RUST AND OPPORTUNITY

TRANSPORTATION AND LOGISTICS IN NORTHEAST CHINA

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REPORT HIGHLIGHTS

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Executive Summary

As China's economy continues to grow, its logistics market was projected to reach $450 billion in recent years with a steady growth rate of 9%forecasted between 2017-2021.[1] Northeast China consists of three provinces – Liaoning, Jilin, and Heilongjiang. The region benefits from its strategic proximity to Russia, Mongolia, Korea, and Japan as well as its historical strength in logistics, agriculture, and manufacturing. It also has a large local market with a population size of 108 million people, which would be equivalent to the 12th most populous country in the world if it were separate.

Unfortunately, the region has not seen the same growth experienced by many other parts of China since the 1980's market reform. The combination of aging industrial infrastructure and sluggish growth has led the region to be known as "China's Rust Belt." China's central government decided in 2007 to make the revitalization of the region a national priority and has included that goal in its 5-year-plans since 2010. A key plank of this plan is to modernize and encourage the region's transportation and logistics cluster.

This report analyzes the growth of the region, the present state of the transportation and logistics cluster, and outlines steps to improve the cluster's performance. Specifically, the recommendations are:

1. Government Reforms
    - Prioritize related and support industries (RSI) that have demonstrated growth potential (e.g., wholesale and retail, construction, and real estate) in instead of industries that the region has limited competitive advantages in (e.g., robotics, pharmaceutical, cloud computing).
    - Better coordinate infrastructure investment across local, central, and foreign governments
    - Increase liberalization to enable private and FDI participation; private-owned companies accounted for only 6% of sales among the top 50 logistics companies in China
2. Private Sector
    - Diversify as market matures and consolidates
    - Adjust to changing demand conditions based on the specific needs of prioritized related and support industries, such as improved customer service through tracking and specialized refrigerated logistics

[1] A.T. Kearney, China 2015: Transportation and Logistics Strategies, https://www.atkearney.com/transportation/ideas-insights/article/-/asset_publisher/LCcgOeS4t85g/content/china-2015-transportation-and-logistics-strategies/10192

Technavio, Third-Party Logistics Market in China 2017-2021, https://www.technavio.com/report/china-logistics-third-party-logistics-market-china-2017-2021

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Regional Profile of Northeast China

Northeast China, also known as "Dongbei" and historically "Manchuria," spans 793,300 square kilometers and formally consists of three provinces: Liaoning, Jilin, and Heilongjiang.[2] The ethnic majority of the region is Han Chinese, and the people of the Northeast trace their ancestries back to migrants of the "Chuang Guangdong" movement, when the central government organized a campaign to "develop the Great Northern Wilderness" in the 19th and 20th centuries. Consequently, Northeast China is more culturally uniform than other regions of the country.

Figure 1 – Map of Northeast China

The agrarian economy of the Northeast is well established. The rural population of the Northeast is concentrated in the southern part of the region, where warmer temperatures support the growth of grains (e.g., maize, soybeans, flax, wheat, and barley) and the raising of sheep and pigs. Fishing activities are prolific along the fertile Amur river in Heilongjiang. The provinces are endowed with rich reserves of coal and

[2] The Economist, *Intelligence Unit,* http://country.eiu.com.prd1.ezproxy-prod.hbs.edu/China (Accessed March 13, 2017).

iron ore, which helped trigger related industrial activities in steelmaking, shipbuilding, automobile, and aircraft manufacturing. The region's 2015 population of 108.5 million (8% of the national population)[3] primarily inhabit the major cities of Shenyang, Dalian, Harbin, Changchun, and Anshan. Both Jilin and Heilongjiang are contain oil reserves, although the latter's Daqing oil field has been in decline since 2000.

Access to the Pacific is available only in Liaoning, while Jilin and Heilongjiang are landlocked by Russia and North Korea and lack navigable rivers during the winter months. The geographic constraints require that agricultural and industrial products of the region travel to Liaoning for international export. Located on the southern tip of Liaodong peninsula in the Yellow Sea, Dalian is endowed with a deep-water harbor that remains ice-free year round, establishing it as a historically significant trading post since Japanese rule in the 1930s.

Under the decentralized institutional framework, urban transport planning and development responsibilities reside with the local municipalities, with the central government's role largely limited to reviewing the plans and providing technical standards.[2] The rapid growth at the local level has made it challenging for the national government to review and approve plans, and the proliferation in the number of agencies involved in transport planning makes coordination extremely difficult.

[3] The Economist, *Intelligence Unit*, http://country.eiu.com.prd1.ezproxy-prod.hbs.edu/China (accessed March 13, 2017).

[2] Hai Xiao Pan, "Implementing Sustainable Urban Travel Policies in China, OECD International Transport Forum Discussion Paper 2011-2012 (2012).

Economic Performance of Northeast China

Once an industrial hub and one of the first regions in China to urbanize, its heavy industry dominated by state-owned-enterprises (SOE) has languished amid the wave of liberalization and privatization in the rest of China. The stagnation led to the decline in regional population and the "Revitalize the Northeast Campaign" by the Chinese central government in recent years to transform the Northeast into one of China's economic growth engines.

Figure 2 - Key Economic and Social Metrics of Northeast China (2015)[4]

Province	GDP (Rmb bn Nominal)	GDP per capita (Rmb)	Annual Real GDP Growth 2015	Disposable Income per head (Rmb)	Household Savings Rate (% of disposable income)
Liaoning	2,867	65,859	0.2%	31,126	31%
Jilin	1,406	52,246	1.9%	24,901	28%
Heilongjiang	1,508	39,544	0.3%	24,192	29%
National	**75,410**	**55,198**	**7.3%**		

Recent stagnation of the region's heavy-industry-led economy (heavy industry accounted for 80% of Heilongjiang's industrial value-add in 2015) has driven real GDP growth rates in the Northeast well below national average. Assessment of the region's economic growth is further complicated by a lack of trust in official data: Liaoning's governor admitted to inflating 2011-14 economic growth statistics. Most notably, Liaoning ranked the lowest in economic growth among China's 34 provinces and fell

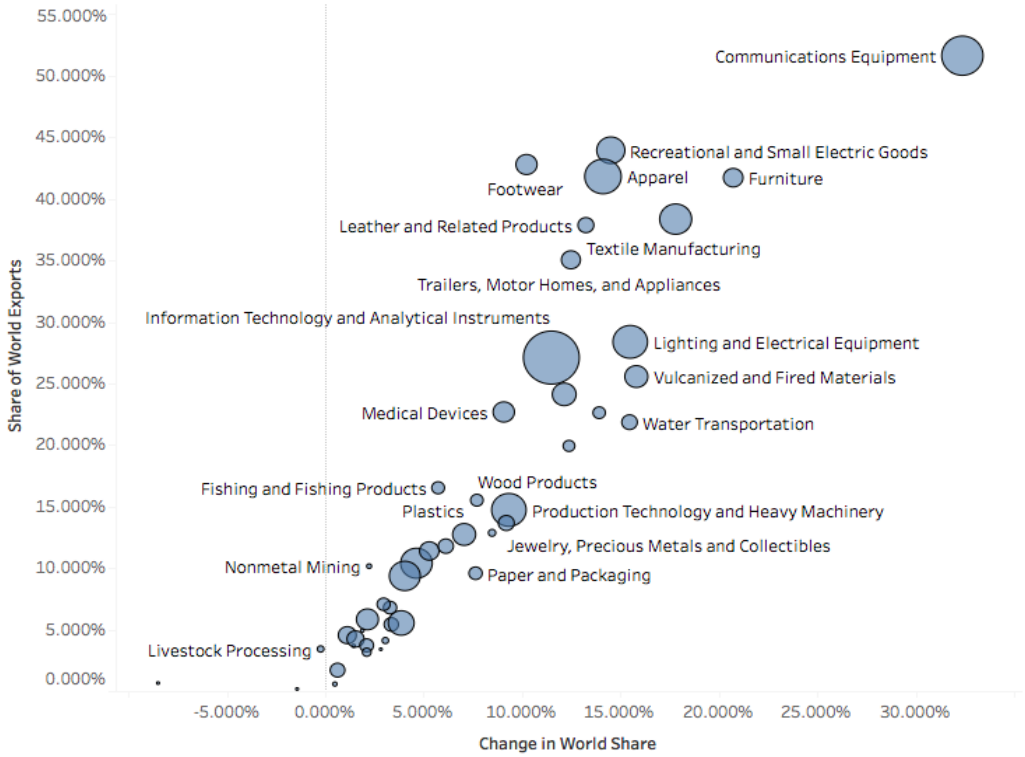
[4] All China Data Center, *China Data Online,* http://chinadataonline.org (accessed March 13, 2017).

into a recession with 2.2% contraction in GRP in the first three quarters of 2016.[5]

Cluster Composition and Relative Performance

As a nation, China has prospered in recent decades as an original equipment manufacturer (OEM) across a broad range of clusters from communications equipment to textile, furniture, and apparel. The growth in basic manufacturing has been driven by the liberalization and opening of the Chinese economy, and China's promotion of foreign direct investment in the nation's manufacturing hubs.

Figure 3 - China's Export Share by Cluster (2005 – 2015)[6]



Note: Communications Equipment represented $205 billions of export value in 2015.

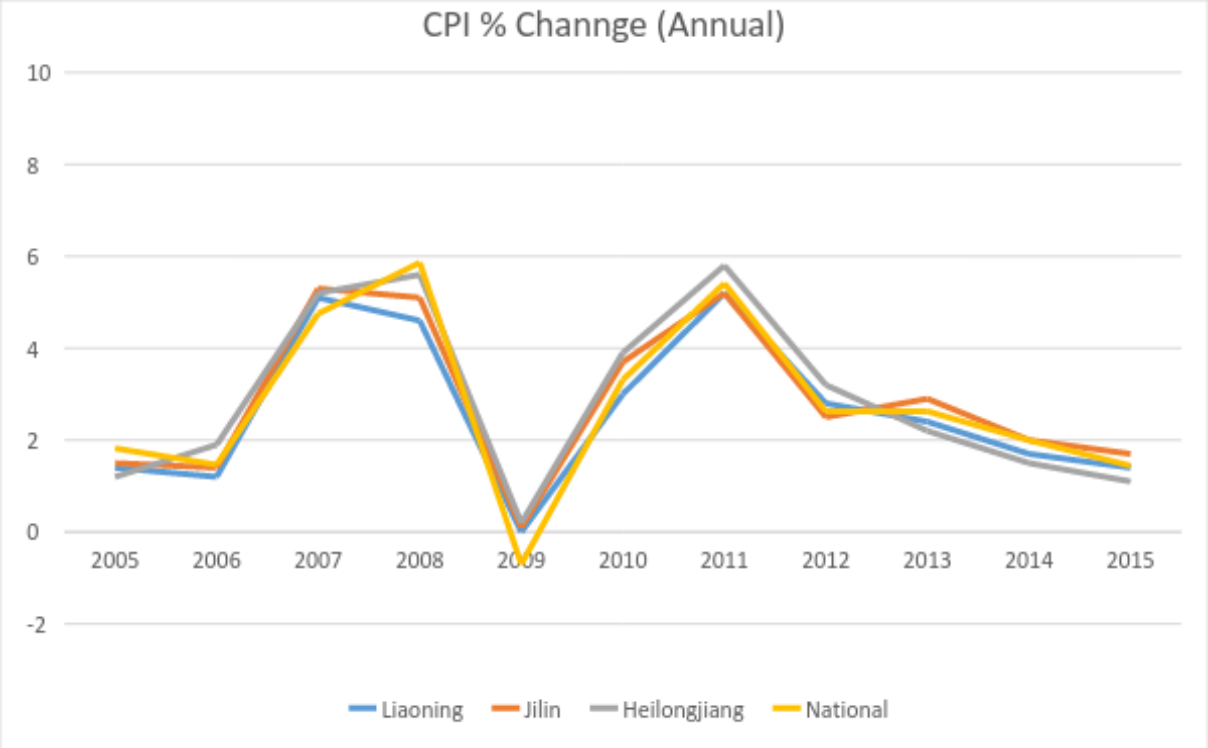
[5] Zheping Huang, *The Chinese government finally admitted that its economic data was made up,* https://qz.com/887709/chinas-liaoning-province-admitted-that-it-inflated-gdp-figures-from-2011-to-2014/ (accessed April 30, 2017).

[6] Richard Bryden, *International Cluster Competitiveness Profile*, http://www.richbryden.com/iccp/ (accessed March 13, 2017).

Macroeconomic Competitiveness

Despite strong growth at the turn of the century, GDP per capita growth rates in the three provinces have slowed dramatically in recent years. From 2010 to 2015, Liaoning, Jilin, and Heilongjiang recorded annual GDP per capita growth of 5.2%, 5.8%, and 3.8% respectively, well off the equivalent national rate of 6.2%. Unemployment rates have been in line with the national average. In 2013, Liaoning recorded unemployment in the urban areas of 3.4%, Heilongjiang 4.43%, and Jilin 3.7%. Inflation has been moderate and declining in all three provinces, with annual change in the CPI index in line with GDP growth and declining to the 2-3% range in recent years.

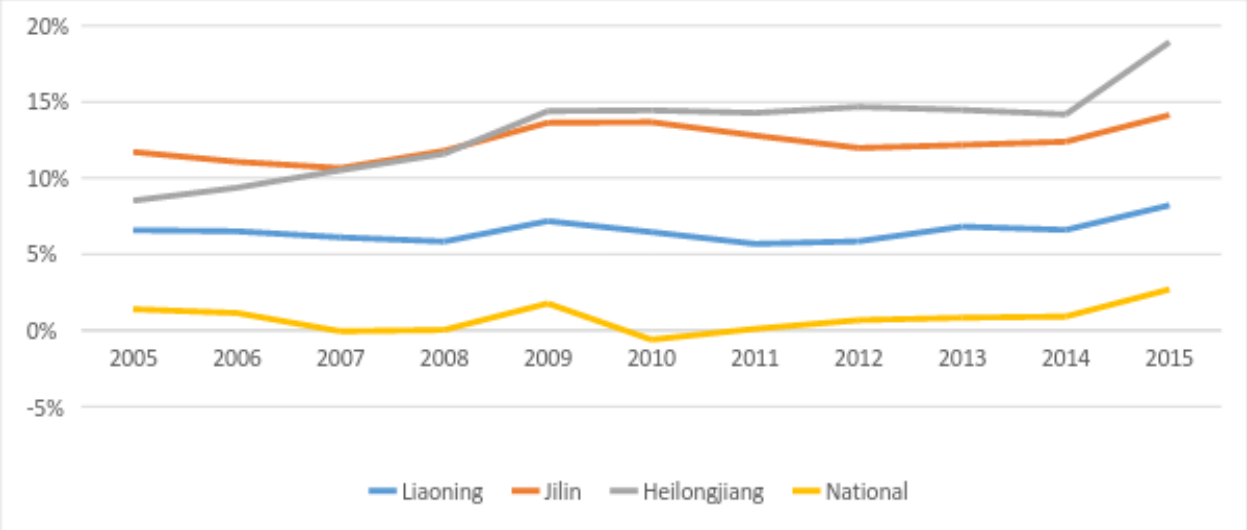
Figure 4 – Annual % CPI Increase in NE China[7]



[7] All China Data Center, *China Data Online,* http://chinadataonline.org (accessed March 13, 2017).

Compared to the moderate deficit spending at the national level of 2.5%,[7] the three provincial governments run significantly higher deficits, suggesting highly expansionary fiscal policies.

Figure 5 - NE China – Government Deficit as Percentages of GDP[8]



"Culture, Education, Science & Healthcare" and administrative expenses make up the largest buckets of outflows. At the national level, significant expenditures have been devoted to capital investments and infrastructures. Large deficits at the three provinces point to a high degree of complexity and friction in local government.

Quality of National Business Environment

Despite the dearth of social and innovation metrics at the regional level, national statistics paint a picture of a nation in transition from a factor-driven economy to more value additive activities and innovation. In the competitive ranking index (Porter et. al),

[7] Delgado, Mercedes, Christian Ketels, Michael E. Porter, and Scott Stern. "The Determinants of National Competitiveness." NBER Working Paper Series, No. 18249, July 2012.
[8] All China Data Center, *China Data Online,* http://chinadataonline.org (accessed March 13, 2017).

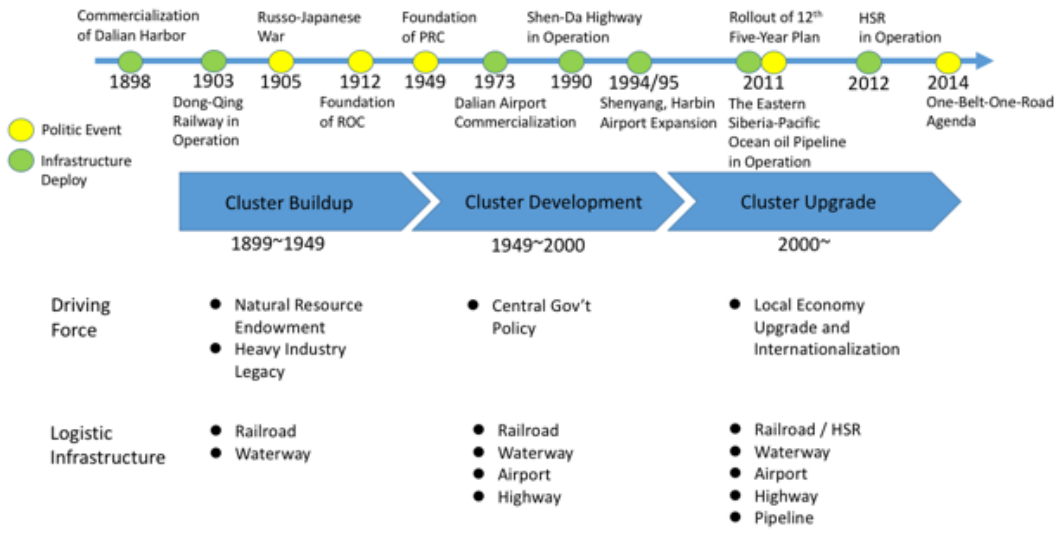
China ranks 33rd in the innovation infrastructure dimension, which covers quality of scientific research institutions, quality of the educational system, and utility patents filed per million heads. In the World Bank's "Doing Business 2017" survey, China ranks 78 out of 190 countries, scoring well in contract enforcement and insolvency resolution, while lagging in construction permits, minority investor protection, and tax payments. In areas of income equality, China scored 42.2 in 2012 on the GINI index.

China ranks in the third quartile (#113 out of 159) of the Fraser Institute's Economic Freedom rankings. Its ranking is hurt by low scores in the "size of government" and "regulation" category, suggesting that central planning and heavy-handed regulation creates friction in both domestic and international trade. China ranks 6.78 out of 10 in freedom to trade internationally (#95 out of 159 countries), an issue that weighs heavily on activity in the Northeast's transportation and logistics cluster.

History of Cluster

The development of the logistics and transportation cluster of the Northeast China, a supporting and affiliating industry itself, was closely tied to local economic progress. To explore the cluster development trajectory, it is helpful to divide Northeast China's economic history into three periods: the Qing Dynasty, post-modern China, and the 2000's (Figure 8). Each segment of history represents a distinct phase of economic development, which created the demand for transportation and logistics, and additionally attracted the needed infrastructure investment.

Figure 6 - History of NE China's Transport & Logistics Cluster



Although Northeast China is endowed with natural resources and is established as China's heavy industry core location, it has been stuck in more traditional economies and has failed to benefit much from new economic driving forces. The service sector and knowledge-based sectors that brought uneven development to other provinces after the 80's market reform haven't found the same foothold in the Northeast. Its development fell behind other regions as a result. Leveraging Northeast China's industry legacy, China's central government has put reviving Northeast China, through a logistics and transportation cluster upgrade, as one of its core regional development plans since 2010. Its pivotal location positions Northeast China well to serve as a hub for neighboring North East Asian countries, which is in turn an important step toward China's ongoing "One Belt One Road" economic integration strategy, a general

guideline that aims for China's bigger role in global affairs through connectivity and cooperation between China and other countries in Eurasia.[9]

Qing Dynasty (1644–1911) to 1949

Since the Treaty of Nanjing (1842) forced China (defeated after the Opium War) to open its market to the UK, the late Qing Dynasty was epitomized by a series of trading conditions with western countries, which were unfavorable to China. Common conditions included unilateral most-favored-nation treatment (guaranteed the treaty recipient country to also get whatever favorable trading terms are granted to any other nation), and taxation as well as extraterritorial right in the concession areas.

Northeast China has long been a target of Russia's expansion ambitions. Forcing the Qing dynasty to sign an unfavorable development treaty in 1898, Russia was authorized to build Chinese Eastern Railway (Dong-Qing Railway), the first ever railroad in Northeast China, which facilitated the international trading between Northeast China and Russia.[10] While bilateral trading between Russia and China started with agriculture products, Northeast China can date its industrialization back to the early 20th century, when it was colonized by Japan. Endowed with plenty of resources such as oil and coal, Northeast China was one of Japan's key mining centers to support its domestic industry development as well as military supplies. Under Japan's colonization, Northeast China also developed its signature heavy industry cluster in the 1930s.

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[9] All China Data Center, *China Data Online,* http://chinadataonline.org (accessed March 13, 2017).
[10] All China Data Center, *China Data Online,* http://chinadataonline.org (accessed March 13, 2017).

With the development of the heavy industry sector, the logistics and transportation cluster grew as well. While the Dong-Qing Railway mainly transported agriculture products when serving Russia-China bilateral trades, the railroad network was expanded and upgraded to accommodate industry goods transportation after it was taken over by the Japanese. As part of the unfavorable lease treaty, Russia also gained access to Dalian Harbor, located in Liaoning Province, since 1898. Among the few unfrozen deep harbors in the North, Dalian was the Qing Dynasty's navy base, and was transformed into a commercial harbor under Russia's control. Following its takeover by Japan after their victory in the Russo-Japanese War in 1905, Dalian harbor strengthened its role as North East Asia's international waterway hub, supporting Northeast China's flourishing heavy industry, as well as mining trading.

During this period from the Qing Dynasty to the period of Japanese colonization, Northeast China mainly relied on the railroad for logistics and transportation needs, which was driven by natural resources endowment and a heavy industry legacy. Meanwhile, the Dalian harbor was connected with the inland railroad system and set up the foundation for waterway-inland transportation integration in later years.

1949-2000

Years of Japanese invasion and civil war with the Republic of China's army destroyed the transportation infrastructure nationally, causing the newly established People's Republic of China government to focus on restoring and expanding the railroad system as one of its core investments. Yet, Northeast China was not among the government's priorities. Once having boasted China's most advanced railroad system,

Northeast China saw stagnant development of its logistic cluster, with the central government pulling the region's resources and talent to build railroads in other places, among them experienced engineers from the Japanese colonization era who were transferred to lead other railroad projects such as the South West China networks.

During the 1960's Cultural Revolution, Northeast China became one of the main destinations for political exiles, due to its harsh environment. Though the industrial sector was stagnant, Northeast China's agricultural sector improved in importance nationally at that time, due to abundant exiled laborers and improved farming facilities. Therefore, from the 1960's to the 1980's, the local logistics industry focused on agricultural transportation by railroad from Northeast China to the South, where a denser population was based. International logistics were lagging behind, as China was quite closed to international trading during that time span.

Since 1980, under the Reform and Opening guidelines, China began its policy of market liberalization and invested in infrastructure to accommodate economic growth. Though the focus was on the Special Economic Zones (SEZs) in coastal provinces, China also invested in modernizing infrastructures, such as railroad network expansions in the North East provinces. In the 1980's, the first highway system in Northeast China, Shen-Da Highway, and modernized airport in Harbin, Dalian, and Shenyang were also established. Led by Dalian harbor, a series of harbors along Bohai Bay of Liaoning Province, including Huludao, Jinzhou, Panjin, and Yingkou have formed waterway clusters as well.

During this second phase of Northeast China's logistics cluster development, the central government policy of the People's Republic of China was the main driving force. Economic development, which accounted for logistics demand, was focused on domestic agriculture transportation and then saw the beginning of industrial sector's revival after the market reform. On the other hand, infrastructure investment, which accounted for logistics capacity, was stagnant during the 1960's to 1980's and then speeded up after the 1980's, with comprehensive air, land, waterway transportation facilities offering a foundation for Northeast China's logistics cluster's competitiveness domestically and internationally.

2000-Present

Over twenty years of market reform brought wealth to coastal regions of China, and China's central government began to notice the regional development inequality. The 1990's saw mining and steel making overcapacity in state-owned-enterprises(SOE) in Northeast China, which led to mining reserve depletion and drove down commodity prices. This solidified the central government's determination to privatize unprofitable SOEs and let them go bankrupt. Though the privatization reform may have helped Northeast China's long-term heavy industry's competitiveness, it also brought unemployment and short-term economic shock in the 1990s. Since the 2000s, China's central government has pushed hard to further revive Northeast China's economy, and has identified an upgrade of the logistic cluster as one of the pivotal development

policies in its 12th Five-Year Plan, which was executed in 2011 through 2015 with the following priorities:[11]

1. Upgrade logistics infrastructure. Synergy-driven investment decisions to prevent blind and excessive investment.
2. Attract logistic service providers. Encourage consolidation, also emphasize attracting supporting industries such as finance, insurance, and IT service.
3. Push more value added service.
4. Logistics clusters to support six main industries, including food, coal, petrochemical, steel, auto, and equipment.
5. Balance and coordinate city and rural area logistic development.
6. Digitize logistics data and facilitate information exchange.
7. Promote logistics technology and innovation.
8. Promote international logistics.
9. Northeast China logistic integration.
10. Green logistics.

Among the above, the most critical component for the logistics cluster development is internationalization. Building on Northeast China's strategic location, industry legacy, and logistics infrastructure, Dalian and Shenyang in Liaoning Province (South), Changchun in Jilin Province (Central), and Harbin in Heilongjiang (North) of Northeast China have been selected as core cities to best positioned as logistics hubs of North East Asia.

[11] China's 12th 5 Year Plan (2011-2015), The State Council – The People's Republic of China, http://english.gov.cn/12thFiveYearPlan/

Figure 7 - Core Logistics Clusters in Northeast China

Cities / Clusters	Infrastructure	International Position	Industry Focus
Dalian	Railroad, harbor, airport	North East Asia waterway and logistics hub	Petrochemical, mines, foods, auto, steel, and coal
Shenyang	Railroad, harbor (Yingkou), airport	North East Asia waterway and logistics hub	Auto & auto parts, equipment, consumer goods, food, agriculture products
Changchun	Railroad, inland waterway, airport	North East Asia logistics hub for inland China	Auto & auto parts, pharmaceutical, food, agriculture products
Harbin	Railroad, inland waterway, airport	Logistics hub for trade with Russia	Agriculture, pharmaceutical, and equipment

Centered around these four cities, transportation investment in Northeast China flourished after the 2000's. Built on the Dong-Qing railroad legacy, Northeast China railroad networks have been further expanded and modernized, while a High Speed Rail system (2012) improved time-sensitive transportation services, such as perishables and fast e-commerce delivery commitment. Since Shen-Da Highway has been in service, another 15 national highways and 21 regional inter-province highways were also launched in the 2000s. Following the Harbin, Shenyang, and Dalian airport projects, Changchun airport was also expanded in the 2000s. Together there are seven international airports in Northeast China, with the four mentioned airports positioned as main airway hubs. In terms of waterways, Dalian remains the biggest harbor in Northeast China, and plays a leading role in the Liaoning Province waterway clusters, especially in petrochemical products transportation for Northeast Asia. Finally, as one

of the flagship projects of Northeast Asia's logistic integration, the Eastern Siberia–Pacific Ocean oil pipeline has been in service since 2011, utilizing Liaoning Province's waterway clusters to ship Russia's oil to Northeast Asia, and to reach farther markets such as Southeast Asia in the future. The Power of Siberia gas pipeline applies the same vision for Russia's natural gas resources, and is expected to be in operation by the end of 2017.

During the most recent phase of Northeast China's logistics cluster development since the turn of the millennium, the logistics cluster's importance has been elevated to a national level. The cluster has benefitted both from Northeast China's overall economic revival and significant transportation infrastructure investments as highlighted below.

Figure 8 - Flagship Infrastructure Projects

Era	Railway	Waterway	Airport	Road	Pipeline
Qing Dynasty	Dong-Qing railroad	Dalian Port			
1945~2000		Huludao, Jinzhou, Panjin, Yingkou	Harbin, Dalian, Shenyang	Shen-Da Highway	
2000~	High Speed Rail system		Changchun	15 national highway, 21 regional inter-province highway	The Eastern Siberia–Pacific Ocean oil pipeline, Power of Siberia gas pipeline

Profile of Cluster

Definition of Transportation and Logistics Cluster

While the definition of 'Transportation and Logistics' varies across classification systems, this paper includes the following categories based on the definition from the U.S. Cluster Mapping Portal.

Rail – The transportation itself as well as associated support activities

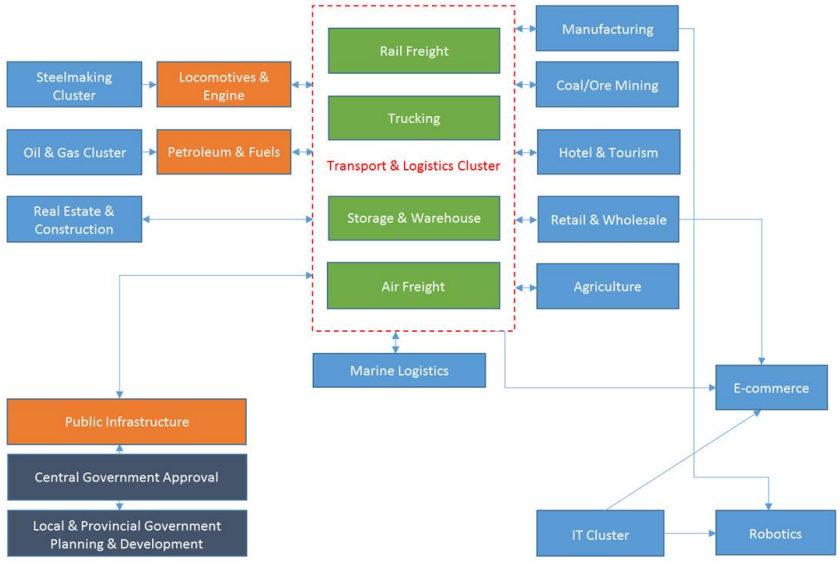
Freight and Bus – Trucking as well as buses both short and long-distance

Air – Freight and passenger as well as chartered and other specialty air

Support – All support activities such as packing and crating, warehousing, scheduling, and arrangement.

Ports and Shipping - Water-based transportation is **not** included in the figures for the cluster although it remains an important associated cluster, especially for this region given the presence and importance of the port at Dalian

Figure 9 – Cluster Map of Northeast China's Transportation and Logistics Cluster

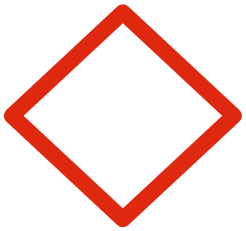


Transportation and logistics is a unique type of cluster as it is not a product or service in the way coal or IT services is. Simply put, the cluster is not a part of the supply chain, it is the supply chain. The cluster is focused on moving products and the associated people to facilitate the construction and use of final products. This entails close links to resource providers, the manufacturers that use those resources, and distributors that get the products in the hands of end customers. In the case of Northeast China, this means linkages with the food and agriculture industry as well as commodities, specifically coal, petrochemical, and steel for input resources. Local manufacturers in the aircraft, automotive, and equipment industries then use many of those resources. Finally, the cluster connects those products to end customers through distribution channels including retail and e-commerce. Furthermore, the cluster moves items out of the region through rail, road, air links, and the port at Dalian.

Figure 10 – Diamond Analysis of the Transportation and Logistics Cluster

Firm Strategy, Structure, and Rivalry:
- Heavy reliance on state-owned enterprises (SOEs)
- Restrictions on private or FDI participation in some sub-sectors
- Highly fragmented industry with on-going consolidation
- 78th in World Bank's Doing Business ranking

Related and Supporting Industries:
- Manufacturing (Aircraft, auto, equipment)
- Commodities (Steel, petrochemical, coal, ore)
- Hotel & Tourism
- Retail & Wholesale
- Agriculture
- Warehousing



Local Demand Conditions:
- Large population size (108M)
- Rising income levels (GDP per capita of 50K Rmb) and domestic consumption levels
- Increased demand for specialized logistics services (e.g., cold logistics for grocery delivery) given the federal government's 5 year plans

Factor Conditions:
- Geographic location with access to a non-freezing deep water harbor at Dalian Port
- Linkages to major markets in neighboring countries such as Russia, Mongolia, South Korea, and Japan
- Increasing investments in infrastructure

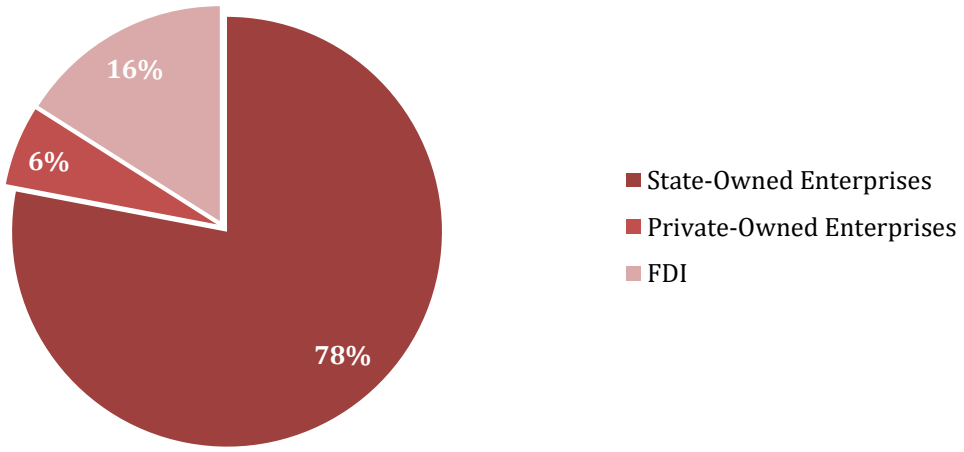
IFCs and Academic Institutions:

Changchun High-tech Economic Zone
Northeast Agricultural University
Jilin University
Harbin Institute of Technology

Firm Strategy, Structure, and Rivalry

While there is some diversity of firms in the cluster, there is still heavy reliance on state owned enterprises (SOEs) in the transportation and logistics clusters across the country. In 2016, private-owned companies accounted for only 6% of sales among the top 50 logistics companies in China (Figure 11).[12] In Northeast China, most of the major industrial players are SOEs and they usually have their own vertically integrated logistics services. Other private players are often restricted from providing logistics services in strategically important sectors such as mining and energy.

Figure 11 – Percentage of Sales by Type of Firm



Also there are varying levels of restrictions for both private and FDI participation. Despite the fact that China opened up its markets after joining the WTO in 2000, there are still many challenges in FDI participation with significant delays in

[12] Deloitte, Consumer Industrial Products Report 2015-2016, https://www2.deloitte.com/cn/zh/pages/consumer-industrial-products/articles/cip-logistics-industry-report-2015-2016.html.

fully allowing FDI ownership. For example, Fedex finally received its license to operate under 100% ownership in 2006, but the company faced restrictions to operate only within certain cities specified by the government.

Figure 12 – Restrictions on Domestic Logistics by Sub-sectors[13]

Domestic Logistics	Private Participation	FDI Participation
Railroad	• Allowed since 80's market reform	• Allowed since 2000, but must be a joint venture (JV) • FDI ownership<49%
Waterway	• Allowed since 80's market reform	• Allowed since 2004, but must be JV • FDI ownership<49%
Freight	• Allowed since 80's market reform	• Allowed since 2001, but must be JV • FDI ownership<49%
Air	• Allowed since 80's market reform	• Allowed since 2002, but must be JV • FDI ownership<25%
Domestic Express	• Legalized after 2009	• Allowed since 2006 • FDI can have 100% ownership

Based on surveys of major companies operating in related and supporting industries in China, the transportation and logistics industry is highly fragmented and inefficient. In 2012, the Director of Global Logistic Properties mentioned that "there are nine million trucking companies in China, six million of which own exactly one truck."[14] Each company has to work with an average of 12 transportation providers and

[13] Deloitte, Consumer Industrial Products Report 2015-2016, https://www2.deloitte.com/cn/zh/pages/consumer-industrial-products/articles/cip-logistics-industry-report-2015-2016.html.

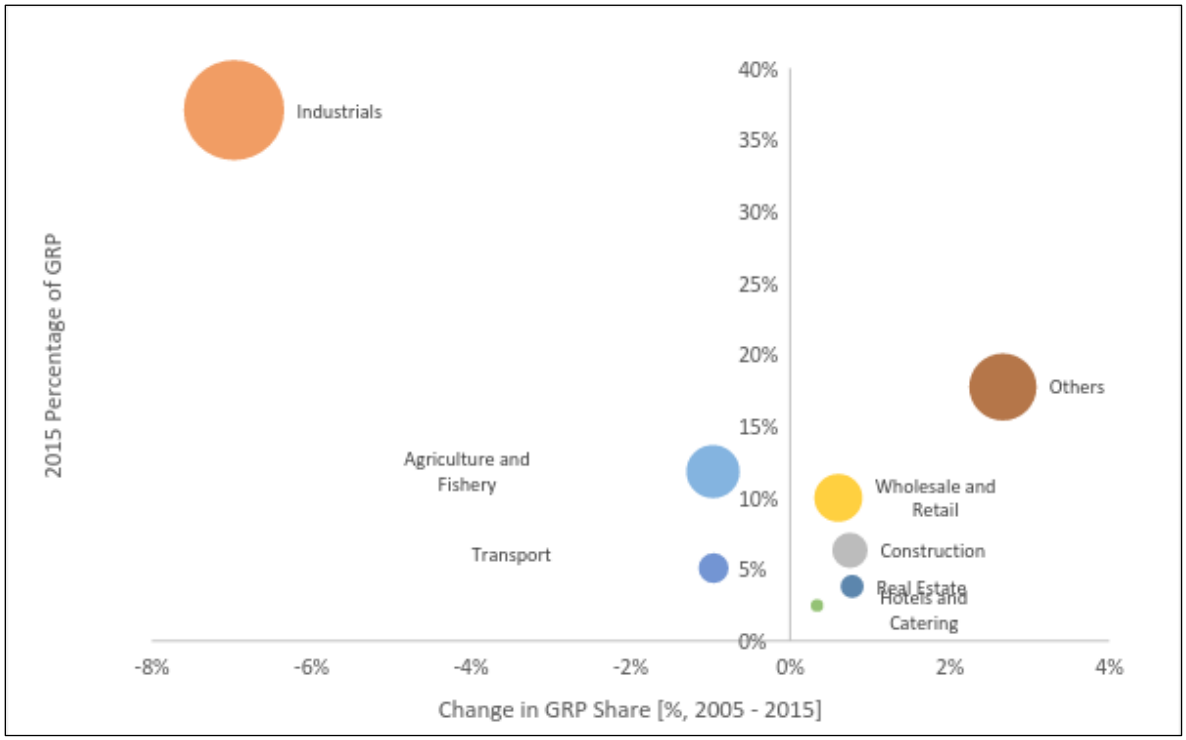
[14] Zito, Matthew. Logistics, Warehousing, and Transportation in China Part 1&2, June 2014, http://www.china-briefing.com/news/2014/06/13/logistics-warehousing-transportation-china-part-1.html

5 warehousing providers.[15] Many industry experts anticipate potential for increased efficiency and economies of scale through on-going consolidation of the fragmented transportation and logistics industry.

Related and supporting industries

Regionally, agriculture and industrials continue to be the primary drivers of the economy in Northeast China. In 2015, the two sectors accounted for 49% of the Gross Regional Product (GRP) of Liaoning, Jilin, and Heilongjiang.[16] Owing to the Yellow Sea connection and high activity at Dalian port, Liaoning's transport industry value-add of 1.702 billion yuan outpaced Jilin's and Heilongjiang's combined in 2015.

Figure 13 - Industry share of GRP – Northeast China[17]



[15] Zito, Matthew. Logistics, Warehousing, and Transportation in China Part 1&2, June 2014, http://www.china-briefing.com/news/2014/06/13/logistics-warehousing-transportation-china-part-1.html
[16] All China Data Center, *China Data Online*, http://chinadataonline.org (accessed March 13, 2017).
[17] National Bureau of Statistics of China, http://www.stats.gov.cn/english/ (accessed April 10, 2017)

While the transport and logistics cluster has maintained a steady contribution to the Northeast's gross regional product, its share has seen a slight decline in recent years. This is largely due to the marked contraction in supporting industries of heavy industrials and agriculture, the product of which bolster activity in transport and logistics. Emerging sectors such as services, retail, and construction have seen tepid growth and are much smaller. Therefore, such emerging sectors have not been able to make up for lost economic activity in agriculture and industrials.

Demand Conditions

As a country, China has the highest transportation and logistics volume in the world with 2917 billion tonne-kilometers of freight.[18] The rising income level across the country has led to rapid growth in domestic consumption and has created high demand for various products to be delivered to a greater number of destinations. While the Northeast region is not necessarily the most developed region in China, Northeast China alone represents a large market with a population of 108M and GDP per capita of 50K rmb.[19] Based on the federal government's regional revitalization plans in agriculture, industrials, and tourism sectors, the following drivers listed in Figure 14 are influencing demand conditions for the transportation and logistics cluster.

[18] Zito, Matthew. Logistics, Warehousing, and Transportation in China Part 1&2, June 2014, http://www.china-briefing.com/news/2014/06/13/logistics-warehousing-transportation-china-part-1.html
[19] The Economist, *Intelligence Unit*, http://country.eiu.com.prd1.ezproxy-prod.hbs.edu/China (accessed March 13, 2017).

Figure 14 – Demand Drivers Based on Regional Revitalization Plans

Revitalization Sectors	Demand Drivers
Agriculture	• Cold logistics for grocery delivery • Hub and spoke logistics to facilitate food transportation to northern provinces and Beijing with higher population density
Industrials	• Manufacturing SEZ along nation's borders • Green policy efforts with emphasis on waste recycling logistics • Value-added logistics (e.g., real time monitoring) to improve security
Tourism	• High speed rail, high way, and waterway for passengers

Factor Conditions

The ultimate goal for the transportation and logistics industry is whether the system is able to efficiently transport goods to their final destinations. In this case, the port at Dalian, down at the bottom is a key entry and exit point. The region is well positioned to serve as a logistics hub and facilitate trade with neighboring countries such as Mongolia, Russia, Korea, and Japan. As the central government makes efforts to improve infrastructure in second and third-tier cities of China's northern region, basic infrastructure enhancements have also enabled new markets for retailers.

Institutions for Collaboration (IFCs) and Academic Institutions

Some of the best universities and research institutions in China (e.g., Jilin University, Northeast Agricultural University, Harbin Institute of Technology) are positioned in the Northeast region. Many of them are specifically tied to key industries in the region with a focus on special economic zones (e.g., Changchun High-tech

Economic Zone) and can serve as major influencers for the transportation and logistics cluster.

The below chart summarizes Chung's recent study on the relative competitiveness of major logistics clusters across Asia (e.g., Korea, Japan, China, Hong Kong, Singapore, Malaysia).[20]

Figure 15 – Comparison of Competing Logistics Clusters in the Region[21]

Cluster Components	China	South Korea	Japan	Hong Kong	Singapore	Malaysia
FC-Factor Conditions	**4.96**	4.48	6.79	7.92	9.93	5.4
DC-Demand Conditions	**10.08**	2.79	6.72	2.33	2.71	0.51
RSI-Related and Supporting Industries	**0**	8.48	10.87	14.15	14.35	5.41
IFSSR-International Firm Strategy Structure & Rivalry	**1.03**	6.69	3.38	7.57	10.25	7.14
TOTAL	**5.4**	5.08	7.38	7.04	7.93	3.46

Singapore, Japan, and Hong Kong are considered the strongest logistics clusters in the region based on superior factor conditions (FC) and related and supporting industries (RSI). China's logistics cluster was highlighted to have significant potential given strengths in demand conditions based on a large population and market size. However, China's logistics cluster faces many challenges in terms of limited coordination with related and supporting industries and restrictions in private competition. Also the inefficient infrastructure planning process between central and regional governments significantly affects broader transportation and infrastructure clusters throughout China.

[20] Chung, A Study on Logistics Cluster Competitiveness Among Asian Countries, July 2016.
[21] Chung, A Study on Logistics Cluster Competitiveness Among Asian Countries, July 2016.

Figure 16 – Strengths & Weaknesses of the Transportation and Logistics Cluster[22]

Strengths	Weaknesses
• Large population and market size • Access to Dalian port and linkages to markets in neighboring countries • Increased level of federal resources and attention for infrastructure development in the region • Partnership opportunities with leading IFCs and academic institutions in the region • Increasing e-commerce activity across the country, which has led to significant demand for supporting services (e.g., warehousing) in the transportation and logistics cluster • Major private investments in in-house distribution among major e-commerce retailers • Increasing levels of foreign investment from global private equity firms (The industry now receives 2.8% of all FDI into China.)	• Immature cluster with high degree of fragmentation, but limited competition due to restrictions on private and FDI participation • Decline in critical related and supporting industries such as industrials and agriculture • High cost of shipping due to high road tolls, which are charged to pay for China's ongoing infrastructure upgrades (Various tolls and fees can account for 30-40% of transport costs for trucking companies) • Poor safety measures (Logistics firms often overload trucks given high tolls and fees) • Low quality of customer service • Challenges in acquiring land and outdated regulations (Transporting goods in China can be twice as expensive compared with the U.S., despite the difference in wages between the two countries due to these issues.) • Inefficiencies in infrastructure planning between central and local governments • Lack of qualified staff and limited ability to attract high quality talent in the region given its brand as the "rust belt" of China

[22] Zito, Matthew. Logistics, Warehousing, and Transportation in China Part 1&2, June 2014, http://www.china-briefing.com/news/2014/06/13/logistics-warehousing-transportation-china-part-1.html

Future Considerations and Recommendations

1. Better prioritization of Related and Support Industries (RSI)

Below is a list of priority sectors that the central government has prioritized for each province in the revitalization plan.[23]

Province	New Priority Sectors
Liaoning	Aerospace, robot, marine equipment, pharmaceutical, hybrid automobile, ICT
Jilin	Pharmaceutical, ICT, automobile electronic, advanced materials (fiber), railroad carriage, satellite
Heilongjiang	Pharmaceutical, cloud computing, advanced materials (carbon), robot, clean energy equipment

However, given the current state of the economy in Northeast China, the government should consider focusing on sectors that might leverage the growth potential in emerging sectors (e.g., wholesale and retail, construction, and real estate) as illustrated in Figure 13 rather than pursuing sectors with limited competitive advantage for Northeast China (e.g., robotics, pharmaceutical, cloud computing).

2. Adjust to changing demand conditions

Given the decline in industrials and agriculture sectors in the Northeast region, local governments cannot only rely on the federal government priorities to promote such sectors. The transport and logistics services must be adapted to effectively meet the needs of emerging industries that are prioritized as discussed in above section. For example, the wholesale and retail industries will likely require value-added logistics

[23] 东北振兴"十三五"规划 NDRC, November, 2016, http://www.ndrc.gov.cn/zcfb/zcfbghwb/201612/W020161219594214175674.pdf

(e.g., real time monitoring) to improve security and improved customer services, while the food and agriculture sectors need cold logistics capabilities for grocery delivery.

3. Infrastructure coordination across local, central, and foreign governments[24]

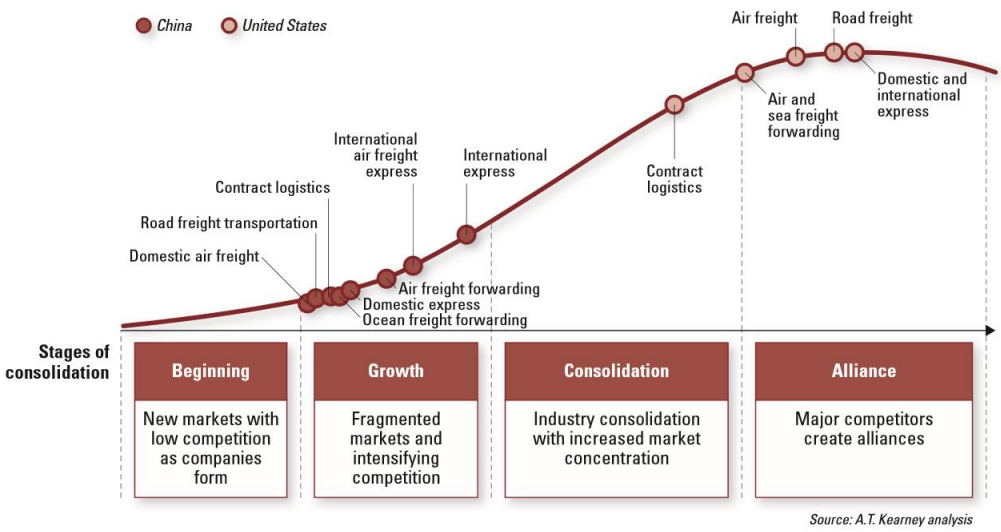
Given the potential for overlapping infrastructure development across borders of adjacent provinces, the central government must closely coordinate infrastructure planning process with local governments. Specifically in the Northeast region, there needs to be improved coordination with adjacent Northern and Shandong provinces given that they can share the same channels to access the Dalian port. Furthermore, there are opportunities for cross border coordination with Russia, Korea, and Mongolia. As part of the One Belt One Road initiative, the central government is already pursuing efforts to establish Memorandum of Understanding (MOU)s to build infrastructure and set up economic zones. Such efforts should be closely coordinated with local governments given the implications for emerging sectors and changing trade relationships.

4. Diversify as market matures and consolidates

As illustrated below, industry experts expect that mergers and acquisitions in the transportation and logistics industry will continue given that it is still in relatively early stages of consolidation.

[24]东北振兴"十三五"规划 NDRC, November, 2016, http://www.ndrc.gov.cn/zcfb/zcfbghwb/201612/W020161219594214175674.pdf

Figure 17 – Chinese Logistics Market's Stages of Consolidation[25]



As the logistics market matures and smaller firms are consolidated, logistics service providers should diversify their product portfolios toward value-added services, including simple sourcing, warehousing, inventory management, distribution and delivery, product testing and secondary packaging. Such services will require better logistics related finance and ICT services.

5. Further liberalization to enable private and FDI participation

Review outcomes of reduced restrictions in Shanghai Free Trade Zone (FTZ), where "logistics and freight forwarding were included among the 18 industries selected for liberalization in the FTZ," and explore opportunities to reduce barriers for private and FDI participation.[26] The central and local governments should consider ways to

[25] A.T. Kearney, China 2015: Transportation and Logistics Strategies, https://www.atkearney.com/transportation/ideas-insights/article/-/asset_publisher/LCcgOeS4t85g/content/china-2015-transportation-and-logistics-strategies/10192
[26] Zito, Matthew. Logistics, Warehousing, and Transportation in China Part 1&2, June 2014, http://www.china-briefing.com/news/2014/06/13/logistics-warehousing-transportation-china-part-1.html

streamline customs administration processes and lower the time required for transferring goods through customs. It will be critical for the central government to encourage private ownership to consolidate and promote healthy cluster competition in the Northeast region.

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Zito, Matthew. Logistics, Warehousing, and Transportation in China Part 1&2, June 2014, http://www.china-briefing.com/news/2014/06/13/logistics-warehousing-transportation-china-part-1.html