Ministry of Foreign Affairs

A Quick Scan of Cold Chain Logistics Sector in China's Greater Bay Area

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Introduction

The Guangdong-Hong Kong-Macau Greater Bay Area (GBA) consists of nine cities in Guangdong province including Shenzhen, Guangzhou, Foshan, Dongguan, Zhuhai, Zhongshan, Huizhou, Zhaoqing and Jiangmen, Hong Kong Special Administrative Regions (HK SAR) and Macau SAR. Home approx.71 million (2018) permanent population, GBA accounts for one-eighth of the entire economic output in China. It is currently one of the four largest bay areas in the world alongside the New York Bay Area, San Francisco Bay Area and Tokyo Bay Area.

With the major cross-border infrastructure under use, such as the Hong Kong-Zhuhai-Macao Bridge and the Hong Kong section of the Guangzhou-Shenzhen-Hong Kong high-speed rail, the integration of comprehensive transportation infrastructure and the construction of logistics infrastructure will further promote the flow of people, logistics, capital, and information in the Greater Bay Area, resulting in more convenient customs clearance for people and goods. Given the consumer scale and relatively high income in GBA, the demand for cold chain products such as fresh agricultural products remain strong. Therefore, the cold chain logistics is expected to develop at a fast pace in this region.

According to the "Analysis Report on Market Outlook and Strategic Investment Planning of China's Cold Chain Logistics Industry" by the Prospective Industry Research Institute, the market size of the cold chain logistics industry in 2019 reached 339.1 billion RMB, a YoY increase of 17.6%. The cold chain logistics market in China is expected to grow and reach 339.8 billion RMB in 2020. Even though the outbreak of the epidemic in 2020 has changed people's shopping behaviours, fresh food on e-commerce platforms and direct delivery remain popular, which will further foster the development of the cold chain logistics sector.

However, the refrigerated transportation facilities are still inadequate in China, making it difficult for most fresh agricultural products to be preserved with standardized and necessary temperature, humidity, and cold storage services during transportation. A comprehensive understanding of the cold chain logistics is important for any company which intends to access to this market. To use cold chain logistics means more than just putting items in an environment with controlled temperature. It is a rather complete logistics network composed of nodes, parks, and various storage warehouses. Only when the cold chain logistics links the isolated points to a network will it deliver real benefits to the producers, consumers, and merchants.

This report outlines the cold chain logistics industry in the GBA, particularly in Guangdong Province. The Section 1 describes the social and economic background of the GBA. The

section 2, 3 and 4 provide information regarding the policy framework, the market status quo, and the development bottlenecks for the cold chain sector in Guangdong. These sections also present the vision and main development goals that the Guangdong Government has set for the cold chain cluster. The section 5 and 6 briefly discuss the projects and the supportive schemes available for the cold chain industry. The final section provides suggestions to the Dutch cold chain businesses who wish to enter the GBA market. There is also an additional section on the cold chain logistics for pharmaceutical sector, detailing its development and the latest trends against the new normal.

Section 1. The Background of the Guangdong-Hong Kong-Macao Greater Bay Area

The Guangdong-Hong Kong-Macao Greater Bay Area (GBA) represents the Hong Kong Special Administrative Region (HKSAR), the Macao Special Administrative Region (Macao SAR) as well as the nine municipalities in Guangdong Province, namely Guangzhou, Shenzhen, Zhuhai, Foshan, Huizhou, Dongguan, Zhongshan, Jiangmen and Zhaoqing, altogether GBA covers a total area of 56,000 square kilometres with a combined population of over 71 million by the end of 2018, accounted for approx. 5% of China's total population.

The development of the GBA was first elevated to a national strategy in 2017. In February 2019, the major strategy was set forth in the Development Plan for the Guangdong-Hong Kong-Macau GBA. The plan includes transforming the GBA into "a vibrant world-class city cluster", as well as "a global innovation and technology hub". It will a

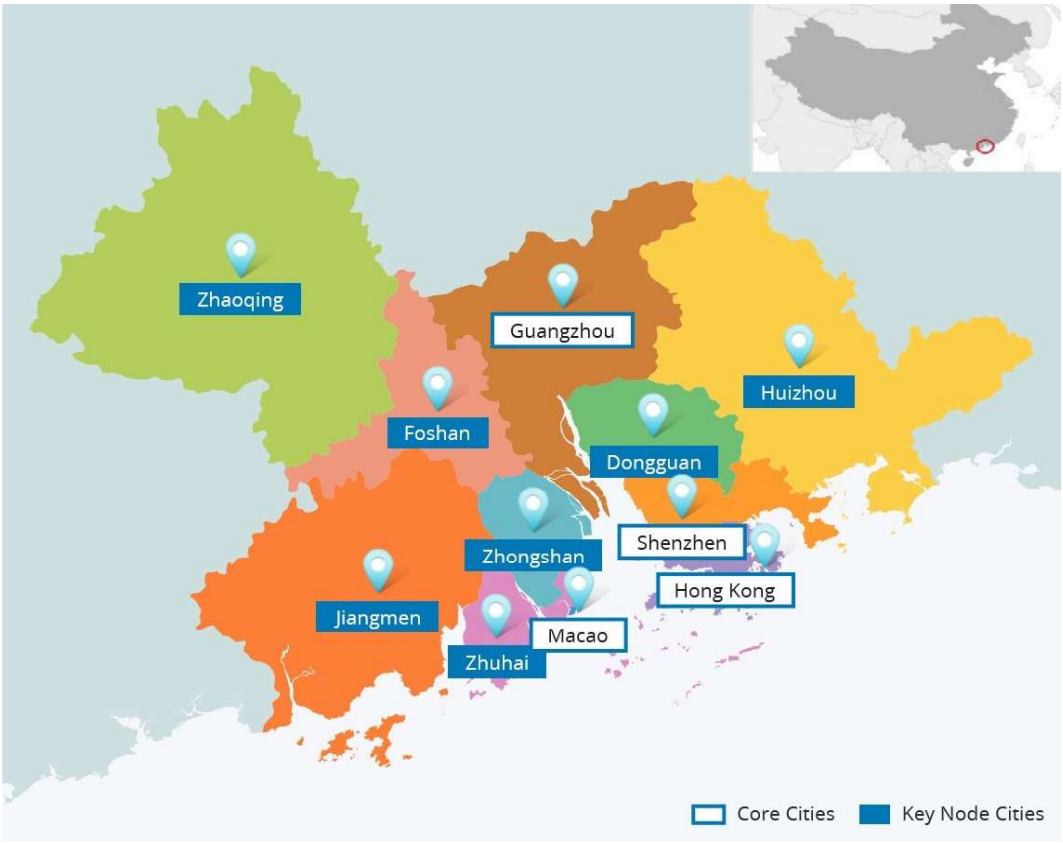
lso be developed into an important "pillar for the Belt and Road Initiative", a showcase for "Mainland, Hong Kong, and Macau cooperation" as well as a high-quality residential area.

As one of the most open and economically vibrant regions in China, the GBA plays a significant strategic role in the overall development of the country. Located in the pioneering region for China's Opening-up and reform, along the coast and with the Pan-PRD Region as its vast hinterland for development, the Greater Bay Area plays an important role in the Belt and Road Initiative.

The Greater Bay Area is a highly developed transport hub for two reasons. Firstly, Hong Kong has long been recognized as an international maritime centre. What's more, Guangzhou and Shenzhen ports enjoy nearly the highest throughputs in the world. Secondly, Hong Kong, Guangzhou and Shenzhen are homes to strong international aviation hubs which operate flight routes that cover almost all the major cities domestically and internationally. In conclusion, the GBA enjoy a modern, comprehensive, and highly efficient transport system.

The Greater Bay Area is a major economic region in China. It has a comprehensive industrial system with a distinctive cluster advantage and strong economic complementarity. Hong Kong and Macao enjoy highly developed service sectors, whereas the nine PRD municipalities have built a stronger industrial structure utilising the emerging industries. The GBA's combined economic output in 2018 registered 1.6 trillion USD. If the GBA is regards as a country, it would be the world's 12th largest economy, slightly ahead of South Korea.

According to the 2018 World's Cities Ranking by Britain's GaWC, three of the GBA's cities were of Alpha level. Hong Kong ranked the third, Guangzhou the 27th, and Shenzhen the 55th. London and New York ranked the top, with Beijing ranked the 4th and Singapore the 5th, and Shanghai the 6th.



The Key Social Figures in the Greater Bay Area

- The combined size: 56,000 sq. km
- The combined GDP: 1.64 trillion USD （2018）
- The nine mainland cities make up 85% of Guangdong's GDP
- The Greater Bay Area accounts for 12% of China's GDP
- Population: 71.12 million （2018）
- Administrative units: 9 cities+2 SARs
- Three of the world's top 10 busiest container ports
- Four major international airports (Guangzhou, Shenzhen, Hong Kong, Macao)

The Overview of the Greater Bay Cities

City	Population	Area	GDP	Intro
Hong Kong	7.45 million	1107 sq.km	2.84 trillion HKD	An international city, tourist destination, finance hub and highly regarded for its legal expertise and institutions.
Macau	0.667 million	33 sq.km	440 billion MOP	A popular tourist destination for its unique Chinese/Portuguese heritage and casinos.
Dongguan	8.34 million	3798 sq.km	965 billion CNY	Known for being the "world's factory" and for its cultural attractions
Foshan	7.65 million	3798 sq.km	1.08 trillion CNY	Known for ceramics and furniture production. It also features cultural and historical attractions including the Bruce Lee's Ancestor's House.
Guangzhou	14.49 million	7434 sq.km	2.5 trillion CNY	Capital of Guangdong, International trade base, and home to the region's leading cultural & historical attractions.
Huizhou	4.77 million	11347 sq.km	422.17 billion CNY	A tourism city, home to the Taoist Luofu Mountain, Pinghai Ancient City, hot spring and beach resorts, and the beautiful Xunliao Bay

Jiangmen	4.56 million	9507 sq.km	320 billion CNY	A well-known hometown of overseas Chinese, famous for its Kaiping Diaolou and Villages
Shenzhen	12.52 million	1997 sq.km	2.8 trillion CNY (estimated)	The gateway of China's opening-up and reform, hi-tech industry base, economic powerhouse, and home to the scenic Dapeng Bay coastal area and beaches.
Zhaoqing	4.11 million	14891 sq.km	230 billion CNY	Famous for the beauty and fresh air of nearby Dinghu Mountain, and the Star Lake Scenic Area.
Zhongshan	3.26 million	1784 sq.km	315.15 billion CNY	A key manufacturing base that attracts a lot of overseas investment and expats.
Zhuhai	1.76 million	1736 sq.km	353.89 billion CNY	A tourism city that is known for its long coastline, islands, hot springs. It is also an SEZ with a focus on textiles and electronics.

*GDP figures are from respective municipal statistics bureaus in 2020, Hong Kong and Macau's figures are of 2018.

Section 2. The Basic Facts of Cold Chain Logistics in the Greater Bay Area

2.1 Policy Background

To better support the development of the cold chain logistics, the Ministry of Finance and the Ministry of Commerce of China have jointly issued the Notice on Supporting the Development of Cold Chain Logistics with the Central Government's Budget. To promote continuous improvement of the industry, Guangdong is listed among the pilot provinces for the development of cold chain logistics and will receive financial support for its cold chain projects.

The "Overall Plan for Developing Supply and Marketing Public Accessible Agricultural Cold Chain Logistics Infrastructure in Guangdong " (hereinafter referred to as the "Overall Plan") have been issued and implemented. By 2022, the cold storage capacity available to public use will reach 1.6 million tons, with more than 2,000 new refrigerated vehicles and more than 1,000 mobile pre-cooling devices. According to the Overall Plan, 17 billion RMB will be invested to promote the cold chain logistics infrastructure within three years.

2.2 Status Quo

Guangdong's cold chain logistics market has continued to grow. As of 2016, there were more than 200 businesses involved in cold chain logistics in the Province. As of June 2016, the province had more than 1,700 cold storages of different sizes (about 85% are low-temperature storages and 15% are high-temperature storages) with a total capacity of about 3 million tons. Most of them were in the Pearl River Delta, especially in Guangzhou, Shenzhen and Foshan, which combined, account for 80% of all cold storages of Guangdong. There were more than 10,000 refrigerated trucks in Guangdong, and the total tonnage of refrigerated ships exceeded 1.6 million tons.

The application of information management systems such as the video monitoring system, the temperature monitoring system, the storage information system and other information system continues to expand among the major cold chain businesses in the province. The vigorous development of e-commerce has catalysed new business models such as the fresh community O2O and home delivery through the cold chain. New cold chain logistics models have also emerged, such as the processor-centred direct sale and the third-party cold chain logistics model.

In summary, the cold chain logistics in Guangdong develops faster and better than before, but there are also challenges. Firstly, the development of cold chain logistics is unbalanced between

the difference regions. The industry is more advanced in the nine cities in GBA whereas in the eastern, western, and northern Guangdong it is relatively backward. Secondly, the structure of cold chain facilities is not ideal: there are more low-temperature storages than fresh storages; more meat refrigerators than fruit and vegetable refrigerators; more cold storages in the GBA than in the rest of Guangdong. Thirdly, the cold chain logistics resources are scattered with low usability rate. The cold storage capacity in Guangdong cannot meet the needs from the new and modern business models and emerging technologies. Fourthly, most of the third-party cold chain logistics businesses are of small size, poor management, and underdevelopment. The cold chain logistics market management is not standardized, and there are not enough professional businesses to provide whole-process cold chain logistics services.

2.3 The bottlenecks

Reducing cost and raising efficiency of the cold chain logistics have become the bottlenecks of the supply side structural reform of the logistics industry in Guangdong. This requires the establishment of a service system of cold chain logistics which adapts to consumers' demand and the modern circulation mode and provides whole-process temperature control and real-time monitoring. The upgrading and development of cold chain logistics in Guangdong face new opportunities and challenges.

In recent years, an increasing number of new business models and traditional companies have entered the already diversified cold chain market. On one hand, under the new normal, many businesses in traditional industries cross boundary and enter the cold chain market (for example, many major traditional logistic companies and e-commerce platforms have launched the fresh product business to tap into the cold chain market). On the other hand, international cold chain companies are accessing to the Chinese market. How to innovate the business and service models under the new circumstances and continuously foster the technological reform remain essential if a more competitive logistics sector is to be built.

The safety of food and drugs, which relate directly to people's wellbeing and social stability, requires a higher standard cold chain solution. However, incidents on food and drugs safety have been frequently reported, arousing high attention to the importance of building a trustworthy cold chain. The whole society is attaching higher requirements to the development of cold chain logistics. Since June this year, more than 10 provinces and cities including Beijing, Liaoning, Anhui, Fujian and Jiangxi have discovered coronavirus-positive samples taken from the imported frozen food or food packages. on November 9th, 2020, the Chinese State Council

issued a Guideline on Cold-chain Food Disinfection, which required all imported food to be traceable and managed throughout the entire process.

Guangdong is home to the largest number of cold chain logistics firms in China, followed by Shandong Province. Guangdong's logistics industry issued a call in October for the building of a safer, more efficient, and more intelligent cold chain sector. Imported cold -chain goods that does not report the source of purchase will not be transported. Remarks from the Cold Chain Logistics Committee, China Federation of Logistics & Purchasing stressed that the domestic cold chain industry should apply more advanced technologies for real-time monitoring of the entire transport process to guarantee utmost safety.

Section 3. The Vision for the Cold Chain Development in Guangdong

Guangdong Government has set out ambitious goals to improve the development of the cold chain logistics across the province. This year, the Chinese National Development and Reform Commission has appointed 17 national backbone cold chain logistics bases with one located in Dongguan City of Guangdong Province. These bases will receive the preferential policies and funds from both central and local governments to further grow the cold chain sector.

The cold chain logistics in Guangdong will mainly be used for the fresh products, such as fruits and vegetables, meat, aquatic products, and other agricultural products. Meanwhile, group dining and the central kitchen, the semi-finished products and the medicine will also require high quality cold chain solutions.

The key tasks are to improve the circulation rate of the cold chain logistics, to reduce the loss of fresh product during transit, and to build a whole-process cold chain logistics system. Guangdong Province also plans to use more green and environmentally friendly facilities and technologies to promote the green development of the cold chain logistics.

In the short term, Guangdong will concentrate on activating model cold storages, refrigerated vehicles, distribution centres and other facilities. Hardware upgrade, functional improvements and technological upgrade will be carried out to comprehensively increase the cost-effectiveness of model facilities and equipment.

Section 4. The Main Goals for the Cold Chain Development in Guangdong

By the end of 2020, a modern cold chain logistics system that complies with Guangdong's economic status will be established by adopting the following measures:

- Reducing costs and increasing efficiency for the cold chain logistics industry. The comprehensive cold chain circulation rate will reach 25%, the refrigerated transportation rate will reach 55%, and the loss rate across circulation links will drop by about 10%.
- Further expanding the capacity for the cold chain logistics facilities. The capacity of cold storage in Guangdong will reach 4.5 million tons, the number of cold chain vehicles will reach 15,000, and the proportion of pre-cooled products will reach 30%.
- Accelerating the cultivation of the demonstrative cold chain logistics businesses. We will identify 25 demonstrative areas and cultivate 50 demonstrative enterprises in cold chain logistics in Guangdong.
- Further improving the industrial layout of cold chain logistics. Optimizing the distribution of the facilities and the equipment, including that of the precooling at the production sites, storages, distribution, and transportation to realize more balanced development. We will seek solutions to challenges such as "the first kilometre", "the last kilometre" and " the broken chain", and build a full coverage, multi-level cold chain logistics network.
- Establishing a whole-process traceable system for cold chain logistics. We will accelerate the pilot application of next generation IT systems such as Internet of Things, cloud computing, and big data in cold chain logistics, enabling the traceability of the sources, destinations and all related parties and future replicate the feasible models across the province.

The Indicators for the Main Goals

Indicators	Status Quo	Goals for 2020
Overall cold chain circulation rate	19%	25%
Refrigerated transportation rate	48%	55%
Circulation link loss rate	17%	Drop by 10%
Cold storage capacity	3 million tons	4.5 million tons
Cold chain transport vehicles	10,000	15,000
Pre-cooling preservation ratio		30%
Cold chain logistics demonstration parks	0	25
Cold chain logistics demonstration enterprise	0	50

4.1 Optimizing the Regional Network

One of the important goals that Guangdong will focus on is to construct a new cold chain network by optimizing the existing one. Guangdong will expand the cold chain logistics distribution network in the production areas, building the cold storages and distribution centres with precooling treatment, primary processing, sorting, storage, packaging, information processing and exchange to release the first kilometre of cold chain logistics in major production sites. For instances, fruits, vegetables, and meat in the eastern, western and northern part of Guangdong as well as the aqua products in coastal areas. Guangdong will also improve the cold chain distribution network by renovating a number of cold chain distribution centres, refrigerated containers, refrigerated cabinets in the key sales areas, such as Guangzhou, Shenzhen and other GBA cities.

4.2 Building a Whole-process Cold Chain Logistics System

Taking the fresh meat for example, Guangdong aims to establish a fully integrated, low-loss and traceable cold chain logistics system, which covers the whole process, starting from the

pre-cooling in the production areas, to the cold chain transportation, and then the cold storage in sales areas, followed by the cold chain distribution and the final circulation markets.

4.3 Strengthening the Key Players in the Cold Chain Logistics

Guangdong will support and strengthen the leading cold chain companies, focusing on the construction of cold chain storage facilities and the upgrading and transformation of the relevant technologies. Guangdong will actively bring in the advanced service providers and equipment suppliers from home and abroad to establish the headquarters or branches in the region.

4.4 Promoting Innovative Cold Chain Technologies

Guangdong will strengthen the introduction, R & D, innovation and application of the technologies and equipment appropriate for the whole-process cold chain logistics. Efforts will be made on the introduction of the advanced technologies in the pre-cooling, refrigeration, environmental temperature and cleanliness control, insulation material, warehouse temperature control, mobile refrigeration, and cooler box manufacturing. Meanwhile the development of new equipment such as the multi-temperature refrigerated vehicle, cooler box and intermodal refrigerated containers will also be encouraged. Efforts will also be made to promote the innovation for the energy-saving technology, the cold source system optimization technology, and the new packaging material technology. In addition, the application energy-saving and environmentally friendly technologies in low-temperature storage and transportation will also be promoted.

4.5 Speeding up the Standardization of the Cold Chain Logistics

Building a standardized cold chain logistics sector is also essential for Guangdong in the long run. The Province is working on establishing local technical standards, operation specifications, safety certification, and the market access system that comply with the international ones. Guangdong will also strengthen and standardize the whole-process monitoring and traceability system. The GBA is home to three independent customs with the different standards. Therefore, to generate synergy in GBA and enable the free flow of agricultural products, the first step is to create a unified customs clearance standard.

Section 5. The Key Projects and Focus Areas

Guangdong will promote the pre-cooling treatment in the production areas to ensure the quality of the fresh agricultural products in the production process; and around large agricultural and aquatic products markets, the Government is seeking to upgrade, transform or build the cold chain storages and transportation centres to improve the refrigeration facilities. Capable enterprises will be encouraged to purchase the intelligent and environmentally friendly cold chain vehicles. The three-compartment refrigerated trucks will be encouraged in order to significantly improve the capacity and efficiency of the cold chain transportation in Guangdong. Besides, Guangdong will actively promote the pre-cooling treatment in the production areas, encouraging raw material sorting, primary processing, rapid cooling, and simple packaging at the production areas. To future enable the whole-process monitoring from the storages to the distributions, the inspection and testing on fresh agricultural products such as meat, vegetables, fruits, and aquatic products will be strengthened as well.

After the outbreaks of Covid-19 in early 2020, Guangdong has identified **6 focus areas** for developing agricultural supply chain .

1) Strengthen the construction of processing facilities for post-production commercialization. Set up supply hubs which have the capacity of post-production commercialization in the vicinity of the growing area, including cold storage and warehouse space. These supply hubs should be furnished with equipment for agricultural product cleaning, processing, pre-cooling, drying, quality inspection, grading, packaging, and refrigeration. All these measures are to fix the weak links, the very initial stage, of the agricultural product supply chain to improve the capacity of commercialization processing and stagger sales of agricultural products. The move aims to encourage enterprises focusing on new type of agricultural operation and agricultural products circulation to strengthen the construction of mobile and shared commercialization processing facilities in growing areas and improve the use efficiency of these facilities and equipment. The move will focus on providing support to the projects that build the post-production commercialization processing facilities, projects that build such facilities near the product growing areas and achieve the goal of extending the selling period and reducing the loss of agricultural products.

2) Develop cold-chain logistics for agricultural products. Support agricultural products circulation enterprises or new agricultural business entities to apply the idea, standards, and technologies of modern cold-chain logistics management, to build agricultural product cold-chain logistics distribution centers with centralized procurement and trans-regional distribution capacity. These distribution centers will be furnished with cold-chain facilities and equipment for pre-cooling, low-temperature sorting, and processing, refrigerated transportation and temperature monitoring. The measure is to set up a cold-chain logistics system for the entire process that covers the steps of agricultural products processing, transportation, storage, and sales. The move will focus on providing supports to the establishment of the entire cold chain for agricultural products and the development of agricultural enterprises that aim to setting up such system. The emphasis of these projects should be solving the problem of cold-chain disconnection in the circulation of the cold-chain of agricultural products.

3) Increase the service capacity of benefiting people at the end of the supply chain. Support agricultural products circulation enterprises or new agricultural business entities to build or upgrade agricultural products retail markets such as farmers' markets, produce markets and community vegetable shops. The move will focus provide support to enterprises which improve the retail sector of agricultural products such as farmers' markets and community produce markets and enhance the service to the public.

4) Raise the level of standardization and branding. Establish a complete industrial chain standard system covering all links, including processing, inspection and testing, quality grading, labeling, and packaging, cold-chain logistics, wholesale, and retail for cultivating and breeding products with local characteristics and advantages. The system should properly integrate standards at all levels, such as national, local, group and enterprise standards. The move aims to push the promotion and application of standards.

5) Optimize the connection between production and sales of agricultural products in the supply chain of key pedestrian areas. Build smart neighborhoods to optimize the connection between farmers and businesses, improve the capability of product display, production, and marketing in pedestrian areas, introduce marketing themes related to the

supply chain of agricultural products, and expand the brand influence of agricultural products.

6) Promote price stability and safeguarding supply of agricultural products in the time of COVID-19 pandemic prevention and control. Preferential support will be given to agricultural product circulation enterprises, such as wholesale markets, fresh produce supermarkets, vegetable markets, warehousing and logistics enterprises, which have made substantial contributions to safeguarding the supply of essentials and promoting price stability.
    - Modes of Support: financial support
    - Supporting Scope: Actual expenses incurred in the process of safeguarding supply and price stability, such shipment, rent, cold-chain storage, pandemic prevention supplies, and cost related to reconnect the supply chain.
    - Amount of Support: Not exceed 40% of actual expense indicated on invoices.

Section 6. The Supporting Schemes

The Chinese central government supports the development of the cold chain logistics in Guangdong Province with budgeted financial subsidies. The Department of Commerce and Department of Finance of Guangdong will dispatch the experts to review the projects applications. These grants, once approved, will be treated as the self-raised fund of the project owner themselves. Except for projects of NPOs, the financial support volume should not exceed 40% of the total project investment; For projects in the establishment of the whole-process cold chain system and in infrastructure constructions, the approved grants should not exceed 40% of the total project investment.

Besides, incubation plans will be carried out for the leading enterprises in the cold chain industry. Guangdong will establish a coordination mechanism with all stakeholders to tackle with the difficulties that the leading cold chain companies have encountered. Special funds will be set up, preferential policies related to land use and power will also be released to accelerate the integration of the industrial chain.

Supporting Plans for the Agricultural Supply Chain Projects in Guangdong 2020

City	Enterprises	Projects	Types (Refers to Section 5 Focus Areas)	Approved Investment (RMB)	Support Intended (RMB)
Guangzhou	CR Vanguard Supermarkets		6. Promote price stability and safeguarding supply of agricultural products in the time of COVID-19 pandemic prevention and control.	35.65 million	1.65 million
Guangzhou	Guangzhou Qiandama Fresh Produce Chain Limited		6. Promote price stability and safeguarding supply of agricultural products in the time of COVID-19 pandemic prevention and control.	10.33 million	1.65 million
Guangzhou	Nansha International	Construction of a Complete Cold-chain	2.Develop cold chain logistics for	100 million	6.6 million

	Cold Chain of Guangzhou Co., Ltd.	Logistics System of Guangzhou Nansha International Logistics Center (South Area)	agricultural products.		
Guangzhou	Guangzhou Roulianbang Food Co., Ltd.	The Establishment of the Integrated Warehouse and Distribution, and Sales Network for New Retail	3. Improve value-added service from the end of the supply chain to the communities	4 million	1.17 million
Shaoguan	Shaoguan Qunda Industrial Co., Ltd.	Construction of Processing and Cold-chain Logistics Facilities for the Annual Capacity of 370,000 Pigs	2.Develop cold-chain logistics for agricultural products.	18.71 million	5.77 million
Shaoguan	Guangzhou Jiangfeng Industrial Wengyuan Co., Ltd.	Construction of an Entire Cold-chain Logistics System for the Integration of Poultry Production and Sales	2. Develop agri-products cold chain logistics capacity	33.36 million	6.6 million
Shaoguan	Wengyuan Baixianguo Agriculture Co., Ltd.	Post-production Commercialization Processing Facilities for 10,000 Tons of Passion Fruit	1. Strengthen the construction of processing facilities for post-production commercialization.	3.33 million	1.04 million
Meizhou	Meisong Grapefruit Cooperative of Meizhou	Construction of Post-production Commercialization Processing Center for Grapefruit by the Fields in Songyuan Town, Meixian District	1. Strengthen the construction of processing facilities for post-production commercialization.	11.22 million	3.69 million
Meizhou	Dapu Tongmei Industrial Co., Ltd.	Post-production Commercialization Processing for Meizhou Grapefruit	1. Strengthen the construction of processing facilities for post-production commercialization.	5.59 million	1.76 million
Meizhou	Meizhou Zhongnong Wholesales Refrigerated Storage Co., Ltd.	Construction of Cold-chain Logistics Distribution Center for Agricultural Product in Wuhua	2. Develop cold-chain logistics for agricultural products.	28.36 million	6.6 million
Shanwei	Shanwei Gaozhan Industrial Co., Ltd.	Expansion of Cold-chain Logistics Center for Agricultural Product	2.Develop cold-chain logistics for agricultural products.	54.86 million	6.6 million
Jiangmen	An Jie Supply Chain	Construction of Cold-chain Logistics Center	2. Develop cold-chain logistics for	25.3 million	6.6 million

	Management Co., Ltd.	of Agricultural Product	agricultural products.		
Yangjiang	Yangjiang Smart Agricultural Technologies Development Co., Ltd	Construction of Processing Facilities for Vegetables Post-production Commercialization	1.Strengthen the construction of processing facilities for post-production commercialization.	10 million	3.5 million
Zhanjiang	Zhanjiang Purple-Black-Red Agriculture and Forestry Technologies Co., Ltd.	Upgrading of Agricultural Product Cleaning Facilities by the Fields and Construction of Refrigerated Warehouse in Zhanjiang	1. Strengthen the construction of processing facilities for post-production commercialization.	5.95 million	1.88 million
Maoming	Maoming Huizhong Aquatic Products Co.,Ltd.	Upgrading Project for Aquatic Product Cold-chain Logistics	2.Develop cold-chain logistics for agricultural products.	2.8 million	0.87 million
Qingyuan	Qingnon E-commerce of Qingyuan City Co., Ltd.	Construction of Poultry Commercialization Processing and Preservation Facilities	1. Strengthen the construction of processing facilities for post-production commercialization.	6.49 million	2.05 million
Chaozhou	Yuxiang Aquaculture Co., Ltd.	Demonstration and Further Procedure for Frozen Aquatic Product Processing	1. Strengthen the construction of processing facilities for post-production commercialization.	10 million	3.3 million
Chaozhou	Guangdong Hairun Cold-Chain Logistics Co., Ltd.	Construction of Supporting Cold-chain Facilities for the Guangdong Hairun Cold-chain Logistics Center	2. Develop cold-chain logistics for agricultural products.	11.29 million	3.72 million
Yunfu	Xinxing Baiyuan E-commerce Co . Ltd.	Construction of Cold-Chain Logistics Distribution Center for Xinxing Baiyuan Agricultural Products	2.Develop cold-chain logistics for agricultural products.	16 million	5.28 million

Section 7. The Implication for the Dutch Cold Chain Companies

From the interviews with the cold chain companies in the GBA, one message is clear: Netherlands enjoys reputation in China for its high-quality agricultural products (including the horticulture industry). As a highly developed country in EU, the Netherlands has established high standards for its cold chain industry. However, because of limited market exposure and short history in the Chinese market, the local businesses know little about Dutch technologies, equipment, and research institutes. They have no idea to what the Dutch counterparts can offer. For the Dutch cold chain companies as well as the cold chain technology and equipment suppliers who aspire to enter the Chinese market, here are some suggestions from local players for your information:

7.1 Where to start

Suggestion No.1, expanding your market exposure in China. The Dutch cold chain companies are suggested to organize the promotional events, information-sharing sessions, and exhibitions to reach more Chinese business stakeholders in the cold chain logistics. More efforts should be spent on the introduction of the Dutch cold chain technology, equipment, concepts, and business models to increase the market exposure.

Suggestion No.2, more frequent information exchange. China has a strong demand for fresh cold chain logistics. However, due to the preservation difficulties and the high loss rate, the cost remains extremely high. EU has high requirements on food safety and applies strict rules on refrigerated transportation. As an EU member, how does the Dutch fresh cold chain logistics operate? How do they reduce the losses and lower the cost? How do they operate the B2C logistics chain in the Netherlands? Information sharing as such would serve as a particularly good beginning for the Dutch cold chain industry.

Suggestion No.3, building long term partnerships. the Chinese clients are highly interested in the high-quality Dutch agricultural products and are absolutely open to long-term, stable, and mutually beneficial partnerships with the well-known Dutch companies. For example, with the cold chain logistics players from both countries, the Dutch companies can export high-quality agricultural products to China and at the same time accept high-quality Chinese agricultural products into the Dutch market as well.

Suggestion No.4, seeking opportunities from the horticulture industry. Fresh flower cultivation and sales from the Netherlands are renowned in China. Pre-cooling facilities for the horticulture

industry is of high demand in China. Some businesses in the GBA are highly interested in learning from the Dutch models and experience on fruit and vegetable wholesale markets. In addition, the Chinese businesses are generally interested in reducing labour costs. They absolutely welcome any cooperation opportunities in labour-reduction technologies and practices.

7.2. Implication

The Chinese market enjoys promising prospect but also is one with fierce competition. It is suggested for the Dutch businesses to establish JVs with the Chinese counterparts in the early stage of market development.

Businesses in the GBA welcome the advanced equipment and technologies. However, to be successful in the Chinese market as a foreign participant, the Dutch cold chain equipment providers should also deploy local after-sales maintenance services. Maintaining cost is a big concern for the Chinese businesses and they are not likely to pay for the equipment, however advanced they are, if they find it is difficult to receive convenient maintenance services.

Successful localization is the key for Dutch cold chain businesses development in China. For any Dutch players in China, they are highly suggested to adapt to the local business environment and the clients' mindset as soon as possible.

7.3 Opportunities

- For the Dutch equipment and technologies providers, evaluate your competitiveness against your competitors from the U.S., Denmark and other western countries, whose refrigeration equipment and technologies are widely used in the Chinese market. For example, if your qualities are similar, are yours cheaper? Whether their service cost is lower? How about the comparative performance stability, failure rate, maintenance cost and products life cycle?
- Seize the current opportunity. The Chinese government is paying unprecedented attention to the development of the cold chain. The demand for the equipment and technologies in this sector is huge. Construction of the cold storage, introduction of refrigerated vehicles, technologies for the whole-process cold chain, and the environmental protection solutions are all desperately needed. For the Dutch players offer the environment-friendly cold storage building materials, the high-quality environment-friendly refrigerated vehicles,

related advance solutions in temperature/humidity monitoring etc., there will definitely be opportunities in China.

- Test the market with the trials. For example, Dutch cold chain companies may cooperate with the major financing platforms for the cold chain businesses in the GBA and invest in a trial project to start with. The Dutch players will then observe and investigate the operation of the local cold chain businesses and obtain more first-hand market information for further scale -up.

The Special Chapter: The Cold Chain Logistics for the Pharma Sector

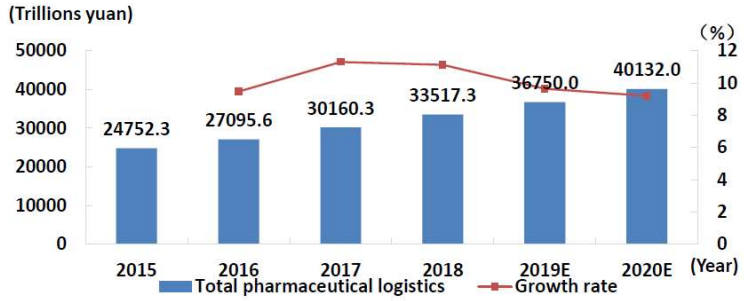
China is one of the world's fastest growing pharmaceutical markets. China has become the world's second largest market from the third place since 2010.

Ten years after China's new Health Care Reform started in 2009, both central and regional governments have paced up their work. Policies in relation to the pharmaceutical sector and the logistics have been launched with pharmaceutical infrastructure built and operated. Given the ongoing pandemic and the status quo of the pharmaceutical cold chain logistics technology, 2020 become an essential year for the pharmaceutical supply chain innovation and reform.

Pharmaceutical logistics is coupled with the pharmaceutical industry. "Having experienced SARS, I believe that COVID-19 will reform the pharmaceutical supply chain", says Mrs. Huo Peiqiong, General Manager of China Resource Pharma Comm, one of China's leading pharmaceutical circulation enterprises headquartered in Hong Kong. "I have witnessed the rise of China's E-Commerce industry. I think it is attributed to the increasing demand for online shopping during SARS lockdown". Mrs Huo believes that just like how SARS changed people's shopping behaviour, COVID-19 will also impact people's health management style. Online medicine consumption demand for both Over the Counter (OTC) drugs and Prescription drugs is already dramatically surging. Due to restricted visits to hospitals during the pandemic, people are more willing to consult online doctors and seek for remote prescribing services. Moreover, people's rising awareness of healthy lifestyle is now driving the sales of Vitamins, Minerals, and Supplements (VMS) market.

1. A Growing Market

In the past five years, China's pharmaceutical logistics industry has been growing at 8% YoY. It is estimated that by the end of 2020, the total value of the pharmaceutical logistics sector in China will reach 4 trillion RMB, among which, fifteen billion goes to pharmaceutical cold chain market.



*Total amount of the National Pharmaceutical Logistics 2015-2020

Beijing Wuzi University

According to the 2017 China Pharmaceutical Logistics Development Report, main drug categories involving the cold chain logistics are vaccine products, injections, tinctures, oral medicines, external medicines, blood products, etc. As of 2020, the total value of these categories is estimated to reach 120 Billion RMB.

2. Infrastructure

According to the Healthcare Logistics Association of China Federation of Logistics & Purchasing, by the end of 2018, the total size of pharmaceutical cold storage facilities in China has already grown up 15.87% comparing with 2017. The growth of the pharmaceutical refrigerated vehicles reached 30.08% in the same period. This rapid growth is a result of a developing pharmaceutical logistics industry, driven by two factors: the expansion of the pharmaceutical cold chain logistics market, and the strict requirements from both the government and enterprises.

Large-scale pharmaceutical distribution centres are changing the pharmaceutical logistics industry fundamentally. In March 2019, Guangzhou Pharma Group started the first phase construction of Biomedical City Baiyun Logistics Project, which is planned to be an important hub for the pharmaceutical supply chain logistics coverage system in Greater Bay Area. The project aims to achieve 4-hour service response for the terminal distribution across the whole area. With a total construction size of 57.5 thousand square meters and annual throughput capacity of 24 million containers, this project will reach an annual drug distribution worth 90 Billion RMB. "In respond to the call of developing Greater Bay Area, Guangzhou Pharma is determined to become the pioneer pharmaceutical logistics service provider in the GBA", says Mr. Huang Xianhua, the Senior Quality manager of Guangzhou Pharma. The mega pharmaceutical distribution centre in Guangzhou has adopted the most developed technologies such as the high-speed intelligent shuttle robots, and automatic storage system. To deepen the pharmaceutical cooperation and enhance the company's impact in the Greater Bay Area, Guangzhou Pharma Group established an international branch company in Macau in January 2020.

Yet Guangzhou Pharma is not the only pharmaceutical company expanding its infrastructure in the GBA. Mrs. Huo Peiqiong from the China Resource Pharma Comm said that her company has built China's existing largest professional pharmaceutical cold storage, covering an area of 40,000 cubic meters. However, this is far from enough to meet the increasing market demand in Greater Bay Area. Mrs. Huo said that more pharmaceutical distribution centres are in the pipeline, for instance, a similar project in Zhuhai.

3. Technology

The evolution of technology is also reflected in the pharmaceutical cold chain logistics industry, such as RFID (Radio Frequency Identification), GPS practice in cold chain, and real-time temperature monitoring technology. Meanwhile, some pharmaceutical E-Commerce enterprises are providing services using cutting edge technologies such as artificial intelligence, big data, and cloud computing. By updating the new equipment and introducing the new technologies, the pharmaceutical logistics sector is moving toward higher efficiency and intelligence

At present, there are 15 kinds of pharmaceutical cold chain equipment to which high-tech can be applied:

refrigerated vehicle, temperature recorder (logger), GPS, mobile printer, near-field communication equipment, power-off refrigeration, visual verification system, thermal insulation materials for cold storage construction, cooling fan, refrigerant, incubator, localizable thermometer, temperature plate, temperature forecast and alarm system.

by Beijing Wuzi University, April 2020

4. Governmental Policy

Disconnection in pharmaceutical cold chain happens from time to time, mainly because there are multiple steps of distribution with different information systems. It is essential to implement unified standard to share information across devices and systems

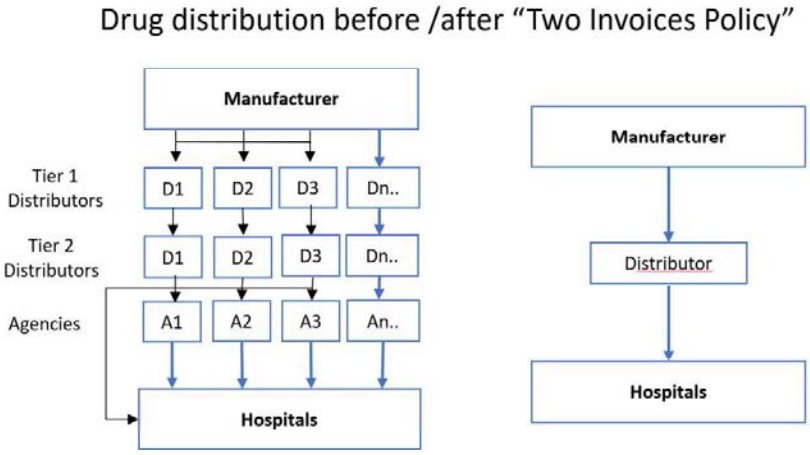
According to data released by the National Medical Products Administration, only about 10% of China's pharmaceutical products are transported with the cold chain logistics today. Nearly 20% of drug quality issues in China are related to the inadequate cold chain logistics. Vaccine scandals occurred in China, for instance, the one happened in Shandong in 2016, all of which a result of the defective pharmaceutical cold chain industry in China

*Vaccine incidents have driven the reform in the industry with rigid supervision
Picture source: The New York Times

In the same year when the Shandong vaccine scandal occurred, the State Council issued the new policy of Amending the Regulations on the Administration of Vaccine Circulation and Vaccination. In 2017, the government issued series of policies to strengthen the cold chain transportation and storage quality. In May 2018, the national standard of Temperature Control Facilities for Pharmaceutical Products Cold Chain Logistics—Specification for Performance Qualification, has been officially implemented.

Among all the policies, the "Two Invoices" Policy impacts the whole pharmaceutical circulation industry. Its release has improved the pharmaceutical distribution efficiency fundamentally.

In January 2017, the National Health and Family Planning Commission (now National Medical Products Administration) released the Implementation of the 'Two Invoices' Policy in the Procurement of Pharmaceutical Products (trial).



According to the policy, the manufacturer shall perform direct delivery or commission a qualified distributor with modern logistics capacity to deliver the pharmaceutical products. In principle, along the pharmaceutical products delivery chain, only one commissioned distributor is allowed. This will help distribution channels to operate in a more transparent way and bring new opportunities for the cold chain logistics solution providers to align with international best practices.

The Key Policies related to the Pharmaceutical Cold Chain Logistics

time	Responsible Department	Policies	Key Remarks
April 2016	State Council	Decision of the State Council on Amending the Regulations on the Administration of vaccine circulation and vaccination	There are 24 major amendments in the new regulations, aiming to establish and improve a standardized, transparent, fair, and orderly, strictly supervised vaccine circulation mechanism. In particular, the intermediate circulation links of class II vaccines will be greatly reduced.
April 2016	State Food and Drug Administration	Opinions on Further Improving the Food and Drug Traceability System (draft)	Food and drug producing, and trading enterprises and medical device users are required to perform the obligation of recording or marking the purchased, traded or used products, encouraging the producing and trading enterprises to establish food and drug tracing system, and supporting industry associations to build traceability information platform
July 2016	State Food and Drug Administration	Decision on the Revision of the Quality Management Standard for Pharmaceutical Trade New Edition of Quality Management	It specified that enterprises shall take effective quality control measures in drug circulation, including storage, trade, and transportation to ensure the quality of drugs, and establish a drug tracing system in accordance

		Standard for Pharmaceutical Trade	with the relevant requirements of the state.
January 2017	National Health Commission	Implementation of the "Two Invoices" Policy in the Procurement of Pharmaceutical Products (Trial)	The significance of the "Two Invoice Policy" is emphasized and the implementation is clarified. The trial is effective in 2018.
February 2017	State Council	Policy on New Reform on Drug Production, Circulation and Use	Some suggestions on the reform of drug production, circulation and use.
August 2017	National Health Commission, State Food and Drug Administration	Notice on Further Strengthening the Supervision of Vaccine Circulation and Promoting Vaccine Supply	Requirements of the notice: standardize the management of vaccine storage and transportation, improve the efficiency of vaccine distribution; actively promote the construction of the whole process vaccine tracing system; further improve the centralized procurement of vaccine; strengthen the supervision and inspection of vaccine circulation.
December 2017	National Health Commission, State Food and Drug Administration	Notice of Further Strengthening the Supervision of Vaccine Circulation (2017 Edition)	To put forward the classified management of vaccine cold chain storage and transportation; to gradually improve the level of cold chain equipment; to improve the management of cold chain temperature monitoring; to standardize the management of

			vaccine storage and transportation, and to strengthen the management of abnormal temperature in vaccine storage and transportation.
May 2018	National Logistics Standardization Technical Committee, Healthcare Logistics Association of China Federation of Logistics & Purchasing, et cetera	National Standard: Temperature Control Facilities of Pharmaceutical Products Cold Chain Logistics— Specification for Performance Qualification	The standard specifies the contents, requirements and operation of temperature control warehouse, temperature control vehicle, refrigerator, incubator, and temperature monitoring system performance involved in the cold chain logistics of pharmaceutical products.

5. The Third-party Pharmaceutical Cold Chain Logistics

To speed up the development of pharmaceutical logistics, in February 2016, the State Council cancelled the administrative approval procedure for the third-party pharmaceutical distribution service, indicating that third-party logistics providers no longer confront any policy obstacles to enter the pharmaceutical industry.

Since the opening of the market, all kinds of enterprises including the traditional pharmaceutical distribution giants and E-Commerce platforms have increased their investment in cold chain logistics. New business models are explored by companies such as JD.com, SF Express, and China Post.

China Post, the earliest third-party player stepping into the field of pharmaceutical logistics distribution, has seized the most rural market share in China. The unique features of China Post, namely, the strong network, good interaction with local governments at all levels, and cooperation with national pharmaceutical distribution enterprises, has ensured its market share from the early stage on.

Third-party logistics companies are more flexible and easier to adapt to new market changes. They also provide high quality service with a relatively low price. Among the multiple business models, it is worth to mention that e-Commerce platforms are playing an increasingly important role in recent years.

One of the leading E-commerce companies, JD.com, signed the Pharmaceutical Cloud Warehouse Strategic Cooperation Agreement with eight pharmaceutical circulation enterprises in 2017.

With fast response, rich bid data resources and a relatively low cost, e-Commerce has become a strong engine driving the pharma cold chain logistics in China.

6. Existing Challenges

6.1 Insufficient Planning and Coordination.

Pharmaceutical logistics is not about low temperature only, but about stable temperature control. The temperature should be controlled within a certain range, including different temperature zones such as cryogenic, frozen, refrigerated, room temperature etcetera. Take vaccine as an example, its transportation requires a full controlled temperature. Once the temperature turns abnormal during any step of the transportation, irreversible consequences happen. As discussed earlier in this report, disconnection happens usually because of ununified standard. As much as the government has put great efforts in improving the policy and industrial standards, building an complete network takes time.

6.2 High Cost

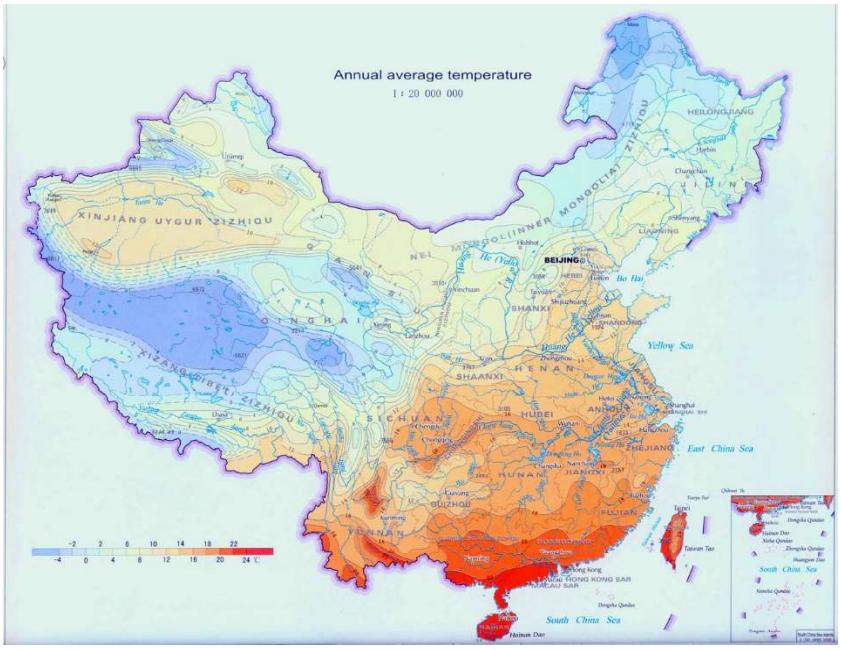
According to Beijing Wuzi University, China's pharmaceutical cold chain market accounts for 10% of the total pharmaceutical logistics market, yet it consumes more than 20% of the overall logistics costs. Moreover, the cost of pharmaceutical logistics accounts for 12% of the total cost of sales, four times that of the United States.

6.3 Lack of the Professional Talents

There are many sectors involved in the pharmaceutical cold chain logistics, not only the general logistics management, the supply chain management, but also the pharmaceutical management, the refrigeration technology, and the information technology. At present, most colleges and universities in China has not yet established a specific major in pharmaceutical cold chain logistics. Enterprises mainly recruit logistics talents or medical talents and further develop their professional skills. Hence, the development of talents become a heavy economic burden for the businesses.

6.4 Huge Temperature Difference in China

Comparing to Europe, the climate among cities and regions in China vary largely. Even in the same season, latitude variety in different regions lead to huge temperature difference, which increases the difficulty to keep pharmaceutical products in constant temperature along the whole transportation chain. Taking China's full landscape and climate difference into consideration, the refrigerant packages that can last for at least 72 hours are required in many parts of China.



*Map from the Nations Online Project

There are potential risks in the last mile transport, especially under extreme conditions or in hot summertime and cold wintertime. Monitoring the whole logistics chain is key to ensure the efficacy and reliability of the drugs. Therefore, more effective loggers are needed to produce real-time temperature data monitor at any time.

7. Future Trends

- Rapid growth of the pharmaceutical cold chain logistics. Factors such as the opening - up of the family planning policy, aging, advanced diagnosis, coupled with the outbreak of the pandemic and the development of the vaccines will propel the whole industry to grow at a faster speed.
- Higher demand for the whole chain monitoring and tracing system. For logistics companies, high-tech devices and efficient logistics management will be needed. Mr. Huang Xianhua, the Senior Quality Manager from the Guangzhou Pharma Group stated that to avoid disconnection along the whole logistics chain, relative equipment and technologies will play a key role. For instance, the usage of high quality cold-storage agents. "Sometimes we receive medicine shippings from the US. The cool insulation packages they use can last for a long time. I always wonder how they managed to do so." Mr. Huang said, "Purchasing such packages is not difficult, but I think localizing the production here in China would be a better option for us."
- Emerging technological advancement. Driven by the new technologies, such as 5G and artificial intelligence, pharmaceutical circulation industry ecological pattern will be reshaped.
- The rapid growth of the pharmaceutical e-Commerce is driving the cold chain logistics development. As a result of the increasing accessibility of internet, online payment, and patients' acceptance of online medical consulting, E-commerce giants such as JD, Alibaba, are stepping into the new "Internet + medicine" circulation model.
- Supportive government policy. Apart from the national level, the regional governments are also pushing up the cold chain development by issuing more beneficial policies. For instance, in the Outline of Guangdong-Hong Kong-Macao Greater Bay Area Development Plan, it is stated that developing cold chain logistics shall be greatly supported. Under this outline, Zhuhai has issued the latest policy to encourage logistics companies upgrading their cold chain equipment. Direct financial subsidy is available to cover up to 10% of the actual investment.

Appendix 1： Companies Being Interviewed

Company Name	**Main Business**	**Region**
Guangzhou Song Yang Cold Chain Logistics Co., Ltd	Cold chain logistics services	Guangzhou
Guangzhou Bao Feng Cold Storage Co., Ltd	Temperature-controlled warehousing and transportation	Guangzhou
Guangzhou Chuansuo Logistics Co., Ltd	Cold chain logistics services	Guangzhou
Guangzhou Weitian Cold Chain Logistics Co.,Ltd	Cold chain logistics services	Guangzhou
24 Hua.cn	Imported fresh-cut flower retailing and warehousing	Guangzhou
Guangzhou Weiheng Corporation	Cold chain logistics services, especially for imported frozen meat product	Guangzhou
Jiangnan Agricultural Products Wholesale Market	Fresh agricultural products wholesaling and storage	Jiangmen
Dah Chong Hong Holdings	A comprehensive trading company, covers FMCG product retailing and warehousing	Jiangmen
Jiangmen Unionasia Cold Chain Co., Ltd	Cold chain logistics services	Jiangmen
Guangdong Baishun Agricultural Products Supply Chain Group	Cold chain logistics services, especially for fresh agricultural products	Dongguan
Walmart China (South China Distribution Centre)	Fresh fruit and vegetable warehousing and distribution	Dongguan
KingMed Diagnostics	Door-to-door, customized, and time-controlled cold chain logistics services in the fields of clinical testing, biomedicine, life sciences, and pharmaceutical research and medical devices.	Guangzhou
Guangzhou Pharmaceuticals Co., Ltd	Medicine warehousing and distribution	Guangzhou
CR Pharma Comm	The second largest distributor in Chinese pharmaceutical market for sales and distribution.	Guangzhou

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