemen or agencies are only responsible for the products before they are sold to the next buyer. Consequently, the incentives for them to invest in technologies and equipment for quality preservation are relatively low. Moreover, the wholesale-market based distribution system makes the tracing on the products very difficult. The buyer does not have any historical data about the products and only gets to know the product quality after receiving the products. Furthermore, multiple transfers of the products mean more product handlings are required. Every loading and unloading activity will increase the chance of mechanical damages to the products and therefore decrease the quality of the products. Finally, the wholesale market system may incur more cross-contamination for food products because the sources of the products are diversified and untraceable.

Although there have been more and more fresh food logistics companies established during the last decade, the market concentration in this sector is still very low. Small storage and transport companies are still the predominating market players who focus on reducing costs other than improving service. In terms of service coverage, only a few big companies such as SF Express, Rongqing Logistics, Suning Logistics have the networks and capacity to provide nationwide logistics service. The remaining majority can only provide service for one or several provinces, not always with the cold chain options. This largely restricts the range of fresh food supply from the remote production origins to the consumer markets. For example, Xijiang is an important fruit growing area. To supply the fruits to the big markets in eastern and southern China, it requires long-distance linehaul transportation with the refrigerated containers. However, in many cases, transportation is just done by normal trucks with cover and ice to protect the products. Even though the products are transported by the refrigerated trucks, the driver may often turn off the refrigerator to save energy costs. In both scenarios, huge losses can happen during long-distance linehaul transportation. The situation for big

³ Multiple layers of wholesalers in the middle between farmers and retailers

logistics companies is better because many of them require temperature recording for the products during the shipments. However, the measured temperature is usually the environmental temperature which can heavily deviate from the product temperature. Moreover, the logistics companies are not the product owners and they only have the responsibility when the products are on their hands. As a result, temperature recording is not continuous through the whole chain but only exists in limited phases.

3.1.4 Last miles

The last-miles fresh food logistics in China have been strongly promoted by the giant eCommerce companies in China in the last 5 years. Like in the other sectors, eCommerce has heavily changed consumer habits in fresh food shopping and brought in significant business opportunities for fresh food retailers and logistics service providers. Companies such as Alibaba and Jingdong viewed the fresh food eCommerce as the last blue oceans in the eCommerce and invested heavily in these sectors. However, the current focus of the eCommerce giants is still on attracting more clients to their platforms by providing subsidies and fast-delivery services. Very few companies put their emphasis on improving product qualities. For example, Jingdong who believes in heavy asset strategy has built up many warehouses but very seldom are refrigerated warehouses.

Another issue that prohibits the application of cold chain logistics in eCommerce last-miles is the high delivery costs per order. Since the value per order for fresh food is relatively low, the last-mile delivery costs are very hard to be covered. This results in a strange situation that only 1% of the Chinese fresh eCommerce companies actually make profits. The logic why eCommerce companies still stay in this track is that they try to utilize the high purchasing frequency of fresh food to form consumers' shopping habits and lock them in their platforms. Even though the companies lose money for the fresh food section, as long as the consumers stay with the platform they can still earn money from the sales of other products. However, due to the negative margin of e-fresh business, it is very hard for the companies to make further investment in the cold chain logistics for the last miles.

Despite many difficulties for e-Commerce companies to develop a profitable business model in the current situation, entering fresh e-Commerce seems a must when taking the huge potential of this market into account. For example, with Alibaba Group as the main investment partner, the Xunlu cold chain will establish in China 50 large and medium-sized professional fresh cold chain warehouses, 100 fresh cold chain transport trunks, 1000 transport branch lines, and integrate the major fresh import and export port resources. Hema Fresh (Alibaba's grocery-store network) has already established a national cold chain delivery network. Therefore, the development trend of the e-fresh market should not be ignored. Although in the current stage, much attention has been put in reducing costs, consumer satisfaction is still an important factor to keep them stay with the platform in the long-term. This motivates the eCommerce companies to gain better control of the product quality. Since the quality problems observed in the last-miles mostly have the root causes in the first-miles, companies like Alibaba start to put the effort in a better connection to the origin of production by building first-mile refrigerated warehouses and work more closely to the local producers. However, due to the lack of experience in the fresh produce industry and lack of local knowledge, the initiatives to connect the first and last miles by the eCommerce companies are by far not very successful. Some interviewees suggest that eCommerce companies in fact should not enter the first-miles but collaborate with the leading local fresh food companies because those companies know the local agricultural production the best.

Finally, to reduce the quality decay of the products and save logistics costs, local food production with a short supply chain becomes a popular choice in China, especially after the outbreak of the Cov19 because short chains are more resilient than the long chains. The short distance between the origin of production and consumer market makes the integration of the first miles and last miles possible. In such a case, the importance of using close cold chain logistics becomes relatively lower. However, due to the limited producing capacity and product variety that the local food system can provide, it will not be the main business model to be adopted in the near future.

3.1.5 Fresh chain coordination

Supply chain coordination is the advanced stage of supply chain management. It requires efficient sharing of information between supply chain players, the establishment of chain-wise accepted standards, and coordinated efforts from all chain stages to achieve the best performance from the whole-chain perspective. Since the development of China cold chain logistics is still in its early stage, effective fresh food chain coordination is rarely observed in business practice. Firstly, due to the lack of IT infrastructure, especially in the upstream chain, data are hardly collected not even to mention data sharing between chain partners. Secondly, the collected data are not detailed enough to support good decision making. Usually, only the temperature information is recorded and no further information on product quality (e.g. firmness, color) is available. Thirdly, even though the data are accumulated by the individual companies, they are not willing to share sensitive information (e.g. the quality information) with the supply chain partners due to a lack of trust. Only when a company can control all the stages of the supply chain, for example, through vertical integration, the data-sharing mechanism throughout the whole chain can be established. However, such kind of companies are very rare in China, especially in the fresh produce industry. Finally, in China, there is a lack of skilled personnel who know both fresh product physiology and cold chain logistics operation. Without this type of inter-disciplinary talents, realizing effective chain coordination in cold chain logistics is almost impossible.

3.2 Opportunities

3.2.1 Short-term opportunities

In 2020, both the central and local governments have intensively released supportive policies and measures to promote China's cold chain logistics development, with an emphasis on first-mile cold chain infrastructure improvement to benefit the farmers. It is in line with the current poverty alleviation program advocated by president Xi. The central document of 2020 put forward, "start cold chain logistics facilities construction project for agricultural product preservation." "Strengthen the overall planning, hierarchical layout, and standard-setting of cold chain logistics for agricultural products." "Arrangements for investment within the central budget to support the construction of a number of backbone cold chain logistics base." This means that the construction of cold chain logistics facilities will be expected to be strongly supported by the national fiscal policy. As the follow-up, last April 2020, the Ministry of Agriculture and Rural Affairs came up with a plan to facilitate the construction of cold chain facilities for agricultural product storage. The ministry explicitly mentioned the focus is on improving the cold chain infrastructure for fruits and vegetable preservation in the first-miles. It came up with a list of targeted provinces which are the important fruits and vegetable producers including Hebei, Shanxi, Liaoning, Shandong, Hubei, Hunan, Guangxi, Hainan, Sichuan, Chongqing, Guizhou, Yunnan, Shaanxi, Gansu, Ningxia, Xinjiang. Because of the heavy investments and low ROI, private companies usually do not have the motivations or capacities to invest in the first-mile cold chain infrastructure by themselves. The governmental subsidies and policy support, in this case, become very crucial. However, the previous government-led programs are not well planned according to the market requirements, resulting in many small and low-tech refrigerated warehouses in the origin of production. The ministry wants to avoid this kind of problem and aims at a high standard of infrastructure buildings. Anyway, combined with the general promising prospect for the fruit and vegetable sector, we may conclude that there is a big opportunity for first-mile cold chain logistics development for fruits and vegetables at least in the short term. Moreover, last July, the National Development and Reform Commission published the names of the first batch of "National backbone cold chain logistics bases". In total, 17 bases⁴ in 16 provinces are granted including Beijing, Shanxi, Inner Mongolia, Liaoning, Jiangsu, Zhejiang, Anhui, FUJIAN, Shandong, Henan, Hubei, hunan, Guangdong, Sichuan, Yunnan, Shanxi, Qingdao. The local governments have promised to come up with supporting measures to scale up the effects. Improving the first-mile infrastructure is also emphasized in the guideline of this program. Therefore, in the short-term, more governmental money

⁴ The list of the recent important cold chain logistics projects is provided in the appendix.

is expected to be invested in this area. The key decision-makers for the government-led projects are the Development and Reform Commission, Department of Commerce and Department of Agriculture and Rural Affairs. The Development and Reform Commission is responsible for project application and planning. The Department of Commerce or Department of Agriculture and Rural Affairs, depending on the provinces, is guiding the project implementation. In addition to the governmental bodies, state-owned enterprises or organizations are also engaged in cold chain logistics development. An important player is the "All China Federation of Supply and Marketing Cooperatives". In collaboration with local governments, it invested in the cold chain logistics parks in different provinces.

Despite the strong supports from the governments, the decisive factor that determines the success of the cold chain business logistics is still whether the companies can provide technology or equipment that can cater to the demand of the market. Since china's cold chain logistics is still in the initial stage of its development, the focus of the companies is still on cost reduction due to the low product price. Therefore, in the short-term, providing low-cost cold chain solutions should be a direction to go. For example, the bulk part of the cold chain costs is from energy uses. In China, there are a lot of low-tech small refrigerated warehouses consuming a huge amount of electricity which hampers the constant use of the cooling system. If an energy-saving refrigerator with decent cooling efficiency can be provided, there should be a big market for it. Another interesting area is to develop low-cost packages for last-mile fresh food delivery because the packaging costs account for a large proportion of the last-mile logistics costs.

To exploit short-term opportunities, Dutch companies should find reliable local partners to together extend the cold chain logistics market because they know better the local market and business culture and can react fast to the demands of the clients. Many interviewees from China mentioned that they are not interested in the companies that only sell their technology or equipment but are looking for the ones which can provide integrated solutions to their problems including good training and after-sales services. This highlights the importance of local service capability. It may be not necessary to already have a joint venture in the short term but collaborating with a strong and reliable local partner is still the key to ensure successful business in China. The private big eCommerce companies who have stepped into the cold chain logistics, as well as the venture capitals behind them, are potential good partners because they have a lot of resources to influence the sector and can better respond to market demand than the state-owned companies. Moreover, since the Dutch horticulture sector has already built up the reputation in China, the existing local partners for CN-NL horticulture collaboration may be also good candidates for the cold chain logistics sector at least from a joint-marketing point of view.

3.2.2 Mid and long-term opportunities

As China's economy further develops, there can be more opportunities for Dutch cold chain logistics companies in the mid and long term. Firstly, with the rising income level, the demand for high-quality products will be increased. Consumers will be willing to pay more for good quality, which in return will promote the adoption of the high-end cold chain technologies and equipment (e.g. CA). Secondly, the fast advance of IT technologies such as 5G communication, the Internet of Things will speed up the process of societal digitalization. In the future, we can expect more data in the fresh food supply chain will be collected. Consequently, efficient data sharing and supply coordination will become an urgent issue to solve. Then, Dutch companies can find the opportunity in this area by supplying the tailor-made data management system and quality-based IT solutions in the China cold chain logistics market. Dutch companies can also provide training for the personnel of the companies in this area. Finally, in the long term, the multi-layer wholesale-market based system will make a gradual transition towards the modern food retailing system where supermarket chains sit in the center, namely changing the current product-driven supply chains to market-driven supply chains. This will force the downstream companies to pay more attention to product quality in the upstream chains. As a result, the demand for advanced postharvest technologies in product handlings, storage, and transportation will be significantly increased. Moreover, the smallholder farming system will be eventually vanishing, which will leave room for large-scale professional farming where Dutch knowledge can play an even bigger role.

3.3 Obstacles and risks

Sectorial challenges

There are sectorial challenges for cold chain logistics development in China, some of which have been already mentioned in section 3.1 such as the incompatibility of the smallholder farming system with Dutch high-tech solutions and the lack of sectorial attractiveness to motivate talented employees to join the sector. Another challenge that was not touched for the cold chain application in China is the different consumption preferences of Chinese consumers from western consumers. The Chinese consumers put a lot of emphasis on the sweetness and soft texture for fruits and vegetables, which can sacrifice the storability of the products. This improves the difficulty in applying well-developed Dutch postharvest management technologies in China.

Complexity of the policy scheme

As aforementioned, the policy supports from the governments is a critical factor that determines the success of the cold chain projects in China, especially for the first-miles where heavy investments with a long payback period are expected. However, to get the policy support (for example subsidies) from the governments is usually very difficult for foreign companies without the involvement of local partners. In general, mercantilism still has its market in China. Many policymakers still have the notion that the Chinese government's subsidies should primarily benefit Chinese companies. This makes the policy scheme very complex for foreign players and finding a powerful local partner becomes a must.

IP protection problem

IP protection is another long-standing problem to impede foreign companies to do business in China. Some Chinese interviewees suggested that the best way to enter the China cold chain logistics market is to create a joint venture with local Chinese companies. However, many Dutch interviewees were against this advice because of the IP protection problem. The corporation sole may be the proper format for Dutch companies to invest in China from the IP protection point of view. Moreover, since the starting USA-China trade war in 2018, huge national and international pressures have been imposed, which has made things better. The IP protection law has been in place (although the implementation of the law is still an issue) and the dedicated administrative body has also been established.

Political risks

The most prominent political risk at the moment comes from the fast deteriorated relationship between China and the USA. Since the middle of 2018, the conflicts between the two largest economies have been severely escalated from the original trade dispute to the technology war and a full ideological confrontation recently. Those conflicts can have an impact on the prospect of China's economy. In general, if such a political situation continues, there will be risks faced by Dutch companies that have businesses in China, especially for the ones with heavy assets there.

4 Dutch cold chain player analysis

4.1 Analysis of interview results

4.1.1 General considerations on Dutch capabilities for supply chain solutions

The Netherlands is an important food producer with a strong impact on global food supply chains. It is the second-largest food exporter in the world and one of the top-three technology manufacturers and exporters in all links of the food supply chain.

Historically the Netherlands has built up an outstanding reputation for its knowledge and technology in the field of large-scale food production and supply chain management. To further consolidate this position, the Dutch agri-food sector is also working intensively on food chain digitalization, adapted to the fast-developing and diverse landscapes, with the engagement of not only the large but also small players throughout the entire chains.

To realize this vision for a nearby future, Dutch companies and knowledge institutes are strongly committed to developing new concepts for multi-scale, high-grade, and more efficient food supply chains. Except for pursuing economic success, they are also dedicated to reducing the environmental impacts of the food sector and creating close-loop and circular supply chains.

Regarding the technological developments and technology industry, Dutch employers' organization FME is taking the lead in mobilizing and connecting all partners in an Agri & Food Cluster; NVKL is part of FME⁵

Some relevant activities of FME Cluster regarding enabling the food transition are:

- Continue the public dialogue on the role of new technology and food sources via the AgriFoodTech Platform⁶.
- Continue developing the High Tech to Feed the World⁷ (HT2FtW) crossover roadmap.
- Continue enhancing the known Dutch approach of knowledge sharing and exploration of new thematic connections via networks of specialists from various disciplines, thematic meetings, and effective dialogues.
- Consortiums of businesses and knowledge centers who jointly start initiatives (e.g. the Sustainable Food Initiative) and commercialize solutions for international markets.

International cooperation with other urban regions is perceived by FME as being necessary to jointly build the critical mass the world needs to address the issues arising from digitization and urbanization. In the earlier mentioned FME study HT2FtW, you can find interesting examples for self-sufficient cities to meet their own food requirements in a sustainable circular system via 'vertical farming' and 'urban farming'.

⁵ FME in key figures: 2,200 member companies, employing 226,000 employees in total, yearly turnover totalling € 103 billion, direct export totalling € 51 billion, support to 30 trade associations

⁶ Initiative by FME, LTO Nederland (Dutch Federation of Agriculture & Horticulture), FNLI and the four Dutch universities of technology, supported by the Ministry of Agriculture, Nature and Food Quality (LNV).

⁷ Initiative by the four universities of technology (Wageningen UR, Eindhoven University of Technology (TU/e), the University of Twente, Delft University of Technology (TU Delft), FME, three Key Sectors (Agriculture & Food, Horticulture & Starting Materials and High Tech Systems & Materials).

4.1.2 The orientation of Dutch cold chain related companies regarding supply chain opportunities in China

From out of the interviews (original results provided in a separate excel file⁸) there are several interesting insights to be shared. Firstly, more than 70% of the interviewees show strong interests and serious ambitions in exporting their products and knowledge to China. In fact, the majority of interviewees are attracted by the large and fast-growing Chinese market and consider it as an inevitable market to go to. The only question is when and how to go there with which region and product chain focus. 50% of the interviewed companies are already active in doing business in China and most of them are concentrated in the market of “first-mile solutions” for fruits and vegetables. Although having the first-mile focuses, most of the interviewees are interested in cooperation with partners in other links of the supply chain. 35% of interviewees want to do business in China in specific product chains only with other Dutch partners (strongly emphasized by 70% of them). Secondly, despite the strong will among the interviewees to expand business in China, there are also reasons for hesitations. These are mainly about cultural differences, legal issues, and IP-issues. However, 50% of the interviewees would like to invest in the processes of “learning by doing” and “building on trust”. Moreover, the majority of Dutch companies have no ambition for knowledge sharing regarding their own specialisms. This is not owing to doing business in China; the companies also do not do it in the Netherlands because they would like to protect the unique selling points of their businesses. Thirdly, even though the fast-growing fresh e-Commerce in China provides ample space for cold chain logistics applications, none of the interviewed Dutch companies is having business or technology directly related to e-Commerce. However, some of the companies have the potentials to offer the data and technologies that could facilitate the development of fresh e-Commerce business models where product quality preservation knowledge plays a crucial role not only in the last-mile delivery but also in upstream supply chain management. Fourthly, the interviewees believe that making use of local staffs in their own Dutch organization is seen as relevant for bridging the gaps of some aspects (e.g. cultural differences, after-sale services) in the short term but it is not perceived as being easy to support the long-term management. Currently, many Dutch companies often ask Chinese clients to hire the right local companies to install the purchased equipment instead of providing after-sale services from the Dutch side. Last but not the least, some Dutch companies which have been working in China, in general, perceived the involvement of governmental officials/organizations as being retarding and complicating the business. However, on the other hand, once such involved governmental organizations took their decisions, the process could go really fast because of the power and influence they have.

4.2 SWOT aspects for Dutch companies

When analyzing all answers, the overview of results could be positioned in a SWOT analysis, of course taking the risk that perhaps some statements then will miss the relevant nuances. However, within the ambitions of this study, it could also help to guide future discussions and elaborate on the best achievable opportunities for cooperation between Chinese and Dutch partners, regarding entering the Chinese cold chain market. It is relevant to emphasize that the elements in the SWOT analysis are of course formulated from the *perspective* of the Dutch interviewees.

Strengths

The expertise of the Dutch companies is indeed historically built on Chain Awareness (“Knowledge x Behaviour”), and in fact, strongly based on the triple helix approach. We say this is a unique strength that is in the DNA of Dutch companies. The open and direct culture and attitude of the Dutch people are seen as enhancing qualities for swift and adaptive cooperation with the Chinese business partners.

⁸ Due to the requirement of anonymity from several interviewees, the original results of the interviews are only for internal use.

Moreover, WUR and Dutch companies are used to think throughout the chain “from out of the product demands” or “micro-climate” (like already demonstrated in China with Dutch Greenhouse projects). The chain perspective broadens the horizon of cold chain logistics application and emphasizes the collective efforts put by the chain players on supply chain coordination, which can, therefore, increase the chance of business success. Finally, the Netherlands is a relatively small and crowded country, thus historically the Dutch are strongly oriented to do business outside their own country/region and know-how to explore the right business opportunities in a flexible way and how to “build on trust”. Several Dutch interviewees felt the same attitude somehow also in Chinese culture.

Weaknesses

Although there is maybe some similarity between Chinese and Dutch for the pragmatic attitude towards business, the interviewees have to admit that there are also significant gaps between Chinese and Dutch *culture/ laws/ politics/ financial* structures. In practice, it takes a lot of time to get really in “continuous business” which is a big barrier for willingness to invest in China. Moreover, a very practical issue is how to maintain the “service and after-sales” in the local market. Regarding maintenance of the equipment, 70% of the Dutch companies do have a worry regarding “after-sales service” in China after the equipment has been installed because of the lack of local qualified personnel to do the work appropriately.

Opportunities

As aforementioned, the largest issue in China lies in the “*first-mile logistics*”; the majority of the interviewees are mainly specialized each in their respective product chains in first-mile solutions. Therefore they are in the right position to help China cold chain logistics upgrading and hoping to get the right prices for their high-level technology solutions. Moreover, in general, the energy consumption issues of the low-tech refrigerated warehouses are perceived to be quite big and complicated in China. It could result in more than 3 times higher costs for energy use due to the low cooling efficiency. Dutch expertise could help to save on energy besides supporting the implementation of integrated solutions for continuous refrigeration capabilities throughout the chain. Furthermore, specialties of some interviewed companies (e.g. related to “Fruits”, “Vertical Farming” and “Tissue Culture”) really fit onto the needs of the Chinese urban developments and needs; 50% of interviewees expect that these technologies could become be disrupting and leverage “full chain developments”. Another perceived opportunity is from the positive attitude of Chinese governments and banks towards the investment in the cold chain logistics sector. It is seen as really a chance to build the consortia with the supports of governments or banks to mitigate the financial risks and others in the formulated cooperation to secure a smooth and trustworthy start. Finally, Dutch companies with experiences in China, in general, preferred to get the project directly from the involved upstream chain companies/farmers because they are convinced that in this way there are improved chances that the added value of the Dutch technology and equipment are best understood.

Threats

The largest threat perceived by the interviewees is the risk of losing their intellectual property (IP) during the collaboration with the local partners in China. Moreover, finding trustworthy local companies for doing the installation and implementation works on the assembly of Dutch installation equipment is difficult both from the perspective of providing good-quality service and the point of view of IP protection.

5 Conclusion

Based on the '*China cold logistics market investigation*' and '*Dutch cold chain player analysis*', many insights and conclusions can be derived. Generally speaking, there are huge needs for cold chain development in China, especially for the first miles because of the lack of cold chain infrastructure in the upstream supply chains. Although the development of the cold chain in China is still in the initial stage, it may be the right moment to step in. Waiting for a few years may make Dutch players too late to access the market because it takes time to build relationships in China. A fact for China's agriculture is that smallholder farming is still the dominant form of farming practice. This is not a very favorable landscape for Dutch players which are experts in big-scale production and postharvest management systems. However, the recently launched big-scale cold chain development projects with the focus on first-miles can stimulate the companies' investment in agriculture and the collaboration between smallholder farmers, both of which can increase the scale of the farming in the future. In the meanwhile, Dutch players should first select bigger-scale agricultural projects (even though the market maybe not very big at the moment), as these are modern farming projects with investors involved, and also often Dutch technology involved (i.e. greenhouses). It is also important to first select high-value products with high production concentration as the starting point to provide adequate volume and profit margin for cold chain applications (e.g. the greenhouse vegetables in Shandong). When approaching the market, the cluster approach that leverages the strengths between Dutch greenhouse and cold chain technologies is essential to be applied. The Dutch government can play an important role in promoting the two sectors as a cluster by orchestrating coordinated go-to-market strategies. Also from a policy perspective, both sectors can contribute to the political agenda of bringing down food losses and improving food security globally.

Different from the situation in the developed countries, the big retailers are the dominating force that is able to coordinate the chain players to achieve the chain-wise goal, e-Commerce giants in China could also play a similar role in China's fresh produce supply chains. Chinese e-Commerce companies have direct connections to huge amounts of end consumers. They know the best about consumers' demands and can shape their awareness of fresh quality development. Moreover, giant e-Commerce companies can mobilize huge resources through its extensive networks which usually involve top-class venture capitals. It would be a missed opportunity for Dutch players if they cannot connect to giant Chinese e-Commerce companies. Recently, President Xi Jinping gave a speech on food waste reduction. Even though the speech focused more on bringing waste down on the consumer level, it may still stimulate the Chinese governments to put even more emphasis on cold chain development to reduce the losses in other chain links. It is very crucial for the Dutch players to access those programs with governmental subsidies. To realize that, finding reliable and powerful local partners is the key. In China, generally speaking, it is very hard for foreign companies to directly get the governmental subsidies. Usually, the collaborating local partners will be responsible for the application of subsidies from the government because they are more familiar with the local culture and policies and know how to deal with the government. The local partners are also the essential party to ensure good services can be provided by the Dutch companies. The Chinese clients do not want to work with the companies which only aim to sell their products and technologies but the ones which can provide integrated solutions to their problems including good after-sale services and training. Training the clients to use the technology or equipment is of high importance because in many cases, even though the technology or equipment is available if the clients use it in a wrong way, the results will be poor as well.

In terms of the interesting sectors and regions, the proposed provinces by the Ministry of Agriculture and Rural Affairs last April offer the targets with the emphasis on fruits and vegetables in the first miles. Those provinces including Hebei, Shanxi, Liaoning, Shandong, Hubei, Hunan, Guangxi, Hainan, Sichuan, Chongqing, Guizhou, Yunnan, Shaanxi, Gansu, Ningxia, Xinjiang. The remote provinces such as Xijiang may derive careful investigation because the markets for their products are far away. As a result, long-time storage and long-distance linehaul transportation are required, which increases the chance of product spoilage and therefore the demand for cold chain applications. The guideline document (mentioned in 3.2.1) also stated energy-saving cold chain facilities are demanded because

of the cost-reduction motivation and low-emission target. Therefore, if the Dutch player can supply the technology and equipment to save energy use, this will be in line with the policy orientation of the government. Moreover, the existing refrigerated warehouses are mostly for storing frozen products w. The warehouses for storing fruits and vegetables are in shortage. Therefore, the current policy addresses the development of fruits and vegetables refrigerated warehouses (or even CA warehouses). Finally, in the mid-term and long-term, the demand for a data-driven quality-centric fresh produce chain will be enhanced. This can bring in another dimension of cold chain logistics development where "smart fresh chain" will become a common business practice in the fresh produce sector. This can provide opportunities for Dutch cold chain companies who can provide good digitalization and quality-control services in the China cold chain logistics market.

To conclude, the main findings of this study are:

- The horticultural sector (fruits and vegetables) in the first-miles is the focal point that Dutch companies should focus on from both the market potential and Dutch USP perspective.
- Team-up with local partners is essential for connecting to the policy-makers, local politics, and for providing good services.
- Successful Business cases that can demonstrate the added values of the Dutch high-tech cold chain solutions must be developed.
- Alignment with the horticultural sector which has already built a reputation in China is important because the cold chain logistics sector is not as visible as the horticultural sector.

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Appendix

Name	Region	Key stakeholder
Pinggu national backbone cold chain logistics base.	Pinggu, Beijing.	Pinggu District Government, Beijing Development and Reform Commission.
Jinan national backbone cold chain logistics base.	Jinan city.	Jinan Development and Reform Commission, Wellcome Cold Chain Logistics Park.
Inner Mongolia Bayangar national backbone cold chain logistics base.	Bayangar.	Inner Mongolia Development and Reform Commission.
Suzhou national backbone cold chain logistics base.	Suzhou.	Jiangsu Development and Reform Commission.
Yingkou national backbone cold chain logistics base.	Liaoning Campkou.	Yingkou Development and Reform Commission.
Dongguan national backbone cold chain logistics base.	Dongguan city.	Dongguan Development and Reform Bureau.
Jinzhong national backbone cold chain logistics base.	Jinzhong.	Shanxi Development and Reform Commission.
Zhoushan national backbone cold chain logistics base.	Zhoushan city.	Zhoushan National Ocean Fisheries Base.
Hefei national backbone cold chain logistics base.	Hefei city.	Anhui Development and Reform Commission Trade and Services Office.
Fuzhou national backbone cold chain logistics base.	Fuzhou city.	Mawei District Government.
Zhengzhou national backbone cold chain logistics base.	Zhengzhou city.	Henan Development and Reform Commission.
Wuhan national backbone cold chain logistics base.	Wuhan.	Wuhan Shanlv Agricultural Products Group Co., Ltd.
Huaihua national backbone cold chain logistics base.	Huaihua City.	Huaihua Development and Reform Commission.
Zigong national backbone cold chain logistics base.	Zigong city.	Zigong Development and Reform Commission.
Kunming national backbone cold chain logistics base.	Kunming city.	Kunming Bao xiang Wan Dun cold storage logistics Co., Ltd., Yunnan Chengda Frozen Food Logistics Co., Ltd.
Baoji national backbone cold chain logistics base.	Baoji city.	Mei County National Kiwi Industrial Park.
West Coast New Area National Backbone Cold Chain Logistics Base.	Qingdao.	Qingdao West Coast New Area Development and Reform Bureau.
Mianyang cold chain logistics project.	Mianyang, Sichuan.	Municipal Bureau of Agriculture and Rural Areas.
Guangzhou Nansha International Cold Chain project.	Guangzhou Port.	Guangzhou Port Co., Ltd.
Smart cold chain logistics base project.	Different areas	Oriental Dragon Business Group.
Jiangxi supply and marketing (Guixi) cold chain logistics park project.	Guixi, Jiangxi Province.	Jiangxi Federation of Supply and Marketing Cooperatives.
Yuxi International "Cold Chain Logistics and E-Commerce" " project.	Chongqing Rongchang.	Yuxi International, Jiu He Liu Cheng.
Zhong Nong Pi cold chain logistics project.	Mudanjiang.	Zhong Nong Pi Cold Chain (Mudanjiang River)

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