



Alaska
International Airport
System
AeroNexus®



AEDC
Anchorage Economic
Development Corporation

AIAS Air Cargo Related Economic Development

Opportunity Assessment

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GLDPARTNERS

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EXISTING CONDITIONS

Introduction and Overview

The State of Alaska has a robust international trade environment. Serviced mainly by both sea and air modes of transportation, the 2012 dollar value of imports destined for Alaska was \$2.1 billion and native Alaskan exports were \$4.5 billion. The largest export category is fish and other marine products followed by natural resource products.

In Alaska for marine transportation, the Aleutian Islands are a major transit for the Great Circle Route linking commerce from the US west coast to southern Asia. Shipping is also expanding through the Bering Strait, a 53-mile wide chokepoint that links both the Northern (Russia) and Northwest (Canada) passages to northern Asian, Russian, and European commerce. For air transportation the Ted Stevens Anchorage International Airport (ANC) is ranked second in the US for landed weight of cargo aircraft, and sixth in the world for cargo traffic (Airports Council International).

ANC holds a unique position among international air gateways in the United States. In 1996, the US Department of Transportation began to permit air carriers from foreign countries (except those from the United Kingdom and Japan) to conduct expanded cargo activities at ANC. These activities included cargo transfer from a foreign carrier's aircraft to any of its other aircraft, transfer from a foreign carrier to any US air carrier, and transfer from one foreign carrier to any other foreign carrier without being considered to have broken its international journey. In 2004 domestic and foreign carriers were afforded more flexibility and the outbound-US operations through ANC were afforded increased liberalization for the first time. ANC and Fairbanks International Airport (FAI) are the only two airports in the United States to have been granted these liberal air cargo transfer capabilities.

Anchorage is within a group of airports that have an important role in global air cargo commerce. Most are origin or destination hubs (or both), while Anchorage's historic role has been strategic and operational. All operate technologically advanced facilities and are capable of high throughput operations. The primary air freight hubs include:

- Frankfurt Airport which is Europe's busiest cargo hub
- FedEx Express Super Hub, Memphis International Airport, US
- Dubai Cargo Gateway, Dubai International Airport, UAE
- Hong Kong International Airport, Hong Kong

- Louisville International Airport
- Paris-Charles de Gaulle Airport, France
- Changi Airfreight Centre, Singapore Changi Airport, Singapore
- Cargo terminal complex, Incheon International Airport, South Korea
- Shanghai Pudong International Airport Cargo Terminal, Shanghai, China
- Ted Stevens Anchorage International Airport, Anchorage, US

ANC was not immune to the precipitous drop in air cargo traffic during 2008 and 2009, when global air cargo traffic fell 3.2% and 9.6%, respectively----the first time that air cargo traffic contracted in two consecutive years.

ANC Total Annual Cargo Volume (MT)		
Year	Volume	%Change
2006	2,808,317	2.6
2007	2,825,511	0.6
2008	2,339,831	(15.7)
2009	1,994,629	(15)
2010	2,646,695	36.6
2011	2,543,155	(3.9)
2012	2,463,646	(3.1)
2013	2,421,145	(1.7)

Source: Airports Council International

The global economic downturn of 2008 and 2009, the worst economic contraction since the Great Depression, had the effect of dragging down all modes of transport. Air cargo traffic fell 12.8% between mid-2008 and year-end 2009, the worst decline since the beginning of the jet transport age. By mid-2009, however, worldwide industrial production and consumer demand began to increase, nudging air cargo traffic toward recovery. Air cargo surged in 2010 as world industry moved to restock depleted inventories. ANC's numbers generally followed the global trends.

Total Annual Cargo Volume 2013 (in metric tons)				
Global Rank	Region	Airport	Total Cargo	% Change
1	HONG KONG, HK	HKG	4 161 718	2.3
2	MEMPHIS TN, US	MEM	4 137 801	3.0
3	SHANGHAI, CN	PVG	2 928 527	(0.3)
4	INCHEON, KR	INC	2 464 384	0.3
5	DUBAI, AE	DXB	2 435 567	6.8
6	ANCHORAGE AK, US	ANC	2 421 145	(1.7)
7	LOUISVILLE KY, US	SDF	2 216 099	2.2
8	FRANKFURT, DE	FRA	2 094 453	1.4
9	PARIS, FR	CDG	2 069 200	(3.8)
10	TOKYO, JP	NRT	2 019 844	0.7

Source: Airports Council International

Growth continued during the first quarter of 2011, expanding an estimated 4.5% compared to first quarter 2010, after peaking at a level not seen since 2007. But starting in June 2010, jet fuel prices were on the rise, climbing 42% by December 2011. This contributed significantly to an air cargo traffic slowdown that was aggravated by the civil unrest of the Arab Spring uprisings, the Japan ("Tohoku") earthquake and flooding in Thailand. The latter two shocks disrupted the manufacture of automotive components and information technology (IT) goods, both of which are key commodity groups for air cargo and the ANC route. ANC cargo throughput declined 14% between 2007 and 2013.

Rising fuel prices have also been a factor in air cargo traffic slowdowns since late 2004, diverting air cargo to road transport and maritime modes, which are less sensitive to fuel costs. Air cargo demand has been affected by excess capacity in seaborne trade since the beginning of the economic downturn which has lowered shipping rates. The price of jet fuel has tripled over the past 8 years, and prices are likely to remain volatile as the threat of supply disruptions persists.

In January of 2014, oil and jet fuel prices were forecasted, in some scenarios, to remain around mid-2012 levels and then decline over the next 3 to 5 years. But, in early 2014 global tensions, including the Ukraine and further Middle East unrest, sparked an upward trend and IATA began projecting higher oil prices that were expected to average \$108 a barrel which was \$3.50 per barrel above previous projections.

However, oil prices fell substantially in the last six months of 2014 from a peak of \$106/barrel to about \$46/barrel currently. Commodity oil price forecasts over the coming few years are varying widely at the moment, influenced by a multitude of emerging and rapidly changing geopolitical factors including OPEC production strategy, economic sanctions on Russia, the Chinese economy's slowing, a lingering and deep European economic malaise, the potential for environmental revelations associated with fracking, ongoing diplomatic negotiations between the West and Iran, etc.

According to the US Energy Information Administration, Brent Crude is forecasted to average about \$57/barrel in 2015, rising to over \$75/barrel in 2016. IATA though is forecasting a steeper rise in oil prices to about \$85 in 2015. IATA is expecting jet fuel to average \$99.90 per barrel in 2015. This translates to a total of \$192 billion that will be spent on fuel, which represents 26 percent of total airline industry costs. In the end, most energy economists are anticipating higher fuel costs over the next few years, but still remaining lower than what has been experienced over the past few years.

It is important to note that the impact of lower fuel prices will not be realized immediately because of the forward fuel-buying practices that are employed by the airlines. Air Cargo World is reporting that the falling oil prices have carriers forecasting record returns for 2015. But even with the rise in total cargo revenues for 2014 that number is still 5% lower than in 2010.

An underlying bright spot for ANC is that air cargo remains a fundamental requirement for many growth industries and consumer spending is still expanding in developed and developing markets. The expansion of regional hubs in the Asia-Pacific continues to act to provide additional stability to the market and the lack of alternate modes of transport (the APAC region is divided by sea, South America and Africa by mountains and distance) ensure that developing regions will continue to find air cargo to be a key factor.

Cargo Snapshot

ANC is a major hub for international air trade with Asian countries. A large number of flights from the United States destined for Asia or from Asia destined for the United States make operational stops at ANC. Anchorage is attractive to shippers because 90% of the industrialized northern hemisphere can be reached within 9.5 hours from Anchorage, allowing the carriers to transport more cargo and consume less fuel. From ANC that would be as far westward as Beijing and Moscow; as far eastward as London and Frankfurt; and as far southward as Mexico City.

The intermediary stop in Anchorage, as opposed to flying from Shanghai to Oakland, actually increases total flight distance by around 144 miles. But this allows the aircraft to carry an additional 45,000kg of cargo instead of extra fuel which increases revenue for the trip. Since Anchorage rests on a peninsula and the approaches to ANC are over water, there are no noise restrictions affecting landing time. Anchorage's prime global location, combined with the growth of China's tech exports has made ANC one of the top airports in the world for cargo traffic.

In defining the cargo transiting Anchorage, the US Bureau of Customs and Border Protection (CBP) views the point-to-point move of US-bound international cargo to be considered international cargo during any stop-overs along the way as long as the final US destination (based on the bill of lading) has not been reached. Therefore all of the cargo that is transiting ANC and FAI does not go through US Customs and there is no publically available data of "what's in the containers". There is data collected on the carriers serving ANC, their origin and destination, the type of aircraft used, frequency of the service and the gross tonnage.

The top origin and destination countries on nonstop international flight segments through ANC are South Korea; Hong Kong, China, Taiwan and Japan. The top cities for nonstop flight segments for air cargo are Seoul, Taipei, Shanghai, and Hong Kong. By tonnage, FedEx and United Parcel Service are the primary US carriers among the top air carriers for imports and exports with Atlas and Polar Air also registering large tonnage. The other major cargo carriers at ANC are Korean Air Lines and Cathay Pacific Airways. In addition other international freight carriers serving ANC are: Air China, China Air, China Cargo, Cargolux, Eva, Asiana, Nippon Cargo, and Singapore Airlines.

The most frequent destinations for the air cargo that travels from ANC to the lower 48 are Chicago, New York City, Los Angeles, Dallas/Ft Worth, Memphis, Louisville, Atlanta, and Miami. In reviewing the city route pairings with ANC, all the Asian freighters as well as the integrators are serving the largest logistics hubs in the lower 48. These hubs are the main distribution points for consumer products but also in several cases offer a window into the make-up of several supply chains.

In a recent month at ANC there were 83 departures to Dallas/Ft. Worth which is the air cargo departure point for auto components destined for Mexico, a major manufacturing location for electronic components leading to a final assembly point in Mexico, and a final assembly location for both military and commercial aircraft.

Scheduled Air Cargo Airlines at ANC	
Air Carrier	Cargo Destination Markets
Air China	DFW, New York (JFK), Chicago, Beijing, Shanghai
Asiana	Miami, Chicago, DFW, Incheon
Atlas	Huntsville, Chicago, Charleston, Cincinnati
CAL Cargo	Atlanta, New York (JFK), Los Angeles, Miami, Chicago, Osaka
Cargolux	DFW, New York (JFK), Los Angeles, Columbus, Chicago
Cathay Pacific	DFW, New York (JFK), Los Angeles, Miami, Chicago, Toronto, Vancouver, Taiwan, Hong Kong
China Cargo	Chicago, Shanghai, Zhengzhou
China Air	Houston, Atlanta, Taiwan, Osaka
Eva	Los Angeles, New York (JFK), Chicago, Atlanta, DFW, Taiwan, Osaka
FedEx	Indianapolis, Long Beach, Oakland, Memphis, Taiwan, Osaka, Tokyo, Incheon, Shenzhen, Hong Kong
Korean Airlines	Toronto, DFW, Frankfurt, New York (JFK), Atlanta, Los Angeles, Miami, Chicago, Chubu (Japan), Incheon, Guadalajara
Nippon Cargo	New York (JFK), Chicago, Taiwan
Polar Air	Cincinnati, Los Angeles, Incheon, Hong Kong, Shanghai
Quantas	New York (JFK), Chicago, Shanghai
UPS	Ontario, Rockford, Louisville, Portland, Taiwan, Hong Kong, Shanghai, Osaka, Singapore, Shenzhen, Incheon
 Domestic	 International

Source: AIAS

Supply Chain Markets

Microelectronics which are high value and generally lightweight are a dominate category of goods transported through Alaska by air. These goods fly from Japan, Korea, Taiwan and Hong Kong and transit through Anchorage on their way to Memphis, Louisville or the nearest UPS or FedEx hub or another location in North America for additional value added activity. Taiwanese electronics retailer, Newegg for example, has its major US operation in Memphis.

Apparel retailers who must manage rapid inventory cycle demands are also heavy users of air freight. In fact with a history of over 35 years, the garment industry was one of the first to grasp the competitive advantages of combining Asian labor with air transport in supply chains, calling this "fast fashion". Their supply chains mimic the electronics industry, coming from Asia through Anchorage on their way to a UPS or FedEx hub. Nike's only distribution center is

in Memphis where last year they added 1.8 million square feet to an already enormous 3.6 million footprint.

To better pinpoint the reality of crafting an Alaskan investment location solution, the Consultant Team has identified eight industrial trade segments defined at the 3-digit industrial classification level. These industry classifications contain the main categories of air cargo and potential business opportunities will fall under these definitions. The Team has refined pertinent trade and cargo flow data to the 5-digit level so prescribed supply chains can be assessed. Eight industrial trade segments were identified as having the most supply chain significance: electronics, pharmaceuticals, aerospace components, auto components, medical devices, bio-science applications, toys and apparel.

Most tech hardware, including the iPhone and iPad, ships from the Original Design Manufacturers (ODMs) in and around Shanghai and ends up in Anchorage where UPS and FedEx have built major logistics hubs. These hubs were built in Anchorage because of its advantages in range vs. payload and spherical coordinates, the shortest path between two points on a surface.

However there is reason for ANC to be concerned as their competitive position might be reduced as aircraft technology continues to increase which allows for aircraft ranges to increase. IATA, the Airport International Transport Association, says that the new aircraft are 70% more fuel efficient than 40 years ago and 20% more efficient than 10 years ago. These more fuel efficient aircraft are increasingly being deployed for the long-haul transoceanic routes which will allow them to overfly ANC.

Both Boeing and Airbus are enjoying strong sales of these longer range products. Cathay Pacific has just announced the purchase of additional Boeing 747-8s and 777-300ERs. The Hong Kong's flag carrier which serves ANC with the 747-8s is in the midst of renewing its freighter fleet with newer, more efficient airplanes, while also looking to strengthen its position as a market leader in the air cargo business. The 747-8 Freighter gives cargo operators the lowest operating costs and best economics of any large freighter airplane while providing enhanced environmental performance. The 747-8 Freighter is the world's longest cargo aircraft measuring 73.3m and holds up to 134 tons of cargo, which is 16 per cent more volume than the airline's predecessor, the 747-400. Not only does the aircraft hold more cargo, it is a leader in environmental performance. The 747-8F is more fuel efficient, produces fewer emissions and is 30% quieter than its predecessor, thanks to the latest innovations in aircraft engine technology. Cathay Pacific has stated its commitment to using 747-8 freighters for their Alaska service.

Although longer range cargo aircraft are coming into use that can operate non-stop between North America and Asia with a full payload, the lingering overall economies of utilizing the current cargo fleets will keep Anchorage as a prime logistics asset for the immediate future.

Looking forward, the Consultant Team has analyzed a combination of factors that will help to define the Alaska opportunity for air cargo-related business growth. The Team has developed a market-sector model that is built on trade flow fundamentals; this information was utilized and further broken down in the supply chain analytics work in subsequent Tasks 2 and 3. The model provides some key foundations that precede the sector supply chain analytics, including current and projected overall trade and growth (by country) in those sectors of the economy that are partially air cargo reliant. This information was then processed into a review of 1) key airport/feeder markets and 2) reviews of market to market supply chains, growth, change, contraction or migration of those business segments which is the ultimate focus in Tasks 2 and 3. In the end, this work helps to understand the potential opportunity to develop a competitive business model to increase cargo and attract value-add operations.

In reviewing North American-Asian trade, the current gross figures for continent-to-continent trade equal about \$1.2 trillion dollars. Approximately 1/3 (or \$389B) of these flows are exports from the US to the 18 prime Asian country/markets, and two-thirds (or \$809B) imported to the US. As described above, the Consultant Team defined eight primary 3-digit industry categories and these are highlighted below. A similar breakdown of trade with each of the 18 Asian countries is illustrated in Appendix A, but some important highlights are:

Gross Trade 2013 Between North America and Asia

			Exports to Asia	Imports from Asia	Total Trade	
Asia			389,000,000,000	809,000,000,000	1,198,000,000,000	Total
Apparel		315	828,899,000	57,631,375,000	58,460,274,000	
Chemicals		325	51,198,067,000	48,997,849,000	100,195,916,000	
Computer and Electronics		334	62,650,029,000	232,931,410,000	295,581,439,000	
Electrical Equipment		335	8,550,581,000	44,045,213,000	52,595,794,000	
Machinery, Non Electronic		333	45,268,592,000	63,556,683,000	108,825,275,000	
Transportation Equipment		336	52,829,427,000	97,018,405,000	149,847,832,000	
Goods Returned		980	0	11,889,672,999	11,889,672,999	
Misc Manufactured		339	22,162,484,000	56,536,310,000	78,698,794,000	
			243,488,079,000	612,606,917,999	856,094,996,999	Selected Categories

Source: USTR/US Census Business

The following airports and airport regions were chosen as a potential competitor class to Alaska (for economic investment projects.). It should be noted that at this point, there are few or no real competitive projects so this review is based on hypothetical competition.

Airport-Related Property - Airport-centric real estate opportunities are traditionally shaped by cargo volumes and proximity to major consumption and production centers. Generally air cargo is disbursed to or received from markets within day's transport to major origin or destination centers. This system allows real estate options to be located within several miles of the airport. This is not the case for ANC. With ANC as a transit airport, on-airport sites become extremely important in the value-added business model. Functionality, connectivity and time in transit become the important components in making a decision, all of which are offered by an on-airport site.

Airport: Dallas/Ft. Worth (DFW)

Overview: Building major new roadway connector between Dallas and Ft Worth, the Airport is aggressively pursuing new air routes, in particular to Asia and the Middle East and is very interested in increasing air cargo activity. DFW has 4000 acres available for development and project development is moving farther from the airport where the land is cheaper. The airport is renovating the four oldest terminals as well as upgrading the runways.

Immediate Submarket Industrial Property Base: 57,500,000 SF

Vacancy: 7.7%

Rental Rate: \$4.14/ Square Foot/Year/NNN **Trend:** down

Successes: OHL, APL Logistics, Cherryman, Dreisbach, Exel

Economic Development: Targets: office, light manufacturing and R&D; significant intra-regional competition, Alliance as corporate competitor is extremely strong; DFW Airport is transitioning to a fully integrated air services, development and economic development entity. Pressure from plentiful and inexpensive competition within Metroplex.

Airport: Los Angeles (LAX)

Overview: LAX is in the midst of a multi-billion dollar development program which includes the new Tom Bradley International Terminal (TBIT) and other major airfield improvements designed to accommodate the new large aircraft that many airlines are now flying into LAX. LA's industrial market supply is constrained; tenants will pay a premium to access proximate high cube buildings with reasonable clearance heights and truck high doors; third party logistics (3PL) companies are very important players in the market; tenant renewals are constant; any new construction will be well received but relatively little projects of scale are realistic in the immediate area; major market driver is intermodal activity

Immediate Industrial Property Base: 14,900,000 SF

Vacancy: 3.2% in the immediate area which is 210 basis points lower than the LA County average.

Rental Rate: \$10.45/SF Square Foot/Year/NNN in the immediate area. The LA County average is \$6.60. **Trend:** upward, tightening and expanding

Successes: Tenant demand is driven by logistics providers, consumer non-durables and food and beverage

Economic Development Targets: Unclear, little coordinated regional economic development strategy or delivery

Airport: Chicago O'Hare (ORD)

Overview: O'Hare is undergoing an \$8 billion modernization program. Project is scheduled to be completed by 2016. Market drivers are e-commerce, distribution and air cargo; biggest demand by consumer products and household goods companies; uptick in spec development; three redevelopment projects of 446,000 SF around the airport and very strong 3PL activity. However much of the O'Hare product is functionally obsolete and less than ideal for modern distribution users.

Immediate Industrial Property Base: 100,200,000 SF

Vacancy: 8.5%

Rental Rate: \$6.02 /Square Foot/Year/NNN **Trend:** upward

Successes: New 476,000 sq. ft. build-to-suit for DHL

Economic Development: Targets: e-commerce, distribution and logistics companies. Always a consistent market, but is changing. Demand market is concentrated on deals below 50,000 SF, first speculative development since 2007 (Panattoni)

Airport: Louisville (SDF)

Overview: Building new roadway connector, preparing for larger, long, range aircraft. UPSWorldPort drives distribution leasing, impact of air cargo across region, vacancy near the airport is dropping. Even with WorldPort, newer big boxes are moving south and east, where there is more land available.

Immediate Industrial Property Base: 29,500,000 SF

Vacancy: 9.2%

Rental Rate: \$3.41/Square Foot/Year/NNN **Trend:** Upward

Successes: Amazon fulfilment center

Economic Development: Targets: Traditional array of healthcare, e-commerce, high tech and third party logistics. More industrial construction than in any quarter in history. Verus and Dermody making significant investments.

Airport: Memphis (MEM)

Overview: Relative central continental location and proximity to FedEx Super Hub which positions Memphis as distribution hub, especially valuable as e-commerce grows. Development around Memphis Airport was minimal until 2012, now new speculative development. Most new regional industrial development is in Mississippi due to costs/incentives and proximity. FedEx operates 1,250 cargo flights per week.

Immediate Industrial Property Base: 46,500,000 SF

Vacancy: 18.0%

Rental Rate: \$2.20 /Square Foot/Year/NNN **Trend:** upward, rightsizing

Successes: Ingraham Micro, Technicolor, Sargeants

Economic Development: Targets: mainly distribution-related. Big box vacancy is limited, land constraints near the airport, available space is generally, Class B-C quality, however Greater Memphis delivered 3 million sq. ft. of industrial product in 2013. Industrial Income Trust, Exeter, Hillwood have acquired property.

Airport: Indianapolis (IND)

Overview: Domestic hub for FedEx, planning 4th runway, focus on key Asian gateways, space constraints, only two sites and six buildings available. High-velocity air cargo assets are insignificant in large market. Regional market is experiencing a large amount of speculative development. Duke, Verus, Prologis and IDI are actively developing major spec and build to suit developments

Immediate Industrial Property Base: 57,200,000 SF

Vacancy: 8.7% 90 basis points lower than the rate for Greater Indianapolis

Rental Rate: 3.24/Square Foot/Year/NNN **Trend:** declining

Successes: Amazon, OHL, Stericycle, Hanzo Logistics, Bensussen Deutch, Hartz, Balcamp, Gordmans

Economic Development: Targets: Traditional array (but with motorsports, clean energy, and "emerging industries"). Distribution presence: CVS Caremark, Finish Line, Brightpoint, Reebok, Red Gold. Conexus Indiana provides thought leadership on logistics, infrastructure and economic development.

Source: Colliers International, CBRE, JLL, and GLDPartners

On Reservation Business Base

Along with the airport administration (Alaska Department of Transportation & Public Facilities), approximately 265 businesses or agencies lease (or sublease) space at ANC. These tenants provide services directly to the airport and its

operation, or provide goods and services that primarily serve air passengers or air cargo clients. Tenants include:

- Air service companies (more than 35 regional and small carriers)
- Airlines (about 45 large air carriers, both all-cargo and passenger service)
- Airport operations and support (about 40 businesses providing services to the airport and airlines)
- Logistics and freight forwarders (at least 10 companies)
- Car rental and parking services (about 15 companies)
- Government agencies, including local, state and federal
- Associations, tour companies, and cultural attractions
- Retail operations and service providers -approximately 80 businesses

Source: McDowell Group/AEDC, 2012

TRANSPORT ASSET REVIEW

This Task was created to review the surface transport assets that intersect with the two commercial airports in the State, with particular emphasis on Anchorage. Combined with the property asset review, this work has been advanced ahead of the potential air cargo market opportunity assessment to understand the reality-based limits of the regional markets. A review was conducted of existing regional road and rail infrastructure at and around the Airports and also in and around the industrial property concentrations elsewhere in the region (particularly Anchorage). The review also makes note of pertinent mid and long-range transportation policy planning and expected Municipality of Anchorage infrastructure investment strategies. The assessment was carried out by field inspection, interviews with City staff including Planning, Public Works and the Port of Anchorage. Further review was conducted regarding the Municipality of Anchorage's policy framework for capital and long range transport planning.

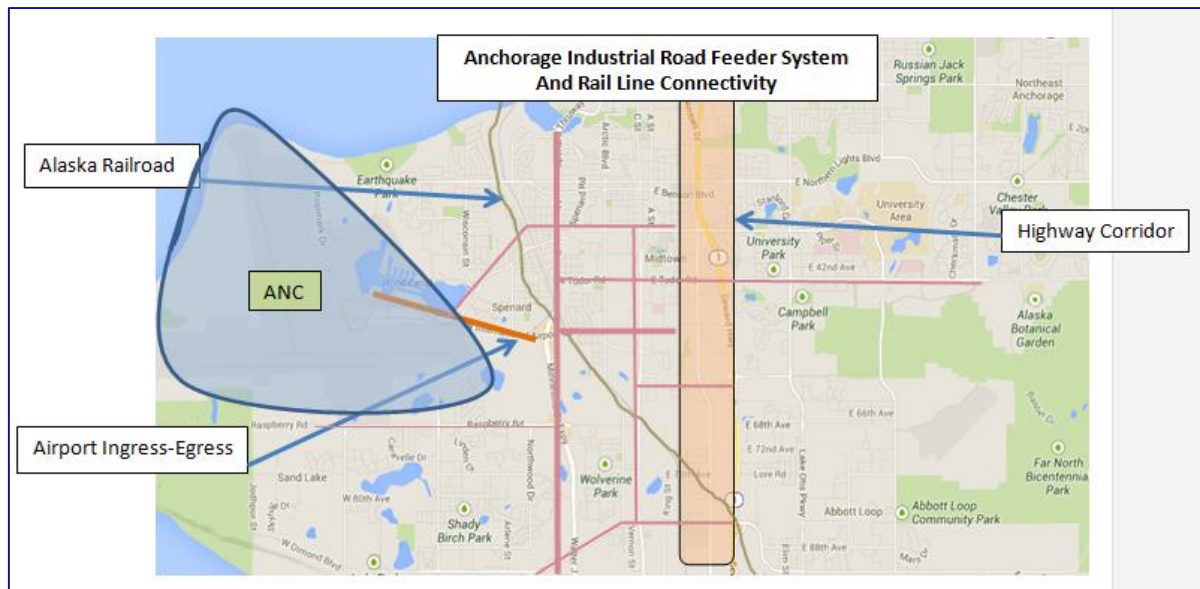
It is probably helpful to review urban region cargo transport infrastructure in the context of the region's and the State's cargo movement situation. Anchorage is by most measures the gateway connection to the world for the entire State. Cargo shipments to and from external locations provide sustainability not only to the urban populations and economies of Anchorage and Fairbanks but also to the entire Alaskan community. It is widely recognized that the foundation that supports these critical commodity flows are both the seaport and airport in Anchorage. As the Port is the companion logistics asset, a brief overview is offered here. A brief overview of the regional rail systems are also offered, although we see very limited direct cargo intersection between air and rail service in the case of Alaska.

Port of Anchorage - The Port provides for vital maritime cargo imports and some exports for cargos with origins or destinations to the Lower 48 states, but also to key global markets. The Port is an origin and destination cargo maritime transport terminal and does not serve as a market-to-market cargo transfer hub except perhaps to Alaskan communities. It should be noted that as recently as the past ten years the Port was envisioned by some to grow into a Pacific cargo transfer hub, where cargos would be transhipped from vessel to vessel as a connection between Asian and West Coast North America markets. This aspiration is no longer active. Though there has been strife with engineering challenges, the Port of Anchorage is undergoing a much needed rehabilitation along with an expansion. Due to the engineering problems, additional funding is not yet fully sorted for that project. Supporting the Port's growth is a series of external planned public works projects designed to improve access to the port and

multimodal transport connectivity within the Port's reservation. These improvements are seen to provide better Port access and also relieve congestion on the surface street system. In terms of the interface between the Port and Airport, the Port has played a role for jet fuel supply and there is some cargo transfer from ocean carriage to small airplanes for intrastate supplies to remote communities. Otherwise, there is relatively little direct intersection between the business of the Port and the Airport. With that said, there are some who feel that the area around the Port and to the northeast of downtown have potential to redevelop into a multimodal served industrial center with access service by road, maritime, and rail service. To the extent that the Port is serving as an inbound product distribution import center, there may be value to this if it were possible as the transport from vessel to distribution center would be minimized. At present, we are told that the predominant movement of distributed goods from the distribution center to Anchorage and Fairbanks markets is via truck.

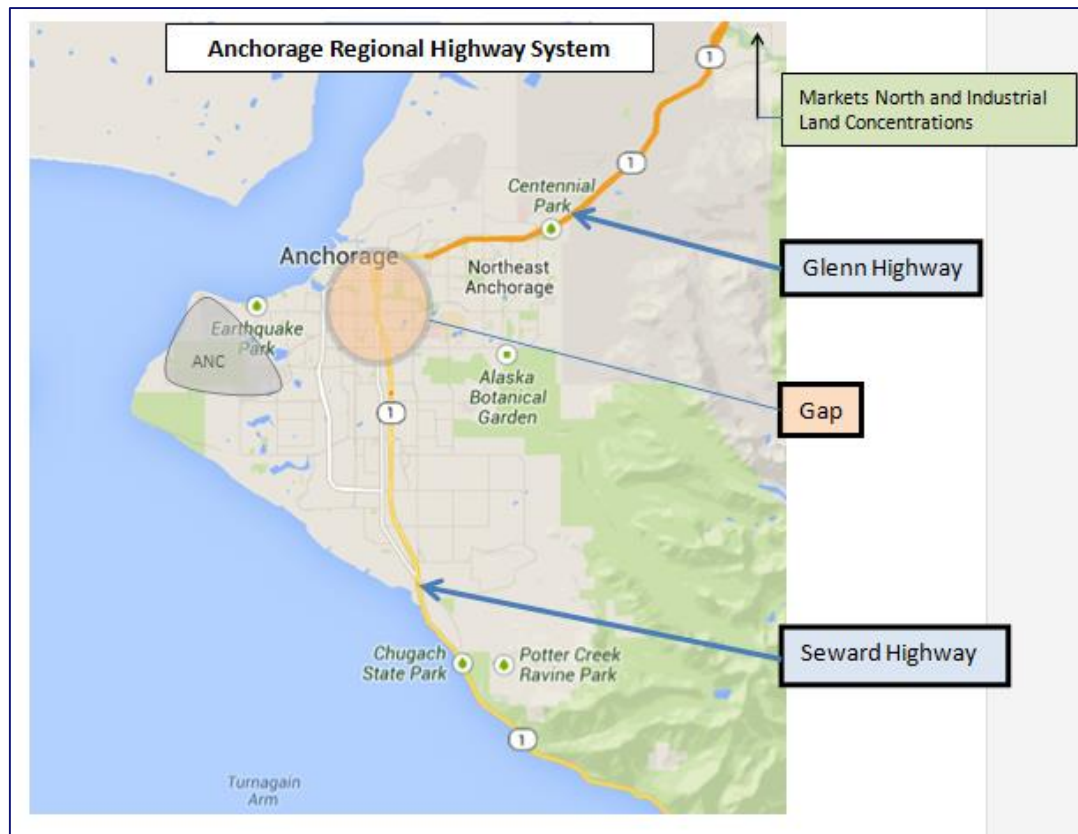
Rail System - The Alaska Railroad (ARR) is a State of Alaska-owned Class II railroad which extends from Seward and Whittier in the south to Fairbanks, passing through Anchorage and connecting Fairbanks. The railroad then extends to Eielson Air Force Base and Fort Wainwright to the north. The ARR carries both freight and passengers throughout its system. The railroad has a mainline that is over 470 miles long. With secondary lines and sidings that the Company manages, it operates on over 500 miles of track throughout its system. The railroad is connected to the Lower 48 via three rail barges that sail between the Port of Whittier and Harbor Island in Seattle (the Alaska Railroad-owned Alaska Rail Marine, from Whittier to Seattle, and the CN Rail-owned Aqua Train, from Whittier to Prince Rupert, British Columbia). The ARR does not currently have a direct, land-based connection with any other railroad lines on the North American network. ARR's urban tracks are well-situated for servicing industrial areas of Anchorage and Fairbanks and in the case of Fairbanks serve directly to the Airport reservation.

Regional Road system - The State surface transport system is a complex matrix of local and State roads. Like most places and similar to the land-use planning situation, Anchorage has a road system that is a product of organic planning. The roadway system is comprised of two highways that approach from the north and the south and a system of arterial and feeder roadways.



Source: GLDPartners

As a metropolitan region, there is a relative deficiency of urban high-speed roadways and a lack of continuity for some east-west movements. The approach highways from the north and the south do not connect in the middle of the City and highway traffic is discharged onto urban City streets creating delays. In our experience, most communities believe that their traffic conditions are among the worst and Anchorage may feel that its traffic delays are unreasonable. There have been and continue to be legislative efforts to solve this by funding a "highway to highway" infrastructure project solution where a new highway connection would be constructed allowing a free flow of traffic through the downtown region. The impact to investment potential that may be associated with the Airport is important when considering the industrial development potential around the Port and north along the Glenn Highway where there is room for fairly large dimension modern industrial development.



Source: GLDPartners

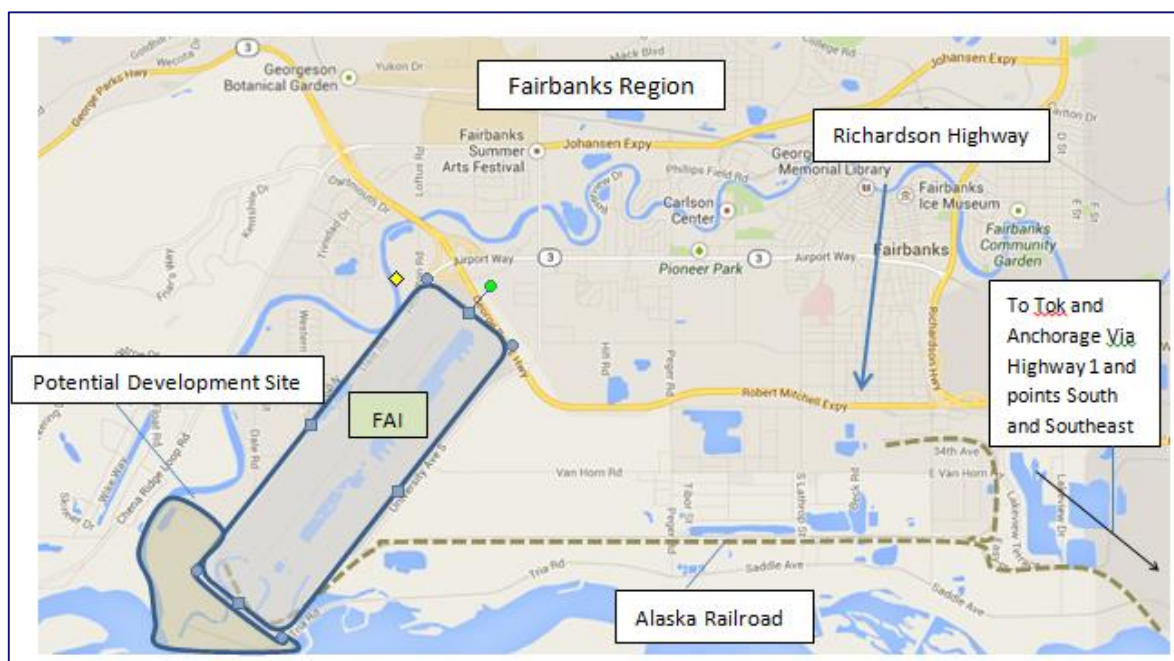
Within the Anchorage urban region, the major road system is characterized by north-south road infrastructure following the region's historic development growth pattern. Bisected by the Seward Highway the City otherwise has a relatively modest system of arterial roads that serve residential and industrial areas.

- **Downtown/Port** - As for the traditional industrial zones in the City, the district that stretches from the Port eastward along the rail line is challenged by poor highway access and terrain issues. This area is 6 to 8 miles from the main entrance of the Airport and requires at least 20 minutes travel time in good traffic conditions, 30 minutes or more during peak travel. With this travel time profile this area would not easily be considered a viable, high-confidence airport-related investment location for operations that require quick access. For uses that don't require frequent high-velocity movements between plane and industrial site, this area may be suitable if there were suitable sites and buildings.
- **Mid-South Anchorage** - The industrial areas east and southeast of the Airport are quite a bit larger, with the closest properties almost adjacent to the Airport, while the farthest properties are approximately 6 miles away. Generally, most of this industrial zone would be accessed from the Airport via arterial roadways. From a time and distance perspective, this district would

provide a better choice than the near-downtown setting, but depending on the location, still may not be considered to be within an immediate Airport catchment area meeting high-velocity transfer requirements.

- Eklutna/Birchwood – These sites are well-located in that they are in close access to the Glenn Highway and also nearby to rail access points. The negatives are fairly large challenges: the pure distance will be a major decision factor and this is exacerbated by the lack of high speed road access near the downtown area. This area could be valuable for uses that do not require frequent transport between the Airport as it has the potential to offer modern fit-for-purpose assets. This area would probably have value given the preceding, but to the extent there are no other closer-in opportunities.
- On Airport – By far, the most attractive location to support an airport-driven logistics-manufacturing operation would be at the Airport. Operating on the reservation creates extremely valuable advantages for some uses requiring operations that require (at least periodically) immediate access to a departing airplane.

If an opportunity were to present itself for an air cargo-related manufacturing/ value-added facility in Fairbanks, the Airport has land within its reservation that would be an ideal solution for an occupying company. There may be other privately owned sites nearby to the Airport, but the unique allure of an on-reservation operation with almost no facility-to-facility travel time and no necessity for travel on public roadways would be an extremely attractive option.



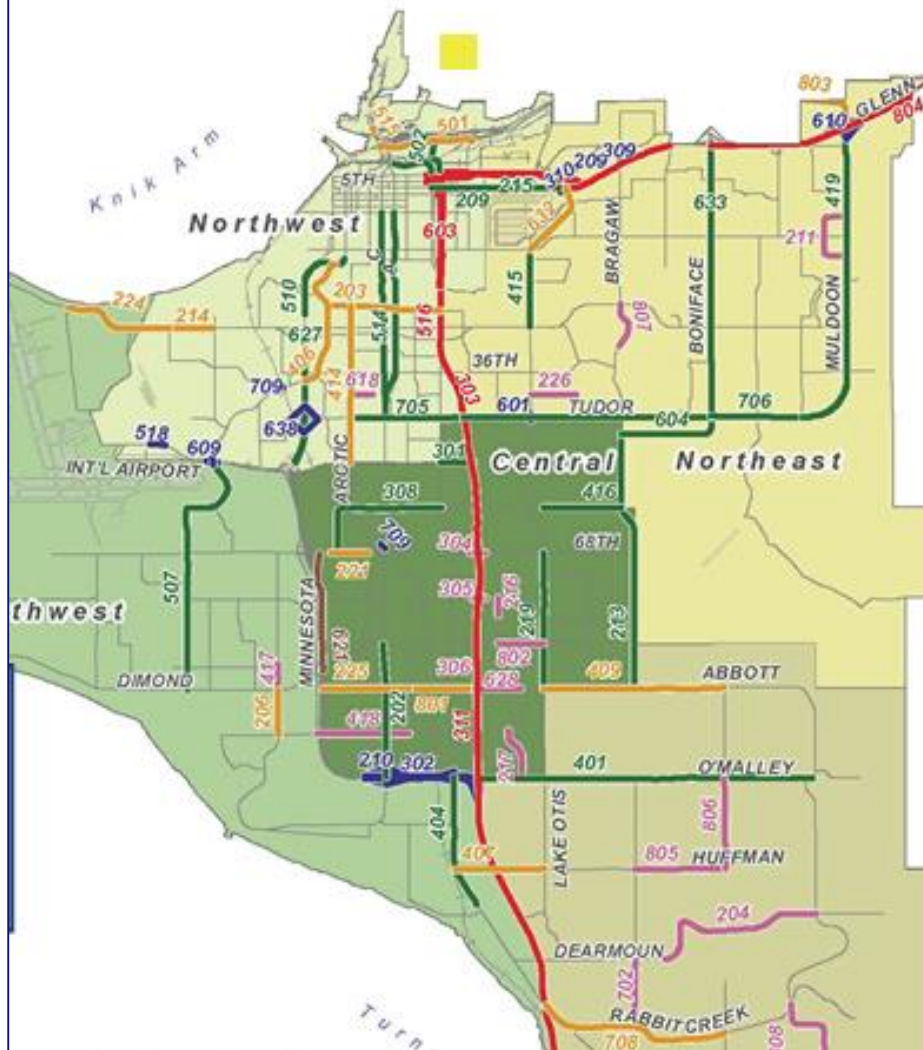
Source: GLDPartners

The MoA's Long range Transportation Plan (LRTP) has identified a series of projects for improving the Anchorage road system and some are pertinent to the Airport business development potential. These projects are listed as recommended projects and can be grouped in the following categories:

- Enhancements to freight routes in the Ship Creek area to improve access to the Port
- Seward Highway improvement
- Glenn-Seward Highway connection
- Extensions of 92nd Avenue and 100th Avenue to improve freight flows

Airport Access - The LRTP includes three major improvements to accommodate airport access from International Airport Road. At the junction of Jewel Lake and Spenard roads, a grade-separated interchange will replace the existing signalized intersection. This improvement also will separate the grade of the Alaska Railroad passenger rail service to the airport. A second International Airport Road interchange at Postmark Drive will accommodate freight shipments to and from air parcel and freight carriers, the post office, and delivery warehouses. It also will improve traffic flow into and out of the ANC passenger terminals and parking areas. The third grade-separation project of the Seward Highway and International Airport Road will provide more direct access from the freeway to the airport. Another road improvement, connection of Dowling and Raspberry roads, will enhance TSAIA access from the south.

Figure 8-1. Recommended Road Projects



Source: Anchorage Bowl 2025 Long-Range Transportation Plan

PROPERTY ASSET REVIEW

This Task is designed with several objectives: 1) to assess Anchorage's ability to provide necessary physical accommodation and labor force for potential air cargo-related economic development projects, and 2) to provide some basic perspective to how both Anchorage and Fairbanks' physical infrastructure might be considered if in a competition with other transport hubs. The review of suitability of the regional product has been conducted through the lens of an investing company or a corporate location advisor with a strong eye toward state-of-the-art requirements as might be dictated in a legitimate corporate location search by a multinational firm.

This work was conducted by the Consultant Team through various on-site and remote interviews and also from data research and market intelligence reviews. The Consultant Team processed all of this information through the filter of their experience in handling a wide spectrum of investment projects, and from the various perspectives of site selection advisor, supply chain consultant and economic development professional. Some important elements of this work will need to be enhanced following the outcomes from Task 2 and Task 3.

Overview – Both Anchorage and Fairbanks are considered from a national and North American perspective as specialty third-tier industrial property markets reflecting their respective sizes and geographic setting. First-tier markets are large, diversified markets, generally supported by consumption markets of 1M or more population. Second-tier markets serve smaller regions but have more diversified industrial bases, including manufacturing. Of the two Alaska markets, Anchorage is the larger more diversified market and its industrial base services the regional and a significant part of the state-wide consumer market (for retail distribution), the energy extraction and mining industries, and various, mostly smaller-scale industrial companies.

Regional Economies – The Alaskan economy can be understood as having four main components, one being the federal government/military, another being the petroleum/gas and mining, a third being fishing and seafood harvesting/processing, and the last being comprised of various other industries and services. Seafood and natural resources dominate Alaska's "exports". Much of what is shipped from Alaska is transported to the Lower 48 states. Alaska's industrial outputs are crude petroleum, natural gas, coal, gold, precious metals, zinc and other mining, seafood processing, timber and wood products. There is a very modest manufacturing base otherwise producing products or assembling components, either in upstream or downstream

manufacturing settings. Other than its key economic contributors, Alaska is a consumer-oriented economy with substantial (for its size) transportation and distribution assets.

Anchorage and Fairbanks are the major commercial hubs for the State of Alaska. Anchorage's main economic sectors include transportation, military, local, State and federal government, tourism, corporate headquarters, energy and mineral resource extraction. Fairbanks economic structure is similar but smaller, and even more dependent for employment on various government facilities, including several large military installations. Anchorage's economy traditionally has seen steady growth, but at more modest levels than the Lower 48 states. Anchorage historically does not experience the magnitude of growth or correction as most other markets and over time this supports an economic steadiness that is reflected in real estate valuations. This steadiness has also produced a healthier public sector and a strong local government bond rating which is increasingly unusual in this era.

Regional Snapshot

	Anchorage	Fairbanks
Population	298,610	100,272
Median Household Income (\$)	36,145	32,334
Number of Businesses (2007)	26,716	6,481

Source: US BEA

Due to its location, the issue of transportation is more important than in other locations. Alaska has significant and in some cases outsized transportation assets, reflecting its strategic location, intra-market connectedness and challenging terrain. The Alaska airport system (reported to be the largest public airport system in the world) is the lifeline connecting many rural bush communities, where there is no or little ground transport options. The commercial airports in Anchorage (ANC) and Fairbanks (FAI) are similarly significant in that they are a sizable element in connecting Alaska citizens and businesses with other Alaska communities, the Lower 48 states and foreign country markets. Both commercial airports have truly world-class facilities to accommodate passenger and air cargo. ANC serves as a global air cargo hub for freighter craft that take advantage of Anchorage's location for strategic operations stops for refuelling and crew changes. Together, both airports serve as a system and provide a seamless product for carriers, providing assurance of no weather delays and

always open status. ANC and FAI have been granted special authority by the federal government for the transfer of cargo. Air cargo transfer options were enhanced in 2004 and these include US exit options on top of the US entry options granted in 1996. It is noteworthy that this liberalization process is unilateral and intended to enhance the operational possibilities for foreign air cargo in Anchorage and Fairbanks.

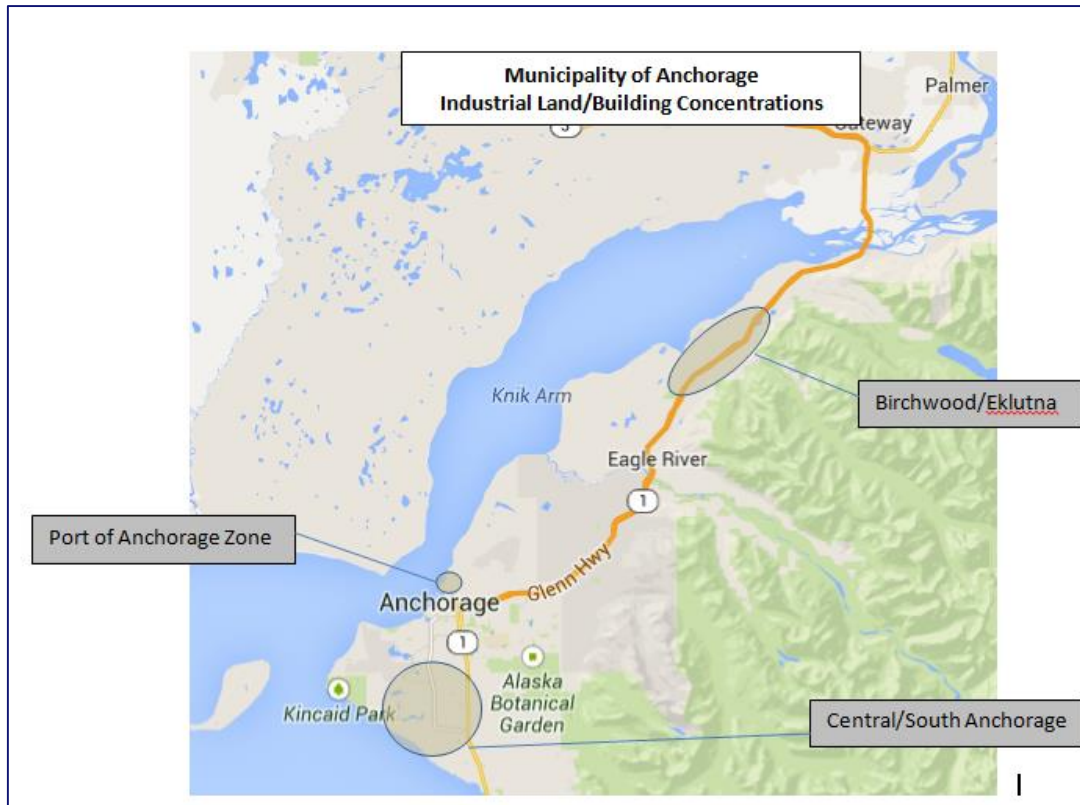
Labor force – Anchorage's civilian labor force is 200,200 and has grown modestly over the past decade. The trade, transportation and utilities and manufacturing sectors support 39,900 jobs or about 20% of the total workforce. Related to the purpose of this assessment, it should be noted that the current manufacturing base produces 2,400 jobs or 1.2% of the total labor force, far below the US national average of 9%. For rough comparisons, Anchorage's labor force is roughly the size of the Reno-Sparks, NV region. (US Bureau of Labor Statistics, 2013) Fairbanks civilian labor force is 46,700 and its trade, transportation and utilities and manufacturing sectors support 8,600 jobs or about 18% of the total civilian force. In Fairbanks, the manufacturing base is 500 jobs or 1.1% of the total labor force. For comparisons, Fairbanks labor force is about the size of Manhattan, KS. The unemployment rate for both markets is 5.1%, which is far below the national average. (October, 2013, BLS) With a modest labor force shed, modest growth, low unemployment and a reasonably narrow industrial work force, the issue of labor adequacy and depth of skills will be an issue for almost all industrial projects and certainly for any sizable inward investment project and projects requiring specialty skillsets. This will be further reviewed upon completion of subsequent tasks.

Industrial Land Use –ANC is located at the western/north-western edge of the core industrial zone and that area is diagonally bisected by the Alaska Railroad line and also various City surface streets. The Seward Highway runs north-south through this area and going northward ends near the city center. The Glenn Highway extends northward from the city center to points north including to Fairbanks via the Richardson Highway. The Glenn and the Seward do not connect at the city center and there is a gap in high speed, limited service for passenger vehicles and motor carrier service.

To the outside observer, there is not an apparent proactive industrial land-use strategy in Anchorage. There is relatively little available land for industrial development and none that can accommodate a planned multi-building, multi-tenant. There seems an uncoordinated use mix proximate to the State's prime economic assets, the Port and Airport.

Anchorage's land use map is a product of generations of public policy, infrastructure and private investment decisions. In terms of industrial development, land-use planning hasn't necessarily been used to maximize economic development potential. Much of the existing industrial land in the urban area is characterized as small (with some mid-sized) parcels in the central and southern portion of the area. There are very modest amounts of available vacant industrial land ready for development in the urban area. Outside of the urban area, there is reasonably significant industrial development opportunity north along the Glenn Highway and with access to the Alaska Railroad. These sites are advantaged by providing for the ability to develop purpose-built, modern industrial infrastructure but is disadvantaged by being 30-45 minutes by highway from the Port and the Airport. There are industrial development opportunities across the Knik Arm though they are substantially disadvantaged by long travel distances to the Anchorage urban area. This could change if the proposed bridge over Knik Arm were to be constructed and regional land-use policy collaboration becomes more prevalent. There is also an existing industrial use concentration in the vicinity of the Port of Anchorage and east of the downtown. This area is benefitted by its location close to the Port and along the Alaska Railroad. It is disadvantaged by having awkward road access to the south and to the north.

Going forward, the MoA is currently undertaking an industrial land review which will help inform future land-use strategy and infrastructure decisions. This process will have a substantial impact on industrial economic development potential. It appears that this analysis is being undertaken from a planning perspective, almost taking generic demand assumptions and translating that information formulaically forward. There isn't yet an apparent transformative growth motivation for economic development. Perhaps the AIAS/AEDC initiative can play an important role in this regard.



Source: GLDPartners

Industrial Property Market – This document provides a review of the industrial property land and buildings market for the purpose of supporting the potential to attract air cargo-related investment to Anchorage or potentially Fairbanks. It is assumed that air cargo-related projects will either require or be greatly benefited by quick access to transiting aircraft, so an airport location is highly desired. In Anchorage, a more complete review was undertaken to include the regional industrial market, particularly offsite as it may prove to be challenging to develop private assets on the airport reservation itself. In Fairbanks, to the extent that there were business attraction opportunities, it was felt that there are plentiful onsite opportunities to accommodate air cargo-related projects and that offsite locations wouldn't be immediately required.

Serving as a commercial and transport hub for all of Alaska, the Anchorage industrial property market is a unique product of the Alaskan economy, proximity to natural resources (oil, gas, mined material and seafood) its strategic location for global logistics and also its remote location from other consumption and production centers. As there is practically no legacy manufacturing industry, there are little large-scale industrially-zoned factory assets. To a fair extent, the same can be said of the Fairbanks economy, with Fairbanks a smaller market

that will be considered even more remote and in some regards functioning as a satellite to the Anchorage market.

Anchorage's industrial property market is somewhat scattered throughout the City and characterized by a mixture of industrial developments, including substantial amounts of older build-to-suit type spaces. There are few medium and large-dimension properties with modern amenities built and almost none available for occupancy. There is relatively little industrial land ready for development in the urban portion of the City and almost none of dimensions necessary for a large industrial use (200,000sf or more). Industrial land use in the MoA is concentrated in the central and south part of the City (referred to in the document as the "core industrial zone") and in a smaller node around the Port of Anchorage. New industrial development is planned to the northeast around Birchwood by Eklutna Development Services.

Reflecting the stability highlighted earlier, both regional markets have an industrial property market that has seen only modest growth and associated private investment, with comparatively little outside risk capital in play. The industrial property market is one that has accommodated incremental growth, mostly fuelled by indigenous demand in the key sectors. Industrial property vacancy rates are low by national standards and land owners and development interests have been circumspect about moving too far in front of the low-growth local market demand that has characterized the region historically.

There are various important challenges for regional industrial property development:

- Relatively low demand – Most demand has been locally serving with limited industrial opportunity to serve outside markets
- High construction costs - Building costs are significantly higher than the Lower 48 largely due to required remediation associated with substandard natural soil conditions and this creates an occupancy cost premium. There are some other costs that are higher than the national norm as well, including weather-sealing and additional set-aside land for the stockpiling of plowed snow.
- Modest property product supply:
 - Land – a limited supply of industrial land of size and dimension in City, assets in the vicinity of the Airport are few
 - Appropriate, ready to occupy leasable space – There are no industrial spaces over 100,000 SF available and few modern spaces otherwise
 - Redevelopment opportunity – Anchorage has relatively few vacant industrial sites in inventory, exceptions are the former Kulis Air National Guard facility and other undeveloped land at the Airport.

Limited demand and restricted levels of developable land has led to few or no speculative investments which has the effect of reinforcing high occupancy costs. The market is largely governed by a “build to suit” environment which makes it difficult for a non-local occupier to move-in quickly, as the current business practice requires user commitment/occupancy lead times that are not advantageous.

In terms of the development opportunity at the Airport, there is undeveloped property and/or property that is being considered for redevelopment. The AIAS has taken control of the Kulis asset and is assessing its redevelopment options and is also considering options from its recent acquisition of approximately 131 acres of land east of Kincaid Park that was previously owned by the FCC.

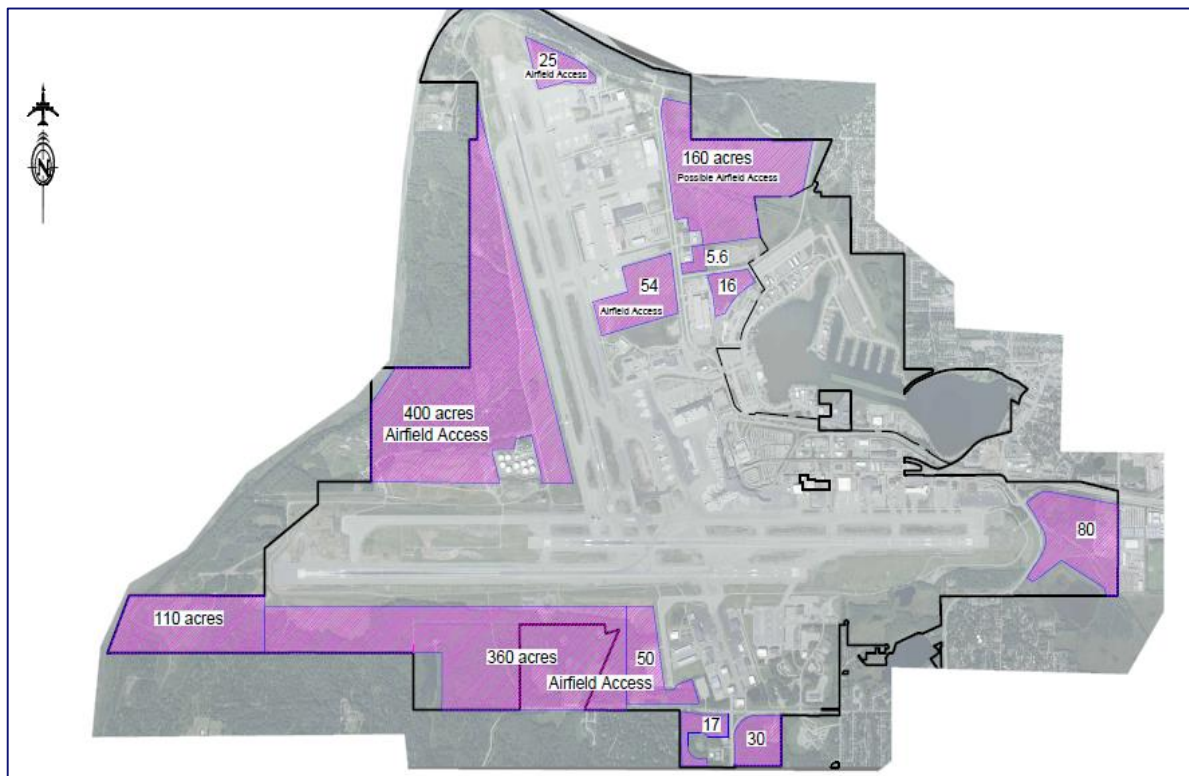
Overall Costs – Measured by CPI, both Anchorage and Fairbanks compare favorably to Lower 48 competitors in net overall costs. For the latest year, Anchorage's CPI is measured at 212.381, whereas the national average is 232, or a 9.4% lower average cost base than the US average. With that said, there are some important cost elements that will be higher than the national average in both regions. Real estate costs will be higher due to limited product supply and higher construction costs. In terms of lease costs for like product, the Anchorage market will typically be 2-4X higher than its airport region competitors.

“While the Anchorage industrial property market in general remains extremely tight from a vacancy and availability perspective, it also lacks the leasing activity of larger markets that have helped them during recovery. Additionally, leasing activity is near to the Airport and not inland. Larger blocks of quality space are nominal for new tenants in the market and there are no existing spaces over 100,000sf.”

Source: JLL, US Airport Outlook, 2013

Given the limited supply of commercially owned assets, it may be that Airport-owned property itself may offer the best opportunity for attracting and accommodate air cargo-related investment attraction. An onsite location for commercial businesses would minimize plane-to-warehouse transit time and reduces operational risk. If at all, it is likely that only certain AIAS-owned assets would be available to private use. Though there are development and use challenges with AIAS-owned assets, there may be a double-upside for the Airport in that it could reap tangible value from land lease revenue and

reinforce business for its cargo carriers. The aerial below highlights in purple properties that the AIAS has identified as potentially developable.



Source: AIAS

MAP AIR CARGO SUPPLY CHAIN TRENDS & DEFINE INDUSTRY VERTICAL TARGETS

Aerospace

Overview

The American Association of Aerospace Industries (AIA) defines aerospace as the industry engaged in research, development, and manufacture of aerospace systems including: manned and unmanned aircraft; missiles; spacecraft; space launch vehicles; propulsion, guidance, and control units for all of the foregoing. The industry also covers a variety of airborne and ground-based equipment essential to the test, operation, and maintenance of flight vehicles.



The non-military commercial aerospace market is highly concentrated and sells mainly to airlines and leasing companies and also to owners of private business or pleasure craft. The government aerospace market is also highly concentrated and sells mainly to public defense and space exploration organizations who require product for military purposes or spacecraft for federal space programs. Aerospace and defense manufacturing demand is driven by military budgets, the possibility of conflict and commercial airline traffic---both passenger and cargo transportation companies. The main success factors for companies operating in this sector are their technical expertise and their ability to prudently price their contracts.

Aerospace products include:

- Aircraft
- Helicopters
- Unmanned aerial vehicles
- Spacecraft
- Missiles
- Propulsion systems
- Guidance and control systems
- Communication systems
- Electronics

- Mission specific equipment
- Ground equipment

Lucintel estimates that the global size of the aerospace industry including defense and commercial is several hundred billion dollars and is divided into the following categories:

- Commercial Aerospace
- Business Jets
- General Aviation
- Helicopter
- Defense
- Space

Commercial aerospace produces a range of products from small turboprops to wide-body jets which are used to move people and cargo all over the world. General aviation and business jets range from the small two-seaters designed for leisure use to corporate jets designed for business transport. AIA references continued double-digit increases in demand for civilian helicopters, fuelled by industries such as oil & gas exploration and law enforcement, as well as their continued application in private and corporate transport. In other segments of the aerospace sector there is a growing interest in unmanned aerial vehicles (UAVs) for civilian use and international interest is expected to result in nearly \$90 billion in sales over the next decade, according to the Teal Group.

ADS Reports, Global Aerospace Industry Outlook, 2015, reports that the commercial aviation sector is emerging as the major contributor to the expansion of the global aerospace market. The US and the European countries are the dominant markets for the aerospace industry and have acted as the catalyst for overall growth. The US represents the largest aerospace market in the world followed by France, UK, Germany and Canada.

When Flight Global and PwC released their top 100 global aerospace companies for 2013 in September of last year, they included Boeing, EADS (Airbus), Lockheed Martin, Northrop Grumman, General Dynamics, United Technologies, Raytheon, General Electric, Rolls Royce, Bombardier, Embraer, Thales, Pratt Whitney, BAE Systems, Honeywell, Textron, and Finmeccanica. Seven of the top ten companies are American companies, one is British, one Brazilian and one Spanish. There were no Asian firms on this list.

The commercial aviation industry in the US has experienced record growth in recent years due to demand for fleet replacement, passenger growth in

emerging markets, and the introduction of new products and manufacturers to the market. US aerospace companies employed nearly 1.1 million workers in 2013, with more than 427,000 working directly in aircraft manufacturing and related industries (NAICS 336411, 336412, and 336413). According to the US Department of Commerce, this industry has the largest trade surplus of any manufacturing industry which comes from exporting almost 50 % of the aerospace production.

Global Supply Chains

The aerospace industry is dominated by a few large firms that contract to produce aircraft with governments and private businesses, usually airline and cargo transportation companies. These large firms, in turn, subcontract with smaller firms to produce specific systems and parts for their vehicles. Typically, USDoD announces a Request for Proposal that details its need for military aircraft or a missile system and lists all the requirements that are needed. Large aerospace firms specializing in defense products subsequently submit bids, detailing proposed technical solutions and designs, along with cost estimates. Very often firms will add additional R&D, electronics, and components relating to their bid, often at their own expense, to improve their chances of winning the contract. Following a negotiation phase, a manufacturer is selected and a prototype is developed and built, then tested and evaluated. If approved by DoD, the craft or system enters production. This process usually takes several years.



Commercial airlines and private businesses follow a similar process where they identify their needs for a particular model of new aircraft based on a number of factors, including the routes they fly and the technical requirements associated with their particular market. After specifying requirements such as range, size, cargo capacity, type of engine and seating arrangements, the airlines invite manufacturers to submit bids. Selection ultimately is based on a manufacturer's ability to deliver reliable aircraft that best fit the purchaser's stated market needs at the lowest cost and at favorable financing terms.

Technically, the modern aerospace industry has always been global. Aircraft are capital intensive, highly standardized and sold to a global market of operators. But there have been evolutionary stages of globalization and that has affected the way that aerospace companies have organized their manufacturing and supply chain activities. In the first wave of globalization, the vast majority of value

chain activities, including engineering, manufacturing and product support, were conducted in the domestic market and often concentrated around a company's headquarters. OEMs occasionally sourced parts, components and engines from foreign suppliers who, in turn, conducted most of their sourcing in their own domestic markets.

This model of supply chain self-sufficiency began to change in Europe in the 1960s and 1970s when European OEMs pursued a multi-national cooperation as a means to achieve scale and critical mass for new programs. EADS (now called the Airbus Group) is a direct result. Military offset programs and the quest for market access provided additional impetus for creating the modern European industry.

Vertical integration and co-location of manufacturing activities in the domestic market were once standard operating procedure but is less desirable today. A new model where OEMs tightly integrate functions such as engineering, manufacturing, and customer support across multiple locations on a global basis, is growing in popularity. In fact when the industry needed to improve its ability to collaborate on development, manufacturing and delivery issues, a company called Exostar was created.

In 2000, four of the largest aerospace and defense companies formed Exostar to improve their ability to work together to integrate their global multi-tiered supply chains. This has proven successful and as an independent corporation, Exostar now manages hundreds of clients. (World Trade 100)

This practice goes far beyond the well-known B787 and A350 supply chain models that make extensive use of Tier I suppliers. Original equipment manufacturers (OEMs) are pursuing this more complex form of industrial organization for several reasons, including enhanced productivity, leveraging the global talent pool, improving market access, upgrading value propositions, and shortening product development and cycle times.



The complexity of the supply chain for the aerospace industry makes it very difficult to understand. It involves the coordination of hundreds of thousands of high tech and highly regulated pieces and parts to put together an aircraft. For instance the new F-35 Joint Strike Fighter aircraft has over 1300 suppliers and

40,000 individual parts. According to the Supply Chain Council of AIA, small to medium sized businesses manufacture between 70-80% of all aircraft parts. In

some cases it is becoming unmanageable to have so many suppliers in the supply chain.

Most aircraft components are parcel size but obviously some of the components such as wings and engines are quite large. But given the tight production time frames that the manufacturers are working in today, aerospace companies make heavy use of air freight to move the components. The larger components will usually move by ground, rail, or ocean carrier transportation unless there is an expedited reason to move via air cargo.

The aerospace supply chain is not as sophisticated as the automobile or textile industries supply chains but it does have a strong focus on collaborating with the customer electronically. The OEMs specify their component needs to Tier 1 suppliers who in turn contract with Tier 2 and Tier 3 suppliers for the parts and components that make up the aircraft systems. However due to competitive pressures and government requirements, there is now even more pressure on the industry to become more efficient and to reduce costs so Tier 1s are cutting back on outsourcing and integrating the production of some of the components in house so that they can have more control over their supply chain. AIA has commented that they do not see any manufacturers looking for new suppliers to deal with the challenge of growth but rather the industry wants the Tier one suppliers to get bigger and better. The number of suppliers is being cut back dramatically; the work and jobs are still there but there has to be consolidation in the supply chain.

An example of this is that in 2012 Lockheed Martin announced that they were replacing 240 vendors with just one vendor for a range of electronic components that they use in their manufacturing process. (Lockheed Martin 2012 Press Release) The vendor that was chosen will be the only supplier to Lockheed Martin for 22,000 electronic components. This vendor will not manufacture these components but will be the sole vendor/distributor interacting with the company and will have component delivery responsibility.

The way in which commercial and military aircraft are designed, developed, and produced continues to undergo significant change in response to the need to cut costs and deliver products faster.

Increasingly, firms bring together teams composed of customers, engineers, and production workers to pool ideas and make decisions concerning the aircraft at every phase of product development. Additionally, the military has changed its design philosophy, using commercially available, off-the-shelf technology when appropriate, rather than always developing new customized components.

International Competition

Globally, rising demand is attracting new entrants into the aerospace market. China and Taiwan's aerospace industry has expanded at an impressive rate over the past decade, due in part to its increasing participation in the supply chain of the world's leading aerospace firms. Korea's aircraft parts industry is drawing global attention, as parts made in Korea are supplied to the newest passenger planes, such as B787, B747-8 and A350. All of these industries are state owned and have offset agreements with the aerospace primes, which require economic activity in the sector because of foreign government purchase of US products. This quid pro quo has been very important to the development of capacity and know-how in these foreign countries.

Lucintel reports that the Chinese aerospace supply chain market is poised for rapid growth by means of joint ventures and foreign investment. Low labor costs create joint venture opportunities for Chinese aerospace supply chain players with the largest aerospace primes such as Boeing, Airbus and Eurocopter for various sub-systems. This is the way that China has begun to build its own indigenous aerospace industry. In China, Aerospace manufacturing is concentrated in Shanghai, Chengdu, Xi'an, Jiangxi, and Shenyang. In Korea there is one major company, Korea Aerospace Industries, which has locations in Sacheon, Sancheong, and Daejeon and in Taiwan the industry is concentrated around Taichung.

Taxal in the report, Managing the Supply Chain Across the Aerospace Lifecycle, questions whether these joint ventures will lead to better global collaboration. There is a concern that China will take these technologies and enhance their own industry to compete against the US. It should be noted that major companies are very careful about the technologies that they are using in the joint ventures or outsourcing to partner firms.



Products produced through joint ventures are shipped back to the US for assembly into the final product. The aircraft parts manufactured in Asia are well suited to JIT programs so air freight becomes the mode of choice over ocean transport which can take 20-30 days (or more) including the ocean and land transportation. For

the reverse flow, US aerospace companies are supplying parts and systems to Asia aerospace manufacturers for assembling their own indigenous aircraft. All of the major US firms listed below have products on the Korean and Taiwanese

aircraft but China is effectively off limits to outside suppliers as they take efforts to protect their indigenous industry

- B/E Aerospace
- Eaton
- Honeywell
- Parker Aerospace
- Rockwell Collins
- Kiddle Aerospace
- GE Propulsion
- Hamilton Sundstrand

In the US defense industry, there are laws banning the use of Chinese-made parts in particular and also specialty metals on any aircraft or weapons system procured from anywhere other than the US. The Chinese ban is in place because of China's pattern of espionage and its military domestic build-up. These bans have no effect on the commercial aircraft industry. (Reuters)

Trends and Influences

Figures compiled by the Aerospace Industries Association (AIA) show sales of aerospace products are starting to rebound after stalling out at the end of the last decade. During the period analyzed by the AIA, aircraft manufacturing has made up an increasingly larger share of all aerospace sales, rising from 51 percent of the total in 2002 to an estimated 56 percent in 2013.

However, when aircraft sales are considered by type (commercial versus military) there are substantial differences in performance during the same time period. Commercial aircraft sales reached record highs in 2012 and 2013, nearly doubling from 2003. By contrast, US military-related sales have declined after climbing to nearly \$60 billion prior to the economic recession.

Aerospace logistics are changing due to market and schedule pressures. Because of large backorders for commercial aircraft the manufacturers must meet increasingly tighter delivery windows. In the past companies maintained at least a one month's supply of stock close to the manufacturing facility, but today because of the increased production tempo less stock is held on/near-site and the manufacturers have begun to ask 3PLs to



manage vendor relationships and their inbound parts supply systems. 3PLs are also becoming an integral part of the supply chain by directly supporting the manufacturing process and handling various product movement and manipulation tasks such as staging, kitting, and other tasks. (Inbound Logistics)

The commercial aircraft manufacturers, Boeing and Airbus, are both optimistic about the future. Having increased output of large commercial aircraft by 18% in 2012, they are forecasting that between 27,350 and 34,000 commercial aircraft will be produced in the next 20 years with a market value of \$4.5 trillion. Both companies are citing the replacement of aging fleet in mature markets, new passenger growth in emerging markets such as Asia and the Middle East, and increasing fuel efficiency standards in North America and Europe as reasons for the growth continuing. The single issue of the demand for increasingly fuel efficient jet engine propulsion is by itself a game-changing industry factor.

The future is less bright for the defense side because of the continued uncertainties about the federal budget and the federal sequestration mandate. There is also concern that the supply chain for the industry could be permanently affected as companies close facilities and lay-off workers. The one bright spot for the defense market is foreign military sales which have been proceeding at a brisk pace.

As noted, with foreign military sales comes an added commitment in the form of offsets. Law 360, a Lexis-Nexis company, reported that early in 2013 the State Department had reported that foreign military sales had more than doubled increasing from \$34 billion in 2011 to \$69 billion in 2012. The majority of these sales are based upon the premise that there is a contract signed stating that the seller will make a commitment to the purchasing country to buy or invest in the resources of the purchasing country. These are called offset contracts and virtually all purchases of US military equipment have these contracts in place. These contracts have not had much visibility in the past but as these foreign military sales increase it will be necessary for public companies to manage these contracts and their obligations very carefully.

Offsets

With US military sales decreasing, aerospace and defense contractors are looking to the emerging and developing nations for potential sales of their products. These nations especially the BRIC (Brazil, Russia, India, and China) nations are seeing strong industrial and military growth. But in the process, the



contractors face the increasing popularity of the offset as a tool of government procurement. Many international customers are requiring contractors to provide additional incentives, or offsets, to act as a catalyst in creating new jobs and to stimulate their economies. Offset agreements may provide in-country purchases, technology transfer, local manufacturing support and also financial support as a condition to a contract award. In some countries these offset agreements may require the establishment of a joint venture with a local company but that local company must control the venture. Offset agreements usually extend over several years and may provide for penalties in the event that the corporation fails to perform.

Even though the US has no official offset policy, most other governments worldwide formally support them. For instance, Canada has a 100% offset policy as do the BRIC nations of China, Russia India, and Brazil. Requiring offsets from foreign contractors is a means of furthering national economic growth and technological advancement.

These offset proposals are evaluated very carefully by the foreign governments as they look to find the most attractive business proposition for their country. It is not uncommon for a government to position one contractor against another during complex and difficult negotiations.

Major Business Players

The Boeing Company

Boeing is the world's largest aerospace company and leading manufacturer of commercial jetliners and defense, space and security systems. A top US exporter, the company supports airlines and US and allied government customers in 150 countries. Boeing products and tailored services include commercial and military aircraft, satellites, weapons, electronic and defense systems, launch systems, advanced information and communication systems, and performance-based logistics and training.



Boeing has a long tradition of aerospace leadership and innovation. The company continues to expand its product line and services to meet emerging customer needs. Its broad range of capabilities includes creating new, more efficient members of its commercial airplane family; integrating military platforms, defense systems and the war fighter through network-enabled solutions; creating advanced technology solutions; and arranging innovative customer-financing

options. With corporate offices in Chicago, Boeing employs more than 170,000 people across the United States and in 70 countries.

Boeing faces strong competition in all their market segments. In the commercial jet aircraft markets they compete against Embraer, Airbus and Bombardier as well as entrants from Japan, Russia, and China. In other sectors, competition comes from Lockheed Martin, Northrop Grumman, Raytheon and General Dynamics. Non-US companies continue to build a strategic presence in the US market by strengthening their North American operations and partnering with US defense companies.

Boeing has recently been in the news concerning persistent problems with its 787 Dreamliner. Boeing has staked its future on the new design, which is described as the world's most fuel efficient as well as the first major aircraft to use composite materials as the primary material in the construction of its airframe. The problems started in December 2012, after a United Airlines flight had to make an emergency landing due to an electric problem. The problems soon morphed into a variety of issues including fuel leaks, a battery fire, wiring problems, a brake computer glitch and a cracked cockpit window. The fifty 787s in operation at the time were indefinitely grounded after a battery was badly damaged by fire on an already landed Japan Airlines plane and after an All Nippon Airways had to make an emergency landing after the instruments aboard a domestic flight indicated a battery error.

It does seem that the Boeing problems were a result of their supply chain strategy. The company has been criticized both internally and externally for outsourcing many of the 787's components to multiple tiers of subcontractor's., which has been blamed for the recurrence and subsequent difficulty in solving the problems. The structure of the 787 supply chain was in sharp contrast to the tighter control and integration employed by Boeing in the fabrication of previous aircraft On the Dreamliner Boeing contracted with a top tier of about 50 suppliers, handing them complete control of the design of their component element of the airplane. (Boeing Annual Report 2013)

The Airbus Group

The Airbus Group, formerly known as European Aeronautic Defense and Space Company EADS N.V, is the world's leading commercial aircraft manufacturer. Airbus' product line is comprised of "families" of aircraft ranging from 100 to more than 500 seats. This includes the



single-aisle A320 which is the fastest-selling aircraft in aviation history; the wide body, long-range A330/A340, the all-new next generation A350 XWB and the double-deck A380. The company also is expanding its scope and product range by applying its commercial expertise to the military market. Airbus is also extending its portfolio of freighter aircraft, and is expected to establish new efficiency and capacity standards in the general and express freight market sectors.

Working with a sophisticated supply chain system Airbus' approach attempts to safeguard that all the aircraft share the highest possible degree of commonality in airframes, on-board systems, cockpits and handling characteristics, which reduces significantly operating costs for airlines.

Headquartered in Toulouse, France, the Airbus group also includes the Airbus Helicopters and Airbus Defense and Space business units. Airbus maintains a presence on every continent.

Airbus itself is a truly global enterprise with fully-owned subsidiaries in the United States; China, and Japan and in the Middle East; spare parts centers in Hamburg, Frankfurt, Washington, Beijing and Singapore; training centers in Toulouse, Miami, Hamburg and Beijing and more than 150 field service offices around the world. Airbus also relies on industrial cooperation and partnerships with major companies all over the world, and has a network of over 1,500 suppliers in 30 countries. Airbus today consistently captures about half of all commercial airliner orders.

The A320 Family is produced on two Airbus assembly lines in Europe: Toulouse, France and Hamburg, Germany; which have been complemented by an additional facility in China. Toulouse is home to the initial assembly line, building A320s; Hamburg has responsibility for the A318, A319 and A321; while Tianjin assembles A319s and A320s. Tianjin is Airbus' first assembly facility located outside of Europe, resulting from a joint venture involving Airbus with a Chinese consortium comprising the Tianjin Free Trade Zone (TJFTZ) and China Aviation Industry Corporation (AVIC). Beginning in 2015, a new A320 Family production facility in Mobile, AL, will build A319, A320 and A321 jetliners. This new location will enable parts to be delivered from global locations from deep sea vessels through the Port of Mobile. (Airbus Annual Report, 2013)

Airbus has developed its own transportation system to airlift the large, pre-assembled sections of its jetliners from their production locations to final assembly lines in Toulouse and Hamburg. This service is performed by a fleet of five A300-600ST Super Transporters. These modified A300-600s, nicknamed the 'Beluga',

have a huge main-deck cargo cabin which enables the loading of complete fuselage sections and wings of single-aisle, long-range and future A350 XWB aircraft. Operated by Airbus Transport International, the Super Transporter is able to carry 103,616 lb. payload over a range of 900 nautical miles. (Airbus 2013 Annual Report)

Airbus's competition mirrors that of Boeing.

Lockheed Martin Corporation

Lockheed Martin is a global security and aerospace company that employs about 115,000 people worldwide and is principally engaged in the research, design, development, manufacture, integration of advanced technology systems, products and services. They operate in over 33 locations in the U.S.



The majority of Lockheed Martin's business is with the US Department of Defense and US federal government agencies. In fact, Lockheed Martin is the largest provider of IT services, systems integration, and training to the US Government. The remaining portion of Lockheed Martin's business is comprised of international government sales and some commercial sales of their products, services and platforms

Lockheed Martin's 2012 annual report states that the operating units are organized into the following broad business areas:

- Aeronautics, with approximately \$14.1 billion in 2013 sales which includes tactical aircraft, airlift, and aeronautical research and development lines of business.
- Information Systems & Global Solutions (IS&GS), with approximately \$8.3 billion in 2013 sales that includes C4I, federal services, government and commercial IT solutions.
- Missiles and Fire Control, with approximately \$7.7 billion in 2013 sales that includes the Terminal High Altitude Area Defense System, Joint Light Tactical Vehicle, PAC-3 Missiles as some of its high-profile programs.
- Mission Systems and Training with approximately \$7.1 billion in 2013 sales, which includes naval systems, platform integration, simulation and training and energy programs lines of business.

- Space Systems, with approximately \$7.9 billion in 2013 sales which includes space launch, commercial satellites, government satellites, and strategic missiles lines of business.

Lockheed Martin's current major program is the F-35 Joint Strike Fighter which is a 5th generation multirole fighter to perform ground attack, reconnaissance and air defense missions with stealth capability. It is being designed and built by a team led by Lockheed Martin and other major aerospace industry partners including Northrop Grumman and BAE Systems. The F-35 development is being principally funded by the US with additional funding from 9 partner nations----UK, Israel, Italy, Australia, Canada, Norway, Denmark, the Netherlands and Turkey. Japan, Singapore and Korea have all announced that they will be purchasing the aircraft. The supply chain for the F-35 is unique in that the partner nations are acting as both consumers and suppliers on the aircraft.

On February 3, 2014, Lockheed Martin launched the civil version of their C-130J Super Hercules military transport plane, the LM-100J saying that they expect to sell about 75 of these planes to mining and energy companies and other commercial and government customers in the coming years. The aircraft will be priced in the mid \$60-million range. The plane is ideally suited for use by oil and gas operators and mining companies, which need to deliver generators and other heavy equipment to austere locations around the world. The plane can also be used for aerial spray, firefighting, medical evaluations, humanitarian aid and VIP transport. (Lockheed Martin 2012 Annual Report)

Summary and Implications

The aerospace supply chain is quite complex and is undergoing a transformation to make it leaner and more efficient both in process and cost. It is truly a global supply chain with parts and components being sourced worldwide. Here are some working assumptions that will be important in determining an AIAS opportunity.

- The commercial aircraft sector is booming with the emerging markets purchasing large numbers of new aircraft. Over the next 20 years commercial aircraft purchases will exceed \$4.5 trillion.
- The supply chain is contracting and becoming more agile.
- 3PLs are becoming an integral part of the aerospace supply chain by supporting the manufacturing process and handling staging, kitting, and other tasks.
- The overall market is becoming more competitive with several nations developing their own indigenous aerospace industry.

- Offsets will play a role in vendor decisions by US OEMs.
- Aerospace products are transported both by ocean vessel for large sub-assemblies and by air for the high value electronic assemblies.
- Asia is a destination market for aerospace sub-assemblies made in the US.
- Asia is an origination market for aerospace sub-assemblies destined for the US.

Further issues to consider:

- Manufacturing in Alaska – There does not seem to be a strong business proposition for the manufacture of component parts in Alaska. With offset agreements creating manufacturing joint ventures especially in Asia, manufacturing opportunities are generally severely limited. The Alaskan Native Corporations have operations that are currently involved in the aerospace industry, but all their activities are currently located outside of Alaska.
- Forward deployment – With 3PLs being called upon to perform more functions within the supply chain, it is plausible that a business case could be developed that will support the location of specific 3PL value added activity in Alaska. The proposition for this activity could be built from activity already occurring in Alaska.
 - Currently build-to-print aerospace components are being manufactured in several Asian locations. Alaska could possibly serve as a consolidation point for these components as they are kitted and sent to the US for inclusion in the final assembly of aircraft.
 - Chubu, Japan is the primary airport in Asia that supports structural deliveries for Boeing. Japanese suppliers are responsible for 35% of the structural weight of the 787. These flights which are chartered by Boeing currently move through Alaska. Alaska could potentially be used as a JIT depot for Boeing components that are manufactured in Asia and are being held for final manufacturing
 - Brazil and Mexico are the leaders in the emerging markets aerospace industry. Brazil is much more established and has a successful industry (mostly Embraer) but Mexico is making great strides with companies operating within the maquiladora system producing subassemblies for major aircraft companies. Mexico may one day become a competitor to the Asia nations and should be seen as a growth story.

Total Aerospace imports to the US by Country 2012			
Rank	Supplier	Value	% Total
1	France	\$10,197	21.8%
2	Canada	8,129	17.3%
3	Japan	6,193	13.2%
4	United Kingdom	4,855	10.4%
5	Germany	3,867	8.2%
Subtotal Top 5		\$33,241	70.9%
6	Mexico	2,388	5.10%
7	Italy	2,008	4.28%
8	Brazil	1,092	2.33%
9	Israel	973	2.08%
10	China	815	1.74%
Subtotal Top 10		\$40,517	86.4%
11	Korea	731.0	1.56%
12	Poland	693.7	1.48%
13	Switzerland	441.9	0.94%
14	Belgium	408.3	0.87%
15	Sweden	398.0	0.85%
16	Netherlands	374.5	0.80%
17	Turkey	358.3	0.76%
18	Australia	346.3	0.74%
19	Hungary	296.3	0.63%
20	Singapore	275.6	0.59%
Total		\$44,841	95.7%

Source: US International Trade Administration

Total Aerospace Exports from the US by Country 2012			
Rank	Market	Value	% Total
1	China	\$9,153	7.7%
2	Japan	8,990	7.6%
3	France	8,480	7.2%
4	United Kingdom	7,579	6.4%
5	UAE	7,375	6.2%
Subtotal Top 5		\$41,577	35.2%
6	Brazil	6,848	5.79%
7	Germany	6,204	5.24%
8	Canada	6,127	5.18%
9	Singapore	4,414	3.73%
10	Korea	3,918	3.31%
Subtotal Top 10		\$69,088	58.4%
11	Mexico	3,716	14%
12	Australia	2,645.1	2.24%
13	Hong Kong	2,591.7	2.19%
14	Saudi Arabia	2,564.8	2.17%
15	Turkey	2,021.5	1.71%
16	Qatar	1,847.7	1.56%
17	Netherlands	1,807.5	1.53%
18	Russia	1,712.8	1.45%
19	Indonesia	1,559.9	1.32%
20	Italy	1,528.1	1.29%
Subtotal		\$21,995.7	18.60%
Total		\$91,083	77.0%

Source: US International Trade Administration

Apparel (Fast Fashion, Primarily)

Overview

The fashion industry is a global industry, where fashion designers, manufacturers, merchandisers, and retailers from all over the world collaborate to design, manufacture, and sell clothing, shoes, and accessories. The industry is characterized by short product lifecycles, intense competition, erratic consumer demand, an abundance of product variety, and complex supply chains. (BLS/GLDP)

The world clothing and textile production trade, encompassing clothing, textiles, footwear and luxury goods - reached almost \$2.70 trillion in 2010, according to MarketLine. Over recent years, the global clothing and textile industry has been affected by the economic recession with consumer spending and confidence in the West moderating from previous growth rates. The apparel manufacturing industry



includes a diverse range of establishments that manufacture full lines of ready-to-wear and custom apparel; apparel contractors, cutting or sewing operations on materials owned by others; and tailors, manufacturing custom garments for individual clients. Knitting, when done alone, is classified in the textile mills subsector, but when knitting is combined with the production of complete garments, the activity is classified in the apparel manufacturing industry.

With low per-piece profit margins for commodity class products, this competitive industry generally experiences constant reinvention with a regular flow of new participants at the retail level. Well-known retail players are re-establishing themselves in the wake of new participants and given increasing competition, most are looking for new efficiencies to enable higher profit margins. Time-to-market metrics are especially critical in this segment as the need to reach customers quickly determines the success of the fast fashion segment and directly correlates to profit margins. Much of this fast fashion sub-segment is defined by ladies products as women tend to remain more conscious of current fashion and are more demanding of cutting edge design than men. With cost cutting an essential practice in the industry, companies continue to optimize energy use, reduce labor requirements and reduce transport and inventory management costs. Many textile manufacturers are reviewing their processes and input streams to cut down on demand for energy in the production process to boost competitiveness.

Though a large quantity of US-sold product is manufactured in other countries, the United States Fashion Industry Association has found that about 70% of the final retail price is created by workers in the US. This accounts for created value during the design, development, production, importation, distribution and sale of goods staged in the US.

Asia as a Changing Apparel Center

While Asia, particularly China, has enjoyed a dominant position in shoes, apparel and household textiles manufacturing for a number of years, makers of these items located in developed nations such as the US and Canada have suffered a long period of decline. For example, over 98% of the shoes sold in America each year are imports, and the majority of these imports come from Asia. To consumers in Europe and North America, this growing reliance on Asia as a low-cost producer has meant very low retail prices for goods of reasonable quality.

However, recent increases in the value of the Chinese currency, combined with rapidly rising labor costs and other factors, have put Chinese manufacturers in an increasingly less competitive position. Competition from very low-cost nations in Africa as well as Vietnam, Sri Lanka, Mauritius, Malaysia, Cambodia, Bangladesh, Pakistan, the Philippines and elsewhere is intense, and an increasing portion of apparel manufacturing formerly done in China is moving to these areas at a reasonably rapid pace. For example, Vietnam's apparel exports to the US have grown about 8% a year in recent years. In the same period, China's apparel exports to the US showed a decline in sales volume.

As wages rise in China, workers there are also expecting increasingly better working conditions and these dynamics are critically important to the apparel industry. Workers in many developing parts of the world are beginning to demand shorter hours and safer working environments. The collapse of a multi-story apparel factory in Bangladesh in 2013 that killed more than 800 people has brought a new global focus on workers' rights and working conditions in the apparel manufacturing sector. These factors are becoming important all the way through the apparel supply chain, with retailers far more attentive to such issues.

The changes that will result from China's rapidly increasing wage rates should not be ignored as they impact the fundamental foundations of the industry. The apparel and textile manufacturing industry has historically been one that has relatively low barriers to entry, with small capital investment needed and a high level of low-skilled labor required. When China's wages were extremely low, the nation had a clear advantage in this industry, particularly in light of its tendency to cluster factories near shipping ports and logistics centers so that goods can be sent to customers with minimal delay. Today however, wages are climbing rapidly in those high-value locations as China's urban workers have an array of options in terms of work opportunities. Demand for workers is high and



workers are able to be selective and demand higher pay rates than those in less-developed nations.

Many Chinese apparel manufacturing firms are massive in size with tightly integrated units providing rapid design, manufacturing and logistics. An example of this and an interesting operation is the Esquel Group of companies. Esquel is one of the world's largest producers of cotton shirts, with an output of more than 60 million garments each year. The firm's vertically integrated operation starts in China where it oversees almost 5000 acres of cotton farms which supply Esquel's spinning, dyeing and knitting facilities that produce 95 million yards of high-quality cotton fabric annually. Esquel has manufactured clothing for a range of global (and US domestic) retailers including: Banana Republic, Nordstrom, Tommy Hilfiger, Brooks Brothers, Abercrombie & Fitch, Nike and Lands' End.

Apparel sales drive a large percentage of overall sales in some large retail segments. Plunkett Research estimates that 80% (\$148.5 billion) of sales at department stores, 60% (\$25.5 billion) of sales at sporting goods stores and 35% (\$41.9 billion) of sales at discount department stores were for clothing and accessories in 2012. E-commerce is becoming a more important factor in the apparel industry. At present, most retail analysts assume about 30% of the goods sold via e-commerce in America are apparel, shoes and accessories and this is expected to grow significantly over the next 5-10 years. This trend is beginning to have quite significant ramifications in terms of industry competition, distribution channels and supply chain cost management.

McKinsey predicts the global women's apparel market will grow an average almost 5% per year through 2025, a significant increase from the historical average of just over 3%. Much of that incremental new growth is expected to occur in emerging markets as disposable income in these markets rise. Emerging markets apparel sales are expected to account for over half of sales by 2025, up from 37% now.

Global Apparel Industry Presence

The industry, its production base and supporting supply chains has evolved quite a lot over the past 50 or so years. In 1963 only 14% of all apparel manufacturing was produced in developing economies. 50 years later, however, over half of world apparel products were exported by just four leading suppliers, all of which were developing economies: China, Turkey, India, and Mexico (WTO, 2009). China is the source for at least 1/3 of all imported apparel into the US, and other Asian countries are also heavily represented in the top source list for US clothing imports. As can be seen in the table below, sources of apparel imports has

shifted quickly and source regions change drastically over time. Currently, of the top 10 import countries, seven are Asian with Mexico, Honduras and Italy also on the list. As cost competition within Latin America has become more intense, lower cost countries have put pressure on Mexico which has fallen from 2nd place to 5th place in the span of a decade.

Rank	1970	1980	1990	2000	2008	2011
1	Japan	Hong Kong	Hong Kong	China	China	China
2	Hong Kong	Other Asia	China	Mexico	Viet Nam	Viet Nam
3	Other Asia	Korea, Rep.	Korea, Rep.	Hong Kong	Indonesia	Indonesia
4	Korea	China	Other Asia	Korea, Rep.	Mexico	Bangladesh
5	Italy	Mexico	Philippines	Dominican Rep.	Bangladesh	Mexico
6	Philippines	Philippines	Italy	Honduras	India	India
7	Canada	Japan	Dominican Rep.	Indonesia	Honduras	Honduras
8	United Kingdom	Italy	Mexico	Other Asia	Cambodia	Cambodia
9	Mexico	India	India	Bangladesh	Thailand	Italy
10	Israel	Singapore	Indonesia	Thailand	Italy	Thailand
11	Germany	France	Singapore	India	Pakistan	Pakistan
12	France	Macao	Malaysia	Philippines	Hong Kong	El Salvador
13	Spain	Dominican Rep.	Thailand	Canada	Sri Lanka	Malaysia
14	Austria	Sri Lanka	Bangladesh	Italy	El Salvador	Sri Lanka
15	Singapore	United Kingdom	Sri Lanka	El Salvador	Malaysia	Nicaragua

Source: UN Comtrade.

US Apparel Industry Presence – The US is a modest player in the global apparel manufacturing segment. The comparatively smallish presence has diminished further over the past 20 years as companies simply cannot match the cost structure of foreign competitors. US employment in the apparel manufacturing industry has declined by more than 80% (from about 900,000 to 150,000 jobs) over the past two decades. In 2010, there were 7,855 private business establishments in the apparel manufacturing industry, employing 157,587 workers—compared with 15,478 establishments and 426,027 workers in 2001. In 2010, only two U.S. counties had more than 500 business establishments—Los Angeles county, California (2,509) and New York County, New York (803). (BLS) The products that are manufactured in the US are typically made in small specialty shops with the preponderance of businesses located in the South, although there is some apparel manufacturing operation in all 50 states.



Global Supply Chain

The clothing industry in general has a relatively segmented supply chain. For many items, raw material (e.g. cotton) may move to another geographic location for milling, cutting and/or sewing before being shipped back to the original geography for distribution and sale. At the same time, design may be handled in the developed country market, and the clothing retailer will control both the design and the order patterns in many cases. In fact, the clothing supply chain is one of the most “customer-driven” supply chains in operation, with the customer generally represented by the retailer.

Most clothing manufactured for the US market has come from imports for the last thirty years or so, although the source geography has shifted, especially with the expiration of the Multi-Fibre Arrangement (MFA) in 2004. The Multi-Fibre Arrangement (MFA) was a World Trade Organization agreement that governed the trade of textiles and garments from 1974 through 2004, imposing quotas on the amount developing countries could export to developed countries. The MFA expired on January 1, 2005. The MFA was introduced as a short-term measure intended to allow developed countries to adjust to imports from the developing world. Today, a free market has allowed growth and today China is by far the largest source of clothing with Vietnam second (Aid for Trade and Value Chains in Textiles and Apparel OECD-WTO-IDE-Jetro 2013).



Overall, the market for fashion will double in the next 10 years," according to fast fashion retailer Desigual. The Company said they see room for competition between 20 companies like Zara-owner Inditex, which has grown fast to become the world's biggest clothing retailer with more than 6,000 outlets. (Business of Fashion)

Fast Fashion

Fast fashion is a modern expression used in the clothing industry to describe an industry supply chain strategy where fashion is quickly translated from designer studios to fashion show catwalk, then quickly to production and to store shelves. This system captures fashion trends presented at Fashion Week in both the spring and the fall and provides a quick-ship, quick-delivery capability to retailers. Trends are designed and produced quickly and inexpensively allowing the mainstream public to enjoy high-style clothing at affordable prices. This system of quick manufacturing at an affordable price is used in large global retailers such as European-based international retailers like H&M and Zara, and others. Fast fashion developed from a quick-response manufacturing model developed in the US in the 1980's and migrated to a market-based model of "fast fashion" in the late 1990's. (Textile Outlook International)

Fast fashion is growing to be an increasingly important component of the wider apparel segment and by its requirement for continuous system speed (design to manufacturing site to store shelf), long distance fast fashion will typically require air cargo transport, while shorter distance fast fashion can be serviced via high frequency, high speed motor carrier. Long distance fast fashion retailers will use air freight to support their practice of changing assortments once a month or even more often throughout the retail season. With that, to maintain their low-cost overhead structure, most fashion retailers have historically avoided air freight if possible by the use of truck (in Europe).



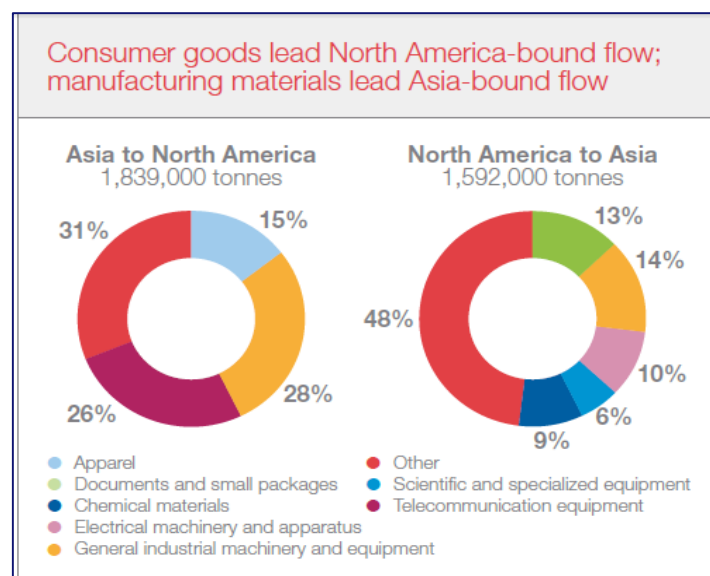
Transport

Other than some high-cost specialty items and fast-fashion goods, in general and for the preponderance of manufactured goods, the apparel sector will use low-cost cargo transportation to move product from remote manufacturing locations to North America. This cargo movement pattern is dominated by the Asia-to-North America marine shipping lane with seaports in Shanghai, Hong

Kong and Singapore being the primary source points for shipment. The main recipient seaports in North America are Los Angeles and Long Beach, and to lesser extents Oakland, Seattle, Tacoma and Metro Vancouver. Utilizing the efficiencies of ocean transport requires a complex land-based transport and distribution system on both ends of the journey. In Asia, land transport has increasingly become more congested and consequently less consistent. In North America, the landside transport system is generally well-developed and mostly reliable with efficient vessel-to-train and vessel-to-truck movements.

In terms of imports to the US, a typical logistics pattern involves ocean-to-rail transfer, then rail from the receiving seaport and on to large inland intermodal and warehousing centers. An onward system of truck delivery transfers product to sub-regional warehouses or increasingly for some retailers, directly to the retail store. Air cargo from overseas manufacturing hubs is used for fast fashion as it allows for delivery to store shelves in hours instead of weeks or in some cases, perhaps months. This transport pattern is to and from strategic sourcing air hubs, providing 24-72 hour delivery to the selling point. The efficiency of cargo movement on the receiving-end is critical because the retailer would not want to waste its extremely high efficiency process on cargo sitting in warehouses or on motor carrier trailers once in the selling market.

Though there is common view that apparel commodity values cannot support air cargo transport, many would be surprised to find that apparel represents about 15% of all air cargo traffic from Asia to North America. Most of this cargo is generally been sourced from the large manufacturing hubs in Asia. (Boeing)



Boeing World Cargo Forecast 2012-2013

Geographic concentrations

Within China some 70% of all apparel is made in the southeast provinces that are located relatively close to Hong Kong (China National Garment Association). Vietnam, Indonesia, and Bangladesh also have smaller but fairly concentrated clothing clusters but with limited and still undeveloped international airport assets. In Vietnam most of the current manufacturers are located in and around Ho Chi Minh City (Database of Clothing). Indonesia's clothing manufacturers are primarily on the island of Java and the island of Batam (which is an apparel-oriented free trade zone).

Bangladesh clothing manufacturing is concentrated around the major cities of Dhaka and Chittagong. International exports have access to transport options at the Dhaka International Airport. Many in the apparel sector believe that Bangladesh will become an important global clothing supplier at the value-end of the spectrum. That said, this region faces geopolitical challenges and government regulatory issues that are less obvious in the industrialized areas of East Asia. It is again important to note that there have been a series of tragic and high-profile building collapses and related accidents in this sub-region and some downstream buyers have removed sourcing from these locations or worked to strengthen workplace conditions. Additionally, the global war on terror has severely impacted Pakistan exports, with a number of US brands removing buying offices including Old Navy, The Gap, Banana Republic, Chaps, Calvin Klein, Timberland (CNTEX).

Apparel Imports by Country		
Country	2013 (M \$ to Nov)	Share
China	\$27,692	37.4
Vietnam	\$ 7,498	10.1
Indonesia	\$ 4,664	6.3
Bangladesh	\$ 4,652	6.3
India	\$ 2,994	4.0
Pakistan	\$ 1,381	1.9
Honduras	\$ 2,283	3.1
El Salvador	\$ 1,697	2.3
Nicaragua	\$ 1,326	1.8
Mexico	\$ 3,411	4.6
US Total Imports	\$74,009	

Source: US International Trade Administration

Much has been made over the past decade of the wage increases in China and the accompanying migration from China to other Asian countries (as well as Mexico and Honduras). It seems likely that the other Asian countries are primarily being used for lower price point goods where the lower wage rates are crucial. At the same time, there have historically been many small manufacturers. At present there is some debate whether the use of apparel industry intermediaries such as Li and Fung are making smaller operations obsolete or simply masking the complexity from the retailers and brand owners who control the apparel supply chain.

Shifts in Geography

Longer term, retailers and intermediaries are considering ultra-low wage nations, i.e. Africa for new sourcing. Interestingly, there is considerable resistance in the buying community so this has been very slow to take hold. Reliability of local suppliers, consistency of local government conditions and good and reliable logistics systems have to be established before this shift will work in any significant way. In the words of one apparel executive, "You're going to see movement into Africa, but it will take a long time" (Apparel Just in Style). This reality suggests that Africa will not be a dominant force in apparel anytime soon, while Asian economies, with their combination of low wages and perceived stability will continue their leadership, with some competition from Mexico and Central America.

Special government efforts – There are a series of examples of central governments supporting economic development and attempting to spur investment in the apparel industry in Asia. In China a new international border cooperation zone for textile processing has been established in the Northeast Jilin Province around the port city of Hunchun. A demonstration zone with the People's Republic of Korea (North Korea) and Russia of 90 square km has been established including an international industrial zone, border trade cooperation zone and economic cooperation zone. In India, new Special Economic Zones (SEZ's) have been established in Mahindra City and Tamil Nadu to support the textile production and fashion accessory industry. In Vietnam, the Cau Treo District has been established in the Ha Tinh Province near to the Vung Ang seaport. In the end, the combination of the natural movement to lower cost settings and government intervention in supporting the industry in certain places will further shape tomorrow's apparel industry geographic concentrations.

Technology Influences and Trends - The global smart fabrics and interactive textile market is expected to reach almost \$2 billion by 2015 (Global Industry Analysts). The market will be driven by economic recovery, new product offerings and a rising degree of consumer confidence. Product innovation will drive a new generation of fibers, including hybrid materials and nanofiber,

generally the world technical textile market is recording high growth. Technology-based product development is on the rise due to the development of new scientific compounds and demand for better quality products using materials such as wool and fiber. As new high-tech fibers are more complex than traditional fibers, the production process calls for more research and qualified engineering. The world market for textiles made from organically grown cotton was worth over \$5 billion in 2010, according to Textiles Intelligence. In this sub-segment, US and EU clothing imports and China's exports are growing quickly.

The continued emphasis on speed to market for "fast fashion" is very real, and is driving intermediaries like Li and Fung and Mast to consider more "super-regional" sourcing, which would probably favor Mexico and Central America in the future. At the same time, apparel manufacturing remains labor-intensive and wages in South Asia remain below those in Mexico and even parts of the Caribbean. Furthermore, much of the apparel "ecosystem" is rooted in Asia, especially China and South Asia so wholesale change is likely to take time.



Major Business Players

Retailers - Fast Fashion

As has been noted above, in the developed world the mass market retailers control the clothing supply chains, as they work with designers to deliver desirable items as quickly as possible. However, the best known of these retailers has a highly developed and differentiated business model which is an important driver shaping the future of fashion supply chains.

Zara

Zara is widely seen as the originator of the fast fashion business. The company is privately held, but has been the subject of several case studies and is widely admired in the industry as an innovator. Zara is a Spanish-based clothing and accessories retailer, founded in 1975. It is the flagship chain of the Inditex Group (also based in Spain), which is the world's largest apparel retailer. Inditex owns several other global retail brands as well. There are over 1800 Zara stores operating in about 86 countries at present.

As a small company and then through its initial period of fast growth, Zara manufactured about half of its product in factories that are located close to its main European base in Spain (Portugal, Morocco and Turkey) as it was essentially a European brand selling to Europe. In its first three decades of

operation this allowed the company to use truck for the shipment to stores, since most of Europe can be reached overnight via truck. At its base in Northwest Spain the company operates a 5M square foot distribution center that is physically connected to 11 Zara-owned factories by an automated underground monorail. There are 124 miles of tunnel-track that connect the complex. Across the surrounding Galicia region is a matrix of subcontractors, creating an enormous Zara-production complex. Zara will sell other goods, including basic commodity apparel products and those products will be made elsewhere and imported by ocean transport.

As the Company has expanded to non-European locations, this has complicated Zara's business model and a wider, more disbursed supply chain is developing. This is similar to other retail chains that have adjusted their supply chains to match a changing global footprint. IKEA is a good example of this, as its store base grew to include now global locations, its fundamental sourcing patterns adjusted and for the US market it procured more products either in-market or in Central America which were closer.

Zara has relatively few stores (45) in the United States and about 150 in North America (Zara Annual Report 2012). It is widely expected that Zara will continue to grow its North American presence and its manufacturing center mix and transport operations will evolve to support what is becoming a significant demand base in North America. As will be expected because of its growing geography, there is some evidence of increased use of long-haul air freight in Zara's 2012 report. One example, is the use of increased fast fashion air cargo movements to support the rapidly growing Chinese store base.

The Zara Design, Product and Market Cycle is extremely efficient so as to maximize the premium selling time in store. Quick design, extremely efficient manufacturing and an extraordinarily tight transport time allows Zara the ability to beat the market to the store and maximize the short period of full price-high profit. Across the industry, 30-40% of products are sold at markdown prices, as compared to only 15-20% for Zara. Zara's inventory holding period is 6 days vs. the traditional retailer which is between 40 and 120 days.

Zara Business Cycle

- Design 1 day
- Manufacture 3-7 days
- Transport 1 day
- Store For Sale Period 17-20 days
- Total 22-30 days

H & M

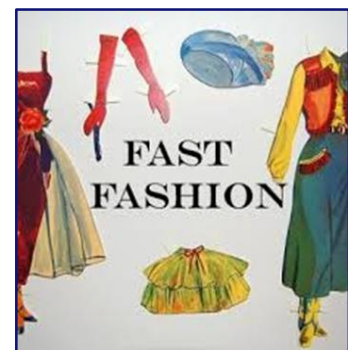
H&M is the second largest apparel retailer in the world, just behind Inditex SA. With 2,600 stores in 43 countries, H&M was a pioneer in pursuing vertical integration with its own distribution network. The company's clothing collections are created in Sweden by approximately 250 designers and buyers. H&M outsources production to a network of 800 suppliers; 60% of the production takes place in Asia, the rest in Europe. H&M offers two main "fashion collections" each year, one in spring and one in fall. Within each season, there are several sub-collections that allow H&M to continually refresh its inventory. The primary collections are traditional long-lead items; the sub-collections are trendier items with short lead times.

The enabler to H&M's ability to react quickly is its network of 20 to 30 production offices, which are placed close to its suppliers. These offices work with both the buyers in Sweden and the production facilities, reviewing samples, checking quality, and choosing the suppliers, which will handle each order. Generally, the items with very short lead times are manufactured in Europe, with longer-lead items manufactured in Asia. Like Zara, this allows H&M to be more responsive to trends. This practice is under increasing pressure as quick-response Asian supply chains are less expensive and with the increased use of technology, the interface between designer and manufacturer is becoming more seamless.

H&M also has a world-class IT infrastructure, which is a key to its success. Each store is connected with corporate logistics and procurement systems and the central H&M warehouse. The IT systems also reach as far as the design and product development teams, so executives have visibility into the entire process, from product design to sales. This leads to more effective management across all channels.

Though the fast fashion sub-segment is growing quickly, H&M is still Zara's most visible rival in the segment. However, it is important to understand that H&M operates on a different business model than Zara. Specifically, H&M does not manufacture any clothes itself; it relies on subcontractors. H&M also has a somewhat lower price point than Zara, and its main business is "budget fashion", with a similar emphasis on frequent new product introductions, turning over store

inventory at least once per month. The reliance on subcontractors is an important distinction as H&M does not hold massive investments in manufacturing assets like a firm with Zara's model. This suggests more flexibility to



disburse manufacturing and as its business changes, move to centers of production that fit its cost, reliability and time to market requirements.

As of August, 2013, H&M operated 278 stores in the US and US sales were roughly \$1 billion. (H&M Full-year report) Although many of H&M's 800 suppliers are located in Asia, the potential benefit/market for air freight to the US has been limited in the past. H&M claims that 80% of all their freight is by rail and sea, with additional in-market truck movements. There is some air cargo movement and a key question is whether competitive forces will require H&M to meet faster fashion supply chain requirements. Their lower price point presents a challenge but competitive forces may be placing new pressure on the several decade old H&M model

Mainstream Retailer

GAP

GAP is one of the largest clothing retailers in the world operating across several divisions and its model is reasonably close to others in this class such as American Eagle, Limited and Express. GAP has over 1000 suppliers in some 40 countries, many throughout Asia including China, Philippines, Bangladesh, Cambodia and Thailand (Gap 2012 Annual Report). Historically GAP has placed initial orders as much as 6 months in advance of delivery, thus having to "guess" consumer demand and mark down what does not sell. Over the past five years, GAP has recovered from a downward trend by overhauling its store structure and updating its style offering. With the increasing presence of such competitors as H&M and its US counterparts such as Forever 21, GAP is making every effort to speed up its supply chain among other competitive responses. GAP purposely does not report on its use of air freight, although some forwarders claim them as customers.

Apparel Import Intermediaries

Given the huge number of suppliers and the sheer distance (both physical and cultural) from North America to Asia, it is not surprising that intermediaries have become prominent in this supply chain. Two of the best known are Li and Fung, which is headquartered in Hong Kong, and Mast Global Fashions, which is headquartered in the US but works very closely with Asian apparel suppliers. Apparel import intermediaries offer domestic wholesalers/retailers and foreign distributors/ manufacturers the ability to facilitate import transactions in the global apparel supply chain. The major consolidators are key players in deciding which carriers and warehousing operators to use, and in some cases they have their own proprietary assets, especially in Hong Kong. Alternatively, some retailers

are large enough to manage their own Asian buying and consolidation, often also in Hong Kong. These retailers are increasingly considering alternatives to China, such as Vietnam, Bangladesh, and Indonesia. In many of these areas there are few choices in terms of 3PL outsourcing but this is a growing influence.

One of the important supply chain capabilities in the apparel sector has to do with whether goods are transported on hangers (shirts, formal coats, suits) or shipped “flat” in boxes. Bringing goods in on hangers requires specialty containers with bars to hold the items and this method of shipping is more expensive. Items shipped flat may require handling, steaming, etc. at the destination which represents increased cost and time.

Li and Fung

Li and Fung provide “comprehensive, sophisticated global supply chain management solutions” to the apparel industry. Apparel design and production coordination is a significant part of their business through LF Trading and LF USA as well as LF Asia-Fashion and Home, although the Company also serves the hard goods and health and beauty aids sector (Li and Fung Annual Report 2012). Li and Fung claims business relationships with some 15,000 suppliers in forty countries, although Asian suppliers certainly are the largest group. Li and Fung works with all sizes of retailers and has an extensive logistics practice as well.

Mast Global Fashions

According to Business Week, Mast Global Fashions “provides ideation, product development, sourcing, production, trade compliance, shipping, and warehousing services” to the apparel and “intimates” retail industry. Although it was begun as a subsidiary of the Limited in 1970 and pioneered many of the “speed to shelf” practices that characterized the Limited, the Company has since been taken private and as an independent company provides services to many different retailers. Mast has extensive operations in Hong Kong where it supports its Asian supplier clients. Limited/Mast were among the first to claim that a design could be seen, manufactured, and brought to shelf within 30 days so they are seen as an early pioneer in the fast fashion segment. Using air freight through Columbus, Ohio (Limited headquarters) was initially central to that practice, but system locations and transportation have been modified since then (author’s proprietary study of Limited, “Fast Fashion without Compromise”).

Manufacturers

As was emphasized above, retailers appear to be the prime movers in modern apparel supply chains. Nevertheless, some brand owners (e.g. VF Corporation,

Levi-Strauss) and manufacturers (Luen Thai; TAL Apparel; Nien Hsing) are sizable and control some product routings. TAL, for example, was the subject of a Wall Street Journal analysis claiming to automate replenishment of shirts at JC Penney stores, based on Penney's point of sale data). TAL and others are now moving production to Vietnam and other Southeast Asian countries (China's Changing Workforce, Wall Street Journal).

Summary and Implications

The apparel supply chain is fragmented but there are larger trends that are reinforcing existing logistics patterns while there are segment trends that may suggest evolutionary changes in supply chain requirements. For the sake of this analysis, we define two broad classes within the apparel business, commodity stock and fast fashion. The commodity stock class represents the body of the mainstream clothing business, stock items that do not change quickly and in terms of supply chain management, production and transport cost and replenishment steadiness are the prime drivers. These are staple items such men's underwear, socks and everyday shirts and trousers that do not change style quickly. These items will generally not move via air cargo and therefore do not represent an AIAS cargo or economic development opportunity.

The fast fashion class represents a relatively small but fast growing segment of the apparel industry. Fast fashion is driven by competitive forces in global clothing retailing, where speed to market is critical in supporting the retailer's need to cycle-through fresh high-style products to the shelf in a matter of days and not months. Fast fashion began as an invention in Europe by a few retailers, but is becoming more mainstream across the sector with retailing names like Zara, Uniqlo (Japan-based but now increasingly global), Forever 21, etc. With that said, even with fast growth in the fast fashion segment the vast majority of the apparel industry will remain as commodity class products.

In all cases, retailers will use the lowest-cost transportation options to meet profitability objectives and the use of air cargo will be by objective limited to the extent possible. It is important to note that there will be variations on the fast fashion class in that the some will rely on extreme high-velocity transit times and will require air cargo movement, while other fast fashion business will be somewhat lower-velocity and will utilize ocean transport to the extent possible.

There are some important working assumptions that are critical benchmarks for reviewing the potential for an AIAS opportunity.

- The apparel industry controls its logistics patterns quite closely and its supply chain requirements drive most buy and transport decisions.
- Fashion retailers will continue to set the rules by their growth patterns and their unique business models, one size does not fit all and the industry is not in a steady-state.
- Both intermediaries and manufacturers play an important role to coordinate production and respond as quickly as possible to customer demand, their role and the role of 3PL firms will influence a range of sector practices.
- Basic commodity class items will be transported by ocean vessel since they are typically ordered six months (or more) ahead of delivery and are not perceived as time-sensitive.
- In the past, fashion goods have been either sourced mostly locally (Zara) or there has been a concerted effort to avoid air freight (H&M, GAP).
- Air freight will continue to comprise a modest share of the apparel industry, but air cargo will likely play an increased overall role in a growing "fast fashion" practice as competition intensifies and becomes more global from a manufacturing location perspective.
- Lower-cost (Asian) manufacturing of fast fashion garments will grow by significant margins to serve both a quickly growing Asian market and also North America.
- Latin America will represent some fast fashion growth but this will likely be less intensive growth than in Asia.

Manufacturing

- There is a theoretical rationale for a US-located fast fashion manufacturing proposition as this would be very desirable to retailers from a time-to-market perspective. At the same time, even without any applied competitiveness review, we can also surmise that this generally will not be cost competitive. With that said, one could reasonably ask if Zara can operate in this manner for Europe from Spain, could it be done in the US by Zara or another firm? We believe that though this is roughly plausible, even if the answer is yes, there is no compelling reason for this to occur in Alaska versus other lower cost settings with proximity to quick road and air transport (throughout the US South for example).
- Conclusion: There is not a strong business case for clothing manufacturing in Alaska.

Forward Deployment

- With expected growth in Asian fast fashion, forward deployment in Alaska could involve such activities as final retailer labelling, readying product for direct to hanger/shelf packaging, certain customizing add-on's and harboring for lot-size deliveries.
- Forward deployment would be for shipment to the North American market from Asia as there is little manufactured product made and moving in the opposite direction. As well, forward deployment activity would not include a move to/move from Europe as AIAS is out of route position for this logistics pattern.
- There is high competition for fashion logistics and AIAS would have to prove its competitive business proposition advantage versus other airports including the west coast gateways and some central continental assets like Louisville, Memphis, Chicago, Cincinnati (GAP), Columbus (Limited, Abercrombie, Express) or DFW.
 - Anchorage could well make sense from a total landed cost perspective, especially for serving the Western US, if a stop in Louisville and/or southern California can be avoided.
- In terms of manufacturing migration, it is clear that some low cost Asian non-China locations are gaining foothold in the mid and higher-fashion segments, AIAS would need to compete well for air cargo supply chain routes from these locations.
- Latin America is likely to also grow its apparel industry and some fast fashion activity is occurring there already. This activity may be increasingly occurring south of Mexico as lower-cost environments are challenging that country's ability to compete. A competitiveness review would need to factor this in as a possible business issue for AIAS, at least over time. If there were feedstock/fabric movements from Asia to Latin America, that movement would likely be via ocean transit.
 - From a consumption market growth perspective, Latin America's growth will create an extended supply chain system growth opportunity for Asia-AIAS-US-Latin America air cargo routing. If AIAS could serve as a high-velocity distribution asset serving the US, that model could be extended into parts of Latin America.

Automotive – New Vehicle & Aftermarket Parts

Overview

Industries in the Transportation Equipment Manufacturing subsector produce equipment for transporting people and goods. Transportation equipment is considered a type of machinery. An entire subsector is devoted to this activity because of the significance of its economic size in all three North American countries. Establishments in this subsector utilize production processes similar to those of other machinery manufacturing establishments - bending, forming, welding, machining, and assembling metal or plastic parts into components and finished products. However, the assembly of components and subassemblies and their further assembly into finished vehicles tend to be a more common production process in this subsector than in the Machinery Manufacturing subsector. There are other aspects of the automotive industry which overlap with electronics and this is now an important aspect of the automotive industry.



Peter Drucker described the automotive industry as “the industry of industries,” because it consumes output from just about every other manufacturing industry. The automotive industry consumes a significant percentage of the world's output of rubber, malleable iron, machine tools, glass, semiconductors, and aluminum, steel, plastic and textiles. As mentioned above, the sector also is an important user of electronic components. These commodities and products are sourced from all over the world via a complex array of supply chains. The automotive industry is unique in that it is a high-volume industry that produces a product of high complexity. The typical automobile is made up tens of thousands of parts and components coming together at assembly. The industry is a bellwether of the national and global economies; the auto industry has historically contributed about 10% to the overall GDP in the developed economies. (Foresight 2020. Economist)

Global Production

In terms of the wide definition of the automotive industry, globally approximately 84 million units were produced in 2012. This figure includes all vehicle types, including passenger vehicles, trucks and commercial vehicles. US auto production is typically in the 10-12 million unit range and that is generally comprised of about 40% passenger cars and 60% commercial vehicles. The

industry is quite global and is increasingly dispersed as auto production is conducted closer to growing markets. North America accounts for only 18.7% of world automotive production.

Global Automotive Production: Breakdown by Major Production Region:

1	Asia	51%
2	North America	19%
3	Europe	19%
4	South America	5%
5	Russia	3%

Source: OICA 2012

Globally, the auto production industry is very diverse and includes some large and small company names that are probably not all that familiar in the US. In total, US production is about 12-14% of global production. (OICA) Some important names on the list of global manufacturers are relatively new, showing the very dynamic nature of the industry:

Global Automotive Companies – Global Brands

Anhui, Avtovaz, Beijing, Brilliance, Byd, Chana, Changhe, Chery, China National, Daewoo, Daihatsu, Dongfeng, Faw, Fiat, Fisker, Fuji, Fujian, Gaz, Geely, Great Wall, Guangzhou, Harbin, Hino, Ij-Avto, Isuzu, Kamaz, Mahindra & Mahindra, MAN, Multicar, Nanjing, Nissan Diesel, Paccar, Proton, PSA, Renault, Saic, Scania, Suzuki, Tata, Uaz, Vaz, Volkswagen AG (including Bentley, Skoda, SEAT).

Heavy Truck and Commercial Vehicles

Companies in this industry manufacture truck and bus chassis and assemble trucks, buses and other special purpose heavy duty motor vehicles for highway use, such as firefighting trucks. The trucks manufactured by this industry are heavy trucks used by freight companies and do not include passenger vehicles. There are seven major manufacturers of heavy trucks in the US including Freightliner, Hino, International, Kenworth, Mac, Peterbuilt and Volvo. Because there are distinct markets within this category, the heavy truck and commercial vehicle market is broken down into eight classes.

Parts and Supplies

A very large component of the auto industry is related to parts and supplies which support 1) OEM vehicle production, 2) after-market replacement and repair parts, and 3) maintenance repair products. There was over \$1.5 trillion of auto-related parts imported into and exported out of the US in 2012. In terms of US vehicle exports, there is a large flow of auto industry goods in and out of the US. In 2011, the United States exported approximately 2.5 million vehicles to more than 200 countries around the world valued at \$60.9 billion. For auto parts, firms in the US manufactured and exported almost \$80 billion worth of products and this figure grew by about 15% in 2012. Much of that goes to other NAFTA countries (73%) with lesser amounts going to Europe (8%), South America (5%), Japan (3%), Australia (3%), Asia – other than Japan and China (3%) and China (2%).

The US parts supplier industry sub-segment is made up of a large and diverse array of firms, including:

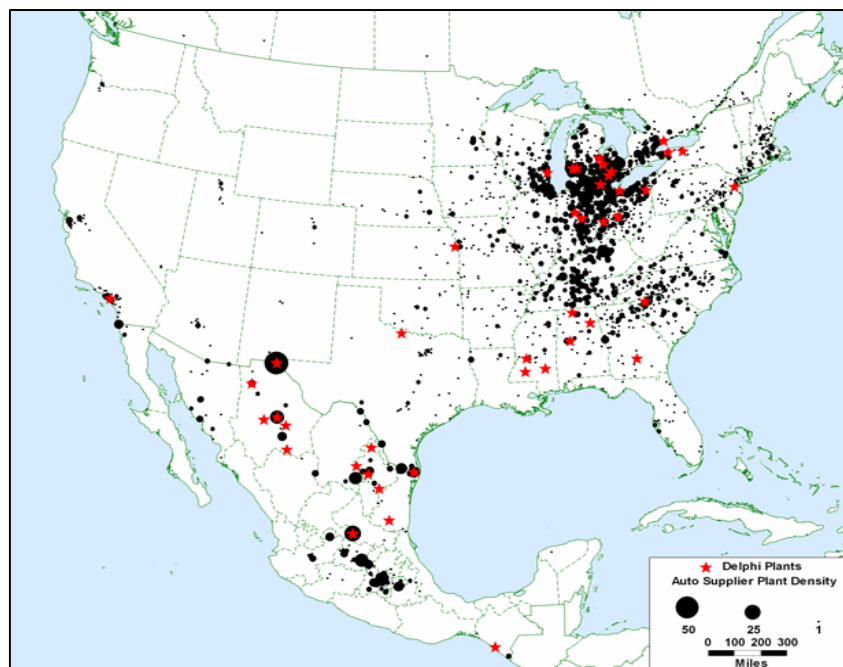
- Johnson Controls
- Goodyear
- Delphi
- TRW Automotive
- Guardian Industries
- International Automotive Components
- Cooper-Standard
- Flex-N-Gate Federal Mogul
- Tower Automotive
- Affinia Group
- American Tire Distributor Holdings
- CC Industries
- Interstate Battery System International
- Remy International
- Allison Transmission
- America Axle
- Autoliv
- Coates International
- Country Accessories
- Dana
- Dorman Products
- Douglas Dynamics
- Enova Systems
- Fuel Systems Solutions
- Gentex
- Gentherm
- Lear
- Meritor
- Miller Industries
- Modine Manufacturing,
- Monroe Muffler Brake
- Motorcar Parts
- Puradyn Filter
- Quantum Fuel Systems
- Technologies Worldwide
- Shiloh Industries

North American Geographic Concentrations

The automotive parts manufacturing and assembly industry is generally clustered in three different geographic zones in North America: The traditional automotive regional centers are in Michigan, Ohio, Indiana and Ontario. Though still quite a center for manufacturing, this region's almost exclusive dominance has diminished as 1) OEM cost pressures mount in the name of increased competition, and 2) as automotive assembly locations have migrated to the Southern US and Mexico.

- 1 The lower cost Southeast US has been a fast growing region for auto assembly plants and parts and component manufacturing. The center of gravity has increasingly moved farther south as foreign manufacturers have built assembly plants in Alabama, Tennessee, Mississippi, Texas and Georgia.
- 2 Mexico has emerged as a globally significant automotive industry player, now the sixth largest producer and 4th largest exporting country in the world. Mexico has three major concentrations of manufacturing activity: 1) Saltillo/Monterrey, 2) Guanajuato/Silao, and 3) Mexico City. There is also investment in the Northwest part of the country, in Hermosillo and Chihuahua.

Auto Supplier Concentration in US and Mexico



Source: Chicago Federal Reserve Bank

The medium and heavy truck manufacturing industry is largely concentrated in Ohio, Virginia, the Carolinas, Oklahoma and Texas. There is also manufacturing presence in Mexico with Volvo, Kenworth, Chrysler, Isuzu, Mercedes, Freightliner and Blue Diamond with plants throughout the country.

Heavy Truck Manufacturing Plants by Location



Source: GLDPartners

Supply Chain Issues and Trends

Overview of the Supply Chain – Network System

A key consideration for the automobile industry is to manage supply chain and sourcing decisions based on total-landed cost, not just labor costs or piece-part costs, which has been the historical model. The typical automobile is made up of approximately 20,000 detailed parts with about 1,000 key components; it has high complexity and is produced in high volumes. The typical original equipment manufacturing (OEM) supply chain consists of multiple assembly plants, hundreds of Tier 1 (T1) suppliers and thousands of Tier 2 (T2) suppliers, dozens of assembly and thousands of dealerships at the customer end. This is an extremely complex supply chain and is being refined continually.

A multi-tiered supply chain (T1, and T2 suppliers) takes raw materials and basic component products and adds value which results in key components that are ultimately assembled into finished vehicles. Assembly operations serve both local regional markets, as well as global markets. Typical order-to-delivery lead times are 30-40 days for regional markets and 60-80 days for global markets. There are four typical value-add manufacturing processes which, though separate, are

systemized to together create the final product: 1) small component from T2 manufacturers through to T1 manufactures and sub-assembly process, 2) powertrain manufacturing for the propulsion system, 3) stamping facility making (typically) steel vehicle bodies and 4) final assembly.

Supplier/Supply Chain Evolution

There are some important changes happening in the way automotive and truck manufacturers are managing their manufacturing processes. In an effort to lower costs, manufacturers are working to streamline downstream manufacturing, generally by pushing parts assembly to component and sub-assembly operations which happen earlier in the manufacturing cycle process.

From an auto manufacturing company perspective, the methodology in which the company handles the movement of parts, components and finished products and manages inventory has changed substantially over the past 20 years. Auto manufacturers began forming partner relationships with third-party logistics companies (3PLs) around 1990. As OEMs were re-engineering their business processes, they realized their logistics management practices required change.

Automobile manufacturers that have outsourced their logistics services have found a reduction in operational costs by sometimes more than 20 percent. In these instances, the 3PL manages the storage, distribution, and inventory level, sometimes integrating procurement, processing, warehousing, marketing, and distribution with finance. Importantly, the 3PL typically makes many critical decisions for the automaker concerning transport mode and carrier, inventory facility use and location, and even sometimes sourcing.

From a North American perspective, over the past 30 years there has been an increasing effort to source from low-cost countries. This trend has rebalanced as manufacturers are requiring suppliers to be nimble to meet rapidly changing production and technology evolution and as transport costs and transit time lags have caused challenges for production managers. Therefore, the lowest product price has proven to be one important factor but in some instances not the most important or dominant factor.

Manufacturers/suppliers and retailers are increasingly cognizant that the total cost of sourcing, includes logistics costs, quality of work and operational efficiency allowing for streamlined production adjustments, etc. In terms of cost, this approach is referred to as “best-cost-country” sourcing, and for supply chain management providers represents another opportunity to encourage, enable, manage and optimize sourcing.

Mexico's automotive sector is expanding rapidly with an influx of recent European and Asian automakers establishing assembly plants. Current production is about 3 million units, and is the 6th largest in the world. Production is projected to increase to about 5 million units in the next 5-10 years. Eight of the 10 leading automotive OEMs have assembly plants in Mexico, and more than 300 Tier 1 suppliers have plants in Mexico. Automakers have announced \$7.8 billion in Mexican investments in the past 24 months. (Automotive News) The following are the major projects over the next 18 months:

- Honda is presently building its 1st large assembly plant
- Toyota plans to build a new plant with a joint venture with Mazda in 2015
- VW and Audi plan for start-up in 2016

Mexico has more free trade agreements than the US and they have a free trade agreement with the EU that saves them a 10% tariff that's applied to US-built vehicles. For automakers that are building "world cars" that are meant for global consumption, Mexico is promoted as an ideal spot as it offers high-productivity, proximity to the large US consumption and extensive supplier markets, and with good global logistics assets. The Port of Veracruz for example was the busiest vehicle port in North America last year, handling 753,685 units for such companies as Ford, Nissan and Volkswagen.

Product Advancements

Across the board, the automotive sector has become a composite of cutting-edge technological applications. In engines, in product materials, in safety systems and entertainment, technology applications are literally changing the very core of the modern vehicle. There is probably no sector that has made more advances in the use of technology as the automotive sector. Cars and trucks bear little resemblance to their ancestor products even 6 or 7 years ago. This phenomenon is interesting but also critical to understand how the industry manages a far more complex research-to-supply chain management system. Some examples of the new technology:

- Communications - This sphere is quite dynamic with year-on-year advances that are literally making obsolete technologies of only several years before. The vehicle is becoming a seamless extension of home or office communications and entertainment. Most of the emphasis at present is on vehicle adaptations for web-applications. This sphere was expected to be worth about \$45 billion by the end of 2013 and should grow by 20% or more annually for the next decade.
- Safety - Safety technologies are transforming the driving experience and manufacturers and their supplier partners have made extraordinary advances including radar-based technology for vehicle alerts, smart braking

technology, camera-based view systems, pedestrian warning technologies and next-generation airbags.

- **Alternative Fuel Vehicles/Alternative Propulsion Systems** - In terms of alternative fuel vehicles, there is quite a divergence in strategy between automakers. Some are investing in electric-only, others in plug-in electric technology, still others in hydrogen and diesel technology. Battery and component technology development is an extremely important issue in the competition for early-stage brand supremacy.
- **Engine Technology** - There have been quite significant advances in engine technology as today's engines are vastly more complex than they used to be and more power is being produced from small engines. After reaching a level of status quo in the 1990's there is now heavy research and development to get to some level of equilibrium in the search for an acceptable power to efficiency ratio.
- **Advanced Materials** – In the name of energy efficiency and maximizing performance, manufacturers and their supply partners have made huge investments in next-generation materials which have created weight savings and added structural rigidity. Other advances have been made in interior materials quality and durability.

Industry Growth Profile

Globally, the demand for automotive products is growing, stemming in large part from demand from China, India, and Eastern Europe. Established automotive markets in the United States, Western Europe, and Japan, however, are large but relatively mature. In these markets the business dynamic is about taking or defending market share or creating profit-enhancing value-add products that offer innovation and/or technological advantage.

On average the automobile industry has been growing at a 3.6% per year for over a decade. Much of this growth can be attributed to the rise of demand in China. The automotive industry in China has been the largest in the world measured by automobile unit production since 2008. Since 2009, annual production of automobiles in China exceeds that of the European Union or that of the United States and Japan combined. (Economist 2009) With that, over the past five years there has been great change in the industry and there are several important developments that have defined the automotive landscape over the past five years:

- The global economic recession of 2008-2010,
- The rise of China as the world's largest producer and consumer of motor vehicles,

- An increasing commitment to fuel savings and efficiency (electric, hybrid, hydrogen
- Technologies, lighter/stronger materials and smaller, high-output engines) and,
- The advent of vehicles as mobile connected devices,
- The emergence of high-technology safety devices

The worldwide automotive supplier industry is currently booming with average profit margins of near 6%, profitability is higher even than their pre-recession levels. The most profitable sectors for suppliers are chassis, exterior and powertrain. Analysts seem to agree that industry prospects remain positive for the next five years, although the slowness in Chinese market growth and higher raw materials prices will put pressure on profitability. With that, there are substantial differences in profitability from region to region, with EBIT margin ranging above 10% in Asia to about 7% in Europe to North America at about 4%. There are also significant differences between sectors, with chassis suppliers being most profitable and then powertrain and tire suppliers.

Trends

Overall, the industry looks very different than it was at the beginning of 2007. The recession had a dramatic effect on the industry and some long-lasting changes as many suppliers went out of business or were forced to seek bankruptcy protection. While all of this was happening, China ascended to its place as the largest auto market in the world and that market is undergoing huge expansion with new domestic and foreign brands. Because of the rising cost of fuel, higher fuel taxes in other parts of the world and increasing government fuel economy standards, carmakers and their suppliers have been on a quest to increase efficiency from smarter engine design to the introduction of new alternative fuel technologies. With partners, automakers are portraying cars as extensions of the office or home with an array of new technology and applications. Each year over the past five, there have been introductions of revolutionary safety features using cameras, radar, facial recognition that previously would have been unthinkable.

Taken together, these developments have caused large shifts in the superstructure of the industry. The net effects are the center of gravity shifting east toward China which exported more than 1 million vehicles for the first time in 2012-13; the emergence of more complex and far-reaching supply chains to serve the rapidly expanding Asian marketplace; and the fast expansion in the emerging markets for new assembly assets with local and international firms establishing bases. Beyond that the emergence of Korea and specifically Hyundai as a global power has been dramatic. Hyundai is now the 4th largest

automotive group in the world based on annual vehicle sales after Toyota, General Motors, and Volkswagen AG. Accelerated movement of the global supply chain base to serve emerging markets, in part to emerging consumption zones and in part from domestic locations, will be followed by a period of near-shore/off-shore dynamic balancing.

- Resetting of the American producers to competitive cost structures
- Relative decline in dominance of Japanese producers
- Continued rise of Volkswagen and Fiat as a global volume leaders
- Continued rise of premium products and premium brands such as Mercedes, BMW and others

The auto industry in the US has turned itself around and has become profitable after a few very challenging years. Investment in new product platforms and in next-generation technology has occurred alongside the economic recovery and has evidenced in substantial growth in the OEM and supplier business categories. Since 2009, the industry has added more than 100,000 jobs. (US House Sub-Committee on Energy and Commerce)

Exports

- The top five US export markets in 2012 for vehicles assembled in the U.S. were Canada, Mexico, Germany, China, and Saudi Arabia.
- While exports to Canada increased modestly in recent years, exports to Mexico, Germany, China, and Saudi Arabia have increased by double digit percentages.
- About 1.8 million vehicles assembled in the United States were exported to over 200 countries in 2012. Experts estimate that the number of U.S. auto exports could rise to over 2 million vehicles as early as 2015.
 - Chrysler, Ford, and GM, together, exported more than 800,000 vehicles produced in the United States in 2011.
 - European and Asian brands exported approximately 750,000 vehicles assembled at facilities across the U.S. in Texas, Indiana, Ohio, Illinois, Mississippi, South Carolina, Alabama, Georgia, and Tennessee.
- In 2011, U.S. exports to China were nearly five times higher than they were in 2009. Last year, 136,222 American-made vehicles were exported to China, a significant figure considering that auto exports to that nation totalled less than 1,000 as recently as 2003.
 - The Middle East region is the second largest market for American-assembled sport utility vehicles (SUVs), behind only the domestic market. Auto Alliance.

New Car Assembly - Ford Motor Company Snapshot



Ford is a public company that has undergone significant transformation in the last 20 years with the majority of that change taking place in the last 10 years. During this time, they have fully shed their production philosophy that was adopted during the 1950's building boom. Ford operates as distinct business operating units in North America, South America, Europe, and Asia Pacific & Africa.

Inexpensive energy led to the SUV production surge in the 1990's, and Ford and its counterparts thrived financially on these high margin vehicles. With the end of inexpensive energy, Ford along with other domestic manufacturers felt compelled to adjust their product mix toward smaller, more efficient vehicles. Along with a raft of new global vehicle platforms and powertrains, Ford adopted a global production strategy similar to that of its Asian counterparts. It became more focused on its core mission and worked hard to shed non-core business activities. The Company divested its vertically integrated parts manufacturing into a spinoff company known as Visteon. The Visteon divestiture was completed in 2000 with it operating as a standalone public company. The Company's goal was to develop a lean supply chain system where it could encourage and mandate delivery efficiency and product innovation, but from the perspective of a client. This allowed Ford to be more fleet footed and focus on what it felt were its core competencies, vehicle design, integrated systems engineering, assembly and marketing.

Today, supporting new more models and far more sophisticated products, Ford's supply chain is significantly more complex, yet its cost of parts as a percentage of vehicle cost has decreased. It has simplified its accountable supplier base by increasing the use of larger systems componentry, resulting in a decrease in Tier 1 suppliers from 3,300 in 2004 to 1,260 in 2013. The goal is to further reduce the Tier 1 base to 750. This reduction of direct supplies brings efficiencies but also introduces business risks as poor performers can create very serious problems.

Today's automotive sector is an ever-changing matrix of global suppliers working together on supply chain integration, sub-assembly process and the systems (transport and logistics) to support. To provide an example, the Lincoln MKZ is assembled in Hermosillo, Mexico for sale in the US market. The plant began operation in 1986 as a stamping plant with assembly soon following and has slowly expanded ever since. Part content for this vehicle is broken down as 60% North American, 30% Asian and 10% European. Of the electronics in the vehicle 70% are Asian, 22% North American and 8% European. The vehicle is assembled with a combination of sheet metal stamped on site with steel sourced in Mexico and the US. Interior and drive trains are assembled from parts and finished components made in other parts of North America, Asia and Europe. An example of today's global auto platform, the instrument cluster which is assembled in Visteon Plant in Michigan is made of several parts sourced globally with the LCD in the center of the cluster coming from a supplier in Seoul, South Korea. As technology is evolving quickly, sometimes on a year to year basis, Ford continues to refine its suppliers to keep up with critical product innovations and this requires that supply chain managers develop flexible systems to accommodate dramatic changes in sourcing location, volumes, speed from production to assembly, etc.

Supply Chain Structure

Supply chain methodology varies significantly across the automotive industry but all manufacturing process is supported by manufacturing layers, or as referred to in the industry, "tiers". From the manufacturing and purchasing perspective, the term Tier 1 refers to a company that directly supplies to the manufacturer, while Tier 2 firms supply Tier 1 firm. Some suppliers are both Tier 1 and Tier 2 suppliers if they directly supply an OEM as well as another supplier that directly supplies an OEM. Tier 3 firms produce products to supply Tier 2 firms, etc. The aftermarket

operates freely with stores carrying parts and components that meant for replacement and repair.

With automotive aftermarket sales, there are various sub-segment distinctions, including small parts retail, large parts retail and wholesale, new car dealer repair, and a B2B sub-segment that is about supplier supporting manufacturer of aftermarket products.

Imports – Automotive Manufacturing

Partner	1992	1996	2000	2004	2008	2012
World	\$ 56,779,088,047	\$ 78,416,450,015	\$ 126,217,589,585	\$ 140,653,418,832	\$ 139,228,684,666	\$ 166,992,586,484
Canada	\$ 21,949,929,049	\$ 32,346,992,407	\$ 44,856,099,093	\$ 45,476,692,976	\$ 36,165,374,396	\$ 46,498,789,000
Japan	\$ 22,630,594,467	\$ 20,902,131,962	\$ 32,663,830,544	\$ 33,097,880,153	\$ 41,690,432,954	\$ 38,185,748,346
Mexico	\$ 3,109,423,659	\$ 11,319,733,323	\$ 20,988,051,424	\$ 18,772,405,445	\$ 22,005,717,680	\$ 35,348,642,828
Germany	\$ 5,904,044,048	\$ 7,423,804,168	\$ 14,574,114,668	\$ 20,444,303,477	\$ 18,569,573,749	\$ 23,718,076,478
South Korea	\$ 739,948,812	\$ 1,851,789,710	\$ 4,867,944,561	\$ 10,043,511,949	\$ 7,416,091,910	\$ 10,621,900,755
United Kingdom	\$ 414,864,367	\$ 1,550,079,888	\$ 2,819,048,525	\$ 4,847,443,542	\$ 3,966,841,285	\$ 4,532,605,621
South Africa	\$ 94,250	\$ 1,258,323	\$ 23,366,320	\$ 423,494,782	\$ 1,815,316,558	\$ 1,885,954,946
Belgium	\$ 246,165,709	\$ 828,984,156	\$ 1,077,007,341	\$ 1,343,023,636	\$ 842,912,351	\$ 1,637,148,806
Italy	\$ 78,593,426	\$ 99,237,677	\$ 221,509,181	\$ 468,703,696	\$ 910,294,953	\$ 987,004,796
Slovakia	\$ -	\$ -	\$ 8,797	\$ 856,629,209	\$ 729,631,384	\$ 873,998,834

Source: US International Trade Administration

Imports – Automotive (Aftermarket and Parts and Components)

Partner	1992	1996	2000	2004	2008	2012
World	\$ 19,086,050,532	\$ 38,338,816,711	\$ 51,640,377,301	\$ 65,013,434,499	\$ 69,358,320,046	\$ 97,923,671,317
Mexico	\$ 4,111,941,907	\$ 9,091,735,410	\$ 13,875,402,552	\$ 17,883,203,138	\$ 20,690,909,711	\$ 33,335,235,783
Japan	\$ 6,829,128,034	\$ 11,396,040,691	\$ 11,936,162,335	\$ 13,052,446,266	\$ 11,296,897,263	\$ 15,251,567,869
Canada	\$ 4,254,516,526	\$ 10,542,898,652	\$ 14,701,836,492	\$ 17,043,398,928	\$ 13,488,542,308	\$ 13,853,267,016
China	\$ 66,601,201	\$ 261,814,392	\$ 834,291,428	\$ 2,384,013,501	\$ 5,394,177,026	\$ 9,448,711,059
Germany	\$ 1,299,222,428	\$ 2,082,930,834	\$ 3,139,792,033	\$ 4,692,979,285	\$ 5,443,098,841	\$ 6,886,565,796
South Korea	\$ 132,629,050	\$ 284,151,666	\$ 599,349,614	\$ 1,097,614,945	\$ 2,871,838,702	\$ 5,571,839,437
Taiwan	\$ 387,477,889	\$ 646,146,431	\$ 830,525,954	\$ 1,312,093,447	\$ 1,679,371,437	\$ 2,095,231,027
United Kingdom	\$ 293,751,341	\$ 490,766,192	\$ 951,386,767	\$ 859,354,740	\$ 844,496,422	\$ 1,149,355,688
Austria	\$ 10,981,351	\$ 161,636,685	\$ 182,845,422	\$ 192,472,395	\$ 344,197,567	\$ 913,375,311
India	\$ 12,635,373	\$ 53,624,605	\$ 124,322,744	\$ 239,618,851	\$ 492,741,686	\$ 833,468,977

Source: US International Trade Administration

Several parameters make electronic parts (Tier 2 Suppliers) a significant air cargo opportunity beyond the supply chain flow. The sum of these parts may be large in both volume and weight but individually on average they are small and light weight when you look at the individual parts that may come from several directions to the point of assembly.

Large and medium automotive parts manufacturers present a working assumption that parts will be broken down to the smallest possible piece and sourced from the cheapest landed cost. This assumption is made on the changes that have taken place and continuing industry trends. There has been a significant shift in the last decade with the changing socio-economic picture of China. With increased costs along with increased skill, China and other more developed

Southeast Asia countries are becoming a place where goods that require higher skill are produced while simpler parts are made in the less developed countries of Asia as well as Eastern Europe and Central and South America.

Airfreight is an accepted method for anything small and lightweight in the automotive industry where once the freight is figured into the cost, it is of equal or greater quality at the production point and equal or less in price. The likelihood increases with goods exchanged between Tier 2 and Tier 1 suppliers. First these are excellent candidates as they are typically small and light weight parts, while secondly the Tier 2 suppliers typically operate with much less cash flow and warehousing is not typically part of the operating model for this group and in most cases the Tier 1 purchaser is paying freight. So if it is a product with a very long life cycle it may go by water only if that decrease in freight covers the warehousing on the Tier 1 end. The development of cheap but acceptable labor for the products in countries such as Mexico is driving an increase in airfreight where many parts are made then sent to another country or continent for final assembly into another product.

Summary and Implications

The auto industry is perhaps the most global of all industrial sectors. On the whole, it has extremely well-developed supply chains that have been honed for decades. In fact, the auto industry has been the test bed for many transport, inventory management and manufacturing system innovations that have been successfully incorporated into other industry supply chain management practices. Today, an auto or truck assembly plant in the US will receive parts and components from hundreds of suppliers from around the world. This requires a delicate choreography of inventory management, fulfilment, transportation, logistics and supplier management. While an automaker's objectives are to carry little or no onsite inventory, the continuous operation of a complex and expensive auto assembly plant cannot under any circumstances withstand shutdowns due to parts outages, so there are multiple systems of redundancy to assure seamless operations.

At the same time, like the rapidly changing global economy it operates within, in many ways the industry is evolving quite rapidly in its own right. There are a series of major factors drivers that are influencing the inherent shape of the automotive business. Here is a summary to the underlying influencing factors in the auto sector:

- There has recently been extraordinary growth in Asian demand markets (especially China) and this is forecast to increase in pace and scale. Global growth will be in Asia and this is where the major automotive producers and

suppliers are focused. This dynamic is new and is fundamentally altering the balance of the global automotive industry.

- New production centers have matured into world-class automotive industrial complexes.
 - China has become a globally significant automotive producer and will soon be the largest manufacturer in the world, Chinese-sourced cars will soon begin to gain significant global market share, requiring new supply chain systems for supplying sales and delivery systems in North America and other places.
 - Little known thirty years ago outside of Korea, that country has emerged as a global auto powerhouse and is as Japan was in the early-mid 1970's.
 - The emergence of Mexico as a global auto manufacturing center has significantly altered the industrial balance within North America, while also becoming a major global export country. Mexico will likely be a top 3 auto manufacturer in the coming years.
 - Assembly operations and parts manufacturing of scale have emerged in smaller measures in such countries as, India and Thailand and will grow through the next decade.
 - Europe and the US are strong participants but their indigenous markets are essentially mature. The key competition for both will be their ability to effectively sell vehicles in Asia.
- In North America, there has been rapid North American industry migration to the US South and to Mexico.
- Mexico has emerged as a global production center for US manufacturers but also Asian and European makers, much of which is exported to the US, but increasingly to other parts of the world.
- There has been a continued expansion of foreign carmaker production in the US with varying supply chain strategies. Some supply virtually all of their components from the US and mostly close proximity, and others still have some reliance on higher-levels of global sourcing. There will be increased pressures for local/regional sourcing.
- The level of innovation and technology is skyrocketing and cars and trucks are now laced with technology in propulsion systems, telecommunications/entertainment, vehicle monitoring and safety systems. This is a fundamental issue and will shape the configuration of next-gen auto supply chains.
 - Alternative power systems including electric and hydrogen propulsion are redefining the very nature of the vehicle that has existing for about a century.

- The parts and component supplier industrial structure has fundamentally changed over the past 10-15 years as the supplier base restructured following the deep recession and due to the requirements of global assemblers
 - There has been massive consolidation as weak suppliers were either let to vanish or were acquired by larger (in some cases global) supplier companies.
 - Manufacturers have increased their demands on suppliers for lower costs and simplified processes. This has meant larger Tier One suppliers which are responsible for increasingly large componentry elements.
 - Parts supply practice has changed along with the changing product components in vehicles. Higher cost electronics are far more commonplace now which has necessitated new inventory management practices.

New vehicle assembly supply chains in North America are very well-honed so that much of the needed part and component content is sourced from very short distances from the assembly plant. Beyond that, there is considerable content movement between the suppliers and assembly plants in the US, Mexico and Canada, but lesser content movement from overseas sources. There are exceptions in terms of Korean and Japanese parts shipped from the mother country to assembly plants in North America. This allows for maximum flexibility and control, and provides for transport cost savings. Those products that do move between continents do so largely by ocean vessel as the supplies chains are planned and managed with high degrees of precision. Especially for the foreign manufacturers, some parts are imported but even this content is kept to a minimum due to exchange, transport cost and manufacturing process control concerns. Air cargo will be used for some high-value technology products and certainly in situations where an expedited delivery is required due to a situational problem. In terms of the export of US manufactured product, this is relatively modest for the same reasons described above. Foreign manufacturers will generally source from home markets for trust, cost and supply chain control reasons. US manufacturers assembling abroad will do their very best to source from the local market, perhaps with the exception of a one to two year start-up period for plant operations where there may be heightened international shipments until local supply chains are refined.

For parts, this is a similar story but to a lesser degree. Original equipment manufacturer parts and supplies for dealer repair shops will mostly be sourced from the same or related stock of domestic suppliers. For the non-dealer parts market, there is considerable imported content via aftermarket retail and ecommerce systems. Similarly, in terms of the reverse flow to external markets

there is some North American content export, especially to markets that do not have large automotive manufacturing industries. Increasingly, as Mexico's auto industry grows as a lower-cost and more fully integrated manufacturing center the flow of parts from Mexico to other countries will be a significant factor in the industry.

The following is a review of plausible Alaska economic development opportunity in the Auto sector as related to air cargo and global logistics.

Manufacturing

- There is little opportunity for any sort of automotive assembly operation in Alaska as it has no existing industrial complex infrastructure, cost structures are out of line with industry requirements and there is no underlying supply chain reason to justify.
- The same is largely true for the significant component manufacturing and sub-assembly that would be undertaken by Tier 1 suppliers, for the same reasons as identified above.
- For small parts manufacturers, there is a theoretical opportunity in Alaska if it could take advantage of air cargo connectivity and support manufacturing *bi-directionally* to both Asia and North America. A small-mid scale manufacturing/assembly operation could deploy quickly multiple late-order combinations to component makers to support either the inventory gaps or to support a highly-tuned Just in Time system. Products would need to be highly specialized technology products to justify quick-order situations that require air cargo movements. This is possible but probably unlikely for operating cost reasons (labor, land and transport).

Forward Deployment

- As the automotive business is increasingly incorporating a range of very high-value technology products, manufacturers at the part and component level and assembly manufacturers will require increasingly speedy, sophisticated and integrated supply chain solutions. Many of these supply chains are essentially new to the automotive industry and are somewhat immature at the current time in terms of quickly changing technology, supplier relationships and the integration into the auto assembly process. This is a space that will likely evolve substantially over the next decade. There are several plausible windows for an AIAS supply chain solution.
 - AIAS could have an opportunity to support a two-way bi-continental supply chain strategy for a common range of high-value electronic and safety systems components that would can be sourced from either/both

North America or Asia, for ready delivery in both directions. This proposition could create value by recognizing the pressure for both very low inventory carrying costs and extremely short lead times in supply chain environments where ocean carriage is impractical.

- The operation would probably be primarily a medium-to-highly sophisticated, high-spec warehouse (temperature, security, systems redundancy) allowing for highly managed computerized storage systems, and high-velocity quick pick and ship operations. Depending on the needs of the specific product category, there may be opportunity that the facility could provide layers of customization that might be required on a shipment lot basis.
- There may be other conditions where an Asia-North America midpoint supply chain parts repository would be advantageous.
 - Various supply chain situations could potentially benefit from a warehousing operation on the ground in Alaska. Some of these situations would be the manufacturer, Tier 1 or Tier 2, who own the goods, as smaller suppliers cannot typically warehouse supply for financial capacity reasons. An important reason supporting this concept is that owning product stock on the ground in the US removes some risk and volatility from supplier's financial well-being, which when considered against the possibility of shutting down an assembly production line for days or weeks is supported by the cost.
- We do not foresee that substantial opportunity from the traditional auto parts destined for the retail auto parts business exists, as this category can generally routinize its supply chain systems and the use of ocean transport will suffice.
- We do see that the e-commerce element of the parts business will grow substantially and there may be a limited window opportunity that an AIAS solution could establish support for that element of the business that can 1) justify air cargo (mostly immediate ship requirements or possibly some very high value electronics), and 2) support distribution to Western US/Canada markets so as to avoid potential backtrack legs.
- It is clear that Mexico will be an increasingly important factor in the global automotive industry. Understanding how the supply chain interface between Mexico and Asia (and US) will develop is an important key for a potential AIAS business proposition. We foresee this to be an extremely important issue and one that may require some time to mature. If there were an AIAS opportunity, it would most probably be in the technology supply space as currently there is some use of air cargo and this will likely grow. We suggest that the high-value product proposition described above be tested with a variation which incorporates a Mexico add-on.

Computer and Electronic Product Manufacturing

Overview

Industries in the Computer and Electronic Product Manufacturing subsector group are establishments that manufacture computers, computer peripherals, communications equipment, and similar electronic products, and establishments that manufacture components for such products. Their rapid growth suggests that



they will become even more important in the future and in addition their manufacturing processes are fundamentally different from the manufacturing processes of other machinery and equipment. The design and use of integrated circuits and the application of highly specialized miniaturization technologies are common elements in the production technologies of the computer and electronic subsector. Convergence of technology is critical in this NAICS subsector, for example communications technology and equipment have been converging with computer technology. (US Census NAICS Definition)

The core business/manufacturing categories of this sector are: computer hardware, semiconductors, consumer products, and communications equipment. Global revenues from these combined sub-sectors are approaching \$2T and are broken down as:

Global Revenue by Electronics Industry Sub-sector, 2013	
Sub-Sector	Revenues - 2013 (billion)
Computer Hardware	\$ 608
Semiconductor and Parts	\$ 755
Global Consumer Electronics	\$ 224
Communications Equipment	\$ 340

Source: CEA

From the onset of the modern computer age in the late 1970's and early 1980's most electronics have been manufactured in Asia. The 1970's was a period where US-based television and other electronics manufacturing had left its consumer market for low-cost manufacturing centers, mostly in East Asia. Japanese brand products were manufactured in Japan and US branded products were now being manufactured in various locations in Asia but typically

China and Taiwan. During the late 1980's and until 2000 almost all electronic manufacturing had moved to China, Taiwan and Southeast Asia, attracted by low labor costs. Japanese brands also relocated manufacturing to these same markets for cost containment reasons. During the period in the 1990's several Korean brands began to gain market share and for competitive reasons also evolved their manufacturing supply chain throughout Asia.

Partner	1990	1995	2000	2005	2010	2012
World	\$ 72,396,362,847	\$ 154,910,057,187	\$ 251,718,097,479	\$ 270,732,323,375	\$ 325,049,823,362	\$ 355,129,911,846
China	\$ 1,405,664,056	\$ 7,265,745,047	\$ 24,681,695,811	\$ 79,682,840,175	\$ 132,770,423,192	\$ 158,388,278,134
Mexico	\$ 5,325,255,181	\$ 12,666,663,420	\$ 33,613,595,165	\$ 33,711,306,671	\$ 52,854,326,833	\$ 54,503,497,550
Japan	\$ 25,766,560,819	\$ 42,062,638,891	\$ 44,505,471,643	\$ 27,843,663,532	\$ 19,440,046,083	\$ 19,450,577,995
Malaysia	\$ 3,109,588,722	\$ 12,791,805,854	\$ 20,282,231,824	\$ 27,131,240,144	\$ 17,187,132,807	\$ 16,262,362,477
Taiwan	\$ 5,665,951,452	\$ 12,664,224,860	\$ 21,830,109,431	\$ 15,507,272,846	\$ 16,606,661,576	\$ 15,791,315,670
South Korea	\$ 5,150,151,037	\$ 13,443,019,430	\$ 21,078,529,876	\$ 15,169,379,584	\$ 17,274,778,425	\$ 13,408,496,575
Thailand	\$ 1,416,845,514	\$ 3,990,953,125	\$ 6,068,991,733	\$ 8,362,933,236	\$ 9,121,471,147	\$ 10,562,591,807
Germany	\$ 2,479,068,574	\$ 3,949,252,404	\$ 5,735,259,154	\$ 7,260,921,286	\$ 8,207,721,183	\$ 10,018,805,766
Costa Rica	\$ 17,764,181	\$ 36,193,705	\$ 1,131,529,307	\$ 750,510,816	\$ 5,606,826,153	\$ 8,164,047,657
Canada	\$ 5,527,763,982	\$ 9,586,535,390	\$ 18,080,541,709	\$ 10,316,783,207	\$ 7,291,988,664	\$ 7,396,676,569
Singapore	\$ 6,532,006,645	\$ 15,314,171,368	\$ 15,122,024,860	\$ 9,607,268,867	\$ 6,123,293,043	\$ 5,294,320,059
Switzerland	\$ 743,566,280	\$ 1,250,497,698	\$ 2,103,818,118	\$ 3,015,118,626	\$ 3,161,762,836	\$ 4,265,831,903
Philippines	\$ 922,117,111	\$ 3,073,172,660	\$ 9,239,360,587	\$ 4,488,358,996	\$ 3,566,501,766	\$ 4,261,472,175
United Kingdom	\$ 2,001,762,608	\$ 4,169,318,782	\$ 5,844,003,842	\$ 4,318,386,590	\$ 3,578,166,259	\$ 3,967,873,028
France	\$ 917,827,390	\$ 2,079,654,354	\$ 2,636,337,384	\$ 2,448,637,418	\$ 2,343,509,297	\$ 2,489,136,248

Source: US Dept. of Commerce - Exports, Computer and Electronic Product Manufacturing Data

This supply chain pattern was in-place for a number of years and remains today, albeit with some exceptions. Generally, costs have risen in urban China and Taiwan and some component manufacturing has relocated to less expensive parts of China or to South East Asian counties like Malaysia, the Philippines and Indonesia. At the same time, many electronics manufacturers have shifted assembly (and some pure manufacturing) to Mexico, primarily to take advantage of proximity to the US market. Proximity has meant that final product transport costs can be reduced, shipment times are shortened and a level of nimbleness added to product manufacturers business planning.

Research and development remains an activity conducted in the home country/product headquarters of the manufacturer. Much of the R&D activity in this sector is done in China, Korea, Japan, Taiwan, Europe and the US.

Trends

- In the Asia-Pacific Hi-Tech Supply Chain Industry Survey published recently by [eyefortransport](#), demand trends were assessed from a survey of several hundred high-tech manufacturing and retail executives. The results suggest that the historically strong markets are losing ground to Thailand, India and eastern China. Within the next five years many respondents in this study

expect India to overtake China as the area with the largest increase in consumer demand.

- After a period of very high growth, global shipments of televisions declined to 227M units in 2013, down from 238M in the previous year and 255M in 2011. Every type of television has suffered a decline, including the major categories of liquid-crystal display (LCD), plasma, cathode-ray tube (CRT) and rear projection.
- The profile of new products is reshaping itself regularly. For the first time ever, global factory revenue for smartphones and tablets will rise to become larger than revenue for the entire consumer electronics market.
- Worldwide original equipment manufacturer (OEM) factory revenue for PC tablets and for smartphones amounted to US\$354B in 2013. These two product categories are on their own able to generate more OEM factory revenue than the entire consumer electronics market which illustrates the overwhelming popularity of smartphones and tablets. The presence of mobile devices has single-handedly reduced the value of each product within the consumer electronics category.
- Apple's popularity continues, though there has been mediation in the consumer euphoria that has been exhibited over the past five years or so.
- The cross-over convergence with auto industry electronics applications is growing unabated and is expected to experience high growth for some time. Global connected automotive infotainment system shipments are expected to grow from 5.7M in 2012 to 51M in 2017. (ABI Research)

Supply Chain

- The industry and its supply chain requirements are in flux. The sector is going through several fundamental shifts that are reshaping the role of air freight and how logistics providers approach this sector. To begin with, in China the production base is shifting away from the Pearl River Delta and the area around Shanghai.
 - Various factors are causing manufacturers to seek new alternatives to locations in urban China. These include the need to maintain low retail prices and associated pressures from rising raw material cost, labor cost rises, increasing concerns about skilled labor availability.
 - The migration of manufacturing to China's interior has picked up momentum, as more and more companies flee from rising costs and labor shortages along the country's eastern seaboard. According to Air Cargo Management magazine, Foxconn has moved over 80% of its factory jobs from Dongguan in Guangdong to Zhengzhou in the western region of

China. Manufacturers are also looking to cheaper places in south-east Asia such as Vietnam and Indonesia.

- The vast majority of all components and most final products are still produced in China and Taiwan but increasingly in Southeast Asia and now Mexico. Mexico has experienced growth from the nearshoring of manufacturing and assembly back from Asia and the impact on manufacturer and retailer supply chain management is large. If Mexico is home to assembly with Asian-manufactured parts and components, this requires a significant new supply chain step that had not existed previously.
- Manufacturers and retailers are searching for higher-quality supply chain management control and this is causing some overhaul in vendor/ supplier/ logistics relationships. Increasingly there are key elements of the supply chain that are outsourced including transportation management from door-to-door, in factory cueing and onsite inventory management, destination market supply stock management in terms of harbored location, and quick-order fulfillment systems.
 - At the retail level, there is still quite a lot of room for additional evolution. In terms of matching retail customer demand to efficient inventory and factory-order systems.
 - At the b2b/industrial level, there is far more sophisticated matching of production, demand management and fulfillment but there is change happening here as well.
- Global destination markets are in transition, with more pronounced growth in emerging economies.. This impacts a range of issues including decisions for factory locations, production line staging, transportation provider and 3PL vendor choice.
 - While demand has languished in North America and Europe, producers are seeing growth in other parts of the world. A study on changes in the supply chain, sponsored by UPS determined that electronics manufacturers were expecting greater demand for their output in most emerging markets such as India, the Middle East, Africa, parts of South America and parts of the Asia-Pacific region.
- Overall, products have changed dramatically in size and weight, meaning less product volume and weight per unit when considering shipment.
 - Air Cargo World magazine cites that the iPad 4 is 10% lighter and 14% smaller than the first generation. The introduction of iPad Air which weighs 30% less than the iPad 4 is having an even more dramatic effect. Another example is the path to eliminate computer hard disk drives which are being replaced by solid state memory which is 10X lighter.

- Air cargo is no longer the default mode that it was a decade ago as some beneficial cargo owners (BCO's) and/or their 3PL's have revised supply chain systems to accommodate slower ocean transit wherever possible.
- Components and small electronics products are typical air cargo movements while larger electronics, especially those in a finished state that have longer model seasons will increasingly avoid air cargo as their longer-term supply chain model allows for the extended times via ocean transport. Component parts are more likely to be used in JIT manufacturing and small electronics are more susceptible to seasonality, so they are transported by air.

Major Business Players

Three companies Apple, Dell and Samsung exemplify how electronic/high tech supply chains function and together they cover the product lines of computers, smartphones, televisions and most small devices with a visual display. Each of these companies are both Asian and US as defined by their global HQ location and represent very different but successful business models.



Apple, USA

Apple is one of the most widely recognized global product brands in the computer and electronics segment. Apple manages its business primarily on a geographic basis. The Company determines its operating segments based on the nature and location of its customers and classifies them into the following categories: the Americas, Europe, Japan, Greater China, Rest of Asia Pacific and Retail. The Europe segment includes European countries, as well as India, the Middle East and Africa (EMEA). The Greater China segment includes China, Hong Kong and Taiwan. The Rest of Asia Pacific segment includes Australia and Asian countries. The Retail segment operates Apple retail stores in 13 countries, including the US. Each operating segment provides similar hardware and software products and similar services, but offers customized supply chain management systems.



Apple designs all of its own goods in the US at its facilities in California while manufacturing is done mostly abroad and almost all of that occurs in China. The

Company designs, manufactures, and markets mobile communication and media devices, personal computers, and portable digital music players, and sells a variety of related software, services, peripherals, networking solutions, and third-party digital content and applications. The Company sells its products worldwide through its retail stores, online stores and via a direct sales force, as well as through third-party communications network carriers, wholesalers, retailers, and value-added resellers. Being a global brand, this puts its manufacturing literally geographically in-between its two largest retail consumption markets, the United States and Western Europe. This allows for an optimized air cargo transport system that supports delivery of semi-customized and customized products to its final destination.

Apple has considered relocating certain production elements to the US or other large final markets but has not advanced to implementation after reviewing their business model and the flexibility that China and Southeast Asia manufacturing allows. Apple's cost structure still remains considerably lower in China as compared to the US and its in-place systems to support last-minute orders from California are well-homed. For now it looks as though Apple will continue to manufacture globally, with the majority of that activity occurring in China and Southeast Asia.

Apple uses some custom components that are not commonly used by its competitors and new products introduced by Apple often utilize custom components available from only one source. This increases the likelihood of air cargo during manufacturing start-up to avoid parts shortages that can be caused by longer delivery lead times. When a component or product uses new technologies, initial capacity constraints may exist until the supplier's yields have matured or manufacturing capacity has increased. Apple's business and financial performance could also be adversely affected depending on the time required to obtain sufficient quantities from the original source, or to identify and obtain sufficient quantities from an alternative source. Air cargo becomes significantly more attractive when the cost analysis is done on writing down an over purchase of goods that become obsolete compared to having a quick reaction and shorter lead-time on orders. Because Apple's markets can be volatile, competitive and subject to rapid technology and price changes, there is a risk Apple will forecast incorrectly and order or produce excess or insufficient amounts of components or products, or not fully utilize firm purchase commitments.

In the US, Apple is now sold in Apple Stores, through online outlets and in some large-volume third party retailers. As mentioned earlier Apple does use air cargo for all personalized items (whether it is aesthetic on an iPod or performance based on personalized laptop specs). They also utilize air cargo for product

launches and peak sales periods. Outside of that, anything that is not considered time sensitive is shipped via containerized ocean transport, which makes Apple a significant user for both modes of transport.

Dell Personal Computers, USA

Dell is one of the leading computer brands in customer recognition along with HP, Gateway and Intel. The Company assembles many of its PC's in the US along with similar production set-ups in other countries such as Ireland for Europe. However, these overseas factories do not manufacture all lines. It is quite important to understand how Dell sources and manages the material that supports its manufacturing system. Practically all of the Company's PC components and parts in its facility in both Texas and North Carolina are sourced from Asia. Dell defines its manufacturing process as consisting of assembly, software installation, functional testing, and quality control. The Company relies on a flat standardized product model, which greatly simplifies the supply chain management process. In this model, the Company relies on a limited number of parts across its product line. Reflecting this, Dell has generated around 900 patents since inception, which is a small number whereas a typical competitor firm could register more than that in a given year. Dell's goal is standardization of products using common products which helps it minimize manufacturing costs. This practice allows the Company to support customized specifications at a cost that is similar to its off-the-shelf competition.

Dell operates both of its US manufacturing facilities on a four day/ten hour shift and then a 3 day 12 hour shift over the weekend (Friday to Sunday). This illustrates their management system efficiency with little or no "downtime". Outside of the US, it has several facilities serving the US and the rest of the world. Two of its largest sources for components are Xiamen, China and Penang, Malaysia. Other manufacturing facilities are located in Austin, Texas; Hortolândia, Brazil; Chennai, India; and Lodz, Poland. Dell will continue with global production (mainly assembly of components) according to most the recent reports. Dell will continue to produce many of its own components as well as purchased third-party components, with 90% of content coming from China and Southeast Asia.

Dell has changed its retailing strategy in recent years. Previously Dell sold all its products on the internet, but about 10 years ago, they began to sell mass produced units (laptops, desktops) through retailers like Best Buy. Dell utilizes much more air cargo for components rather than for finished products.

Samsung, South Korea

Samsung is a South Korean based multinational conglomerate whose electronics division dates back to 1967. With Samsung's diverse product offering, the business is divided into several segments. For the purpose of this document, the following is limited to what the Company calls the Visual Display Category within their Consumer Electronic division. This covers everything with a visual display from televisions to smart telephones, laptops and tablets.



During the late 1960's through the 1970's Samsung aspired primarily to be a computer company but shifted R&D in the 1980's to include Television (and other Audio Visual) technology which led Samsung to the front of the global electronics industry. Last year Samsung became the largest manufacturer of mobile telephones by number of units globally, overtaking Nokia. During this time, they opened manufacturing plants in the state of New York, outside of Tokyo, in Poland and in Austin, Texas.

Being a multinational conglomerate with ultimate headquarters in South Korea, Samsung has a spread out supply chain with manufacturing facilities across the world, but the concentration of assets is in Southeast Asia. The Company manufactures under a lowest total landed cost mandate with parts and components are usually produced long distances from the final point of assembly. Samsung has facilities in urban China for the higher skill requirement products while some other simpler electronic based parts remain in China in lower cost settings and throughout Southeast Asia.



Samsung follows a distribution method similar to that of Apple and opposite that of Dell. Samsung does not retail directly to the consumer. All sales are to third parties who sell to the retailer then to consumer. Top retail outlets are electronic superstores such as Best Buy, office suppliers such as Staples and mobile phone re-sellers such as AT&T and Verizon.

Sales for the Visual Display category are concentrated where there are large displays (televisions) and in mobile telephones. In 2013 Samsung was number one in sales for large displays with slightly more than 25% of the global market, leading the second place contender by 10%. In 2013, one out of every three smartphones sold, was a Samsung product, amounting to over 300 million units. 2014 is forecasted for more than a 30% increase with 400 million units planned for production.

Summary and Implications

During the last ten years as wages and the cost of living has increased in China so has the migration of electronics/high tech manufacturing centers from the urban Chinese cities to inland (central and western China) areas to drive down costs. Other countries such as Thailand and Malaysia have also benefitted from this migration of manufacturing centers. However, the supply chain is growing with a significant inflow of components from manufacturing hubs in Eastern Europe and Central and South America and especially Mexico which has shown significant growth in nearshoring.

- Airfreight is the accepted mode for anything time sensitive in the electronics industry and in the arrangement of special production and customer delivery situations.
- Ocean transport will continue to be the chosen method of transport for long-life cycle goods whether it is an iPod that will be on sale for two years or a hard drive that will go into the current Dell laptop for the model the following model year.
- The retail landscape has changed significantly for personal computing in the last ten years based on market consolidation and changes in consumer buying patterns and will continue to change over the next five to eight years due to the increasing functionality of tablets and smartphones. Retailers are becoming much more sophisticated about supply chain management but still have much room for improvement.
- Computer components are sourced primarily from Asia in both raw materials and finished product. China is the source for approximately half of all computers and electronic products imported into the US with the top five accounting for around 75%. China has made between 40 to 50% of all electronics imported into the United States during the last 5 years.
- Mexico is a factor today and will become a far more important factor in the future, for assembly (or primarily isain0sourced products) but also for full production.

Manufacturing

- All manufacturing scenarios would be predicated on taking advantage of an independent decision to conduct some forward deployment activity in Alaska.
- For a company that is increasingly managing a far-flung Asian sourcing system, there may be an opportunity for some specialized final assembly or customization to Alaska

- Customization of laptops and desktops, which consists of inserting memory and hard drive combinations to an already assembled unit. This may allow for lower inventory level on-hand in the US and a central deployment strategy for final assembly.
- To the extent that there are US-produced small components used in Asian manufacturing settings, if competitive from a land economics perspective, a case could be made for sourcing from Alaska and then quick-shipped to a final Asian assembly point for JIT production.

Forward Deployment

- There is an opportunity for forward deployment component assembly for electronics/high tech components that are sourced from multiple Asian markets. Samsung is an example of a company that has components being supplied from multiple locations which are thousands of miles away from the final assembly facility.
- For higher-priced non-electronic products, there could be some chance that bulk quantity shipments-inbound could require sorting, multi-product bundling, labelling and packaging at a central transit-stop location.
- AIAS could provide a western-market edge distribution point so as to avoid the cost and time of transit backtrack miles if sending from a domestic distribution point in the central or eastern US.
- The increasing use of the ecommerce selling model will require more forward deployment than ever before, especially in November and December. By taking advantage of the integrator presence, AIAS could potentially serve as hub-point allowing for 8-12 hour delivery windows from a westernmost US supply point with inventory build-up periods in September and October.
- Limitations: Due to local limitation issues such as the size of the physical asset and labor force, project scale may be a challenge in Alaska, especially in Anchorage.
- Mexico and Central and South America will begin to see a significant increase in trade volume as China's manufacturing costs continue to rise while Latin America develops increasing levels of quality and a stable supply of labor at a good cost. This trend will lead to making it cheaper to manufacture in Latin America with a supply chain across greater spans using the cheapest cost of labor that the individual part or component will accept. AIAS needs to establish itself as an integral link in the Asia to Mexico/Latin America supply chain market. This will require an integrated market proposition to include AIAS-to-key US markets that are important air gateways to Mexico and Latin America (such as Los Angeles, Phoenix, Houston, Dallas and Miami)

Pharma

Overview

The US pharmaceutical industry is defined by the US Census Bureau as companies engaged in researching, developing, manufacturing and marketing drugs and biologicals for human or veterinary use. For statistical



purposes, the US Government classifies all medicines as part of the pharmaceutical industry, including products developed through the use of biotechnology. Data on companies that produce drugs and biologics are classified under NAICS 3254. (US DoC)

The US pharmaceutical industry plays a crucial role in the economy. According to the most recent economic census there were over 1500 companies in the US alone that manufacture and market drug and biological products. Battelle Technology Partnership Practice reports that the US pharmaceutical sector employs more than 810,000 workers who have an average compensation of \$110,490. The worldwide market for pharmaceuticals is growing at a 5-8% rate and is projected to reach \$1.2 trillion by 2016 according to IMS Health. Although the primary markets will continue to be in the traditional strongholds of the US, Western Europe, and Japan, market growth is shifting towards the fast growing developing countries such as China, India, Brazil, Turkey, Mexico, South Korea, and Russia.

The World Health Organization reports that the 10 largest drugs companies control over one-third of this market, several with sales of more than US \$10 billion a year and profit margins of about 30%. The 10 largest drug companies are Novartis, Pfizer, Merck and Co., Sanofi, Roche, Glaxosmithkline, AstraZeneca, Johnson and Johnson, Abbott and Teva. Five of the largest ten companies are based in the US, four in Europe and one in Israel. None of the top ten are located in Asia. Though there is strong growth in emerging markets, the World Health Organization is predicting that North and South America, Europe and Japan will continue to account for more than three-fourths of the global pharmaceuticals market well into the 21st century. Companies currently spend one-third of all sales revenue on marketing their products - roughly twice what they spend on research and development.

As is well-understood, the global pharmaceutical market is dominated by US and Western European companies but in the past five years, Chinese pharmaceutical imports into the United States have more than doubled. US

Pharmacopeia, a private organization that creates the nation's official quality standards for drugs, reports that already half of the aspirin used worldwide comes from China, as do 35% of the painkiller acetaminophen and almost all synthetic vitamin C. India's pharmaceutical imports into the US have also increased dramatically, making it the fastest-growing drug importer. Industry Week has reported that today up to 40% of the drugs Americans take are manufactured outside the US, as well as up to 80% of the active pharmaceutical ingredients in those drugs.

The major segments of the pharmaceutical industry are:

- 1 Originator chemically-synthesized drugs which are developed as a result of extensive research and development and clinical trials
- 2 Generic drugs
- 3 Over-the-counter drugs
- 4 Pharmaceutical substances which are active pharmaceutical ingredients (API), the ingredients that make the drugs effective and excipients which give the drug its form, tablet, capsule, etc.
- 5 Biologicals or biotech drugs which are derived from living material
- 6 Biosimilars which are versions of the biologicals



The major customer groups to the pharmaceutical industry are (not in order of sales):

- 1 Chain pharmacies
- 2 Independent pharmacies
- 3 Mail order houses
- 4 Hospitals
- 5 Food stores with pharmacies
- 6 Clinics
- 7 Mass merchandisers with pharmacies
- 8 Nursing homes and long term care facilities

This mix is changing dramatically from the old distribution model of a relatively simple customer chain consisting of drug companies, wholesalers, retailers, and, in some places, insurers.

The major US pharmaceutical manufacturing centers are in California, New Jersey, Puerto Rico, Pennsylvania, New York, Indiana and North Carolina. These locations were chosen based upon costs, availability of skilled labor, proximity to markets, research facilities, transportation infrastructure, tax and tariffs, etc. The issues of research facilities and skilled labor and friendly government (including support via incentives) were main drivers, but tax issues and transport connectivity are rapidly becoming more important factors. In China the key manufacturing regions are in the major cities along the coast and in India the pharma manufacturing and biotech sectors are concentrated in the Karnataka state (Bangalore) and the Mumbai and Hyderabad regions.

The Basis of the Pharmaceutical Industry

The Active Pharmaceutical Ingredient (API) industry is the industry that manufactures pharmaceutical ingredients from raw materials through both chemical and physical means. APIs are commonly referred to as “bulk pharmaceuticals” and are usually made in places quite a distance from where the final product is made. According to Scott Szwast, Director of Healthcare Markets for UPS, when manufacturers receive the ingredients used to make pharmaceutical products, they’re actually dealing with two separate supply chains. One consists of active pharmaceutical ingredients (APIs), the substances that make a drug a drug and the second set of materials that flows into drug manufacturing plants consists of excipients—inert ingredients such as binders and coatings that are used to put the drug into a pill or other format for consumption. These two very different raw material supply chains must synchronize precisely at a manufacturing facility to create a pharmaceutical finished product. (Inbound Logistics)

Today the greatest concentration of APIs are manufactured in Asia, especially China and India. More and more companies are outsourcing their manufacturing of APIs which frees up investing in very expensive equipment and infrastructure. The MDTV Alliance says that a current and important example of this practice is AstraZeneca who had been manufacturing 85% of their APIs but are now withdrawing from that business in favor of outsourcing.

The current growth in new medical technologies is spurring the demand for APIs worldwide today especially with the increased importation of raw pharmaceutical ingredients from emerging markets. According to Boehringer Ingelheim, countries

such as India and China, which now supply over 40% of APIs used in the US will double that figure to an extraordinary 80% in the next 10 years.

Global Supply Chains

Pharmaceutical supply chains are becoming more and more complex. Prescription drugs are often just one aspect of a company's business as they find themselves dealing with the challenge of ensuring steady revenue growth by expanding into new areas: generics, over-the-counter (OTC) products, health services, companion devices, and many other segments. At the same time, companies are using direct-to-consumer, direct-to-pharmacy, and other new distribution channels, and they are relying more on external partners for manufacturing, selling, and other services. With the tremendous growth in global markets, by the end of this year, emerging markets are expected to drive 50% of the industry's growth. The result is and will be a large increase of manufacturing facilities and market-oriented products, suppliers and trade channels. Many companies have minimal standardization of processes, procedures, and interfaces in-place and will find strong challenges in their growth. Despite these profound changes, very few pharmaceutical companies have redesigned their supply chains to accommodate these new complexities. The industry has been very slow to adapt JIT practices and many experts feel the pharmaceutical industry will mature its supply chain management practices over the next decade. (Boston Consulting Group, GLDPartners)



Most of the industry's supply chains were originally set up to produce few items, in high volumes and in less efficient factories. Consequently, supply chains were designed to never allow inventory shortages while meeting a range of regulatory requirements, even if that meant maintaining high inventory levels. This required very high inventory carrying costs and in many cases absorbing substantial write-offs for unused or expired/discarded product. Now however, modern supply chain practice is moving companies into a new era of pharmaceutical manufacturing. The regulations that prevented the introduction of continuous manufacturing in the pharmaceutical industry are being removed. The US Food and Drug Administration (FDA) is encouraging companies to move toward continuous manufacturing and MIT in cooperation with Novartis is currently doing extensive R&D on designing a continuous manufacturing process which will literally revolutionize the manufacture of pharmaceuticals.

Reverse logistics represents a very important part of supply chain management in the pharma industry. Managing product returns is much more than a simple product movement challenge. Due to the sensitive nature of drugs and important potential health and financial considerations, the management of returned goods is a serious business with legal ramifications. The disposal of expired drugs is tightly controlled by all governments, so the practice of reverse pharma logistics is receiving quite substantial attention from manufacturers and their 3PL partners.

Pharmaceutical returns also require more vigorous security than most other goods because of the high value of the product. World Trade 100 magazine reports that an individual one year supply of many newer pharmaceuticals can exceed \$200,000. The most expensive, however, is Soliris, by Alexion Pharmaceutical. This drug treats a rare blood disorder and costs \$409,500 for a one year treatment. More common drugs have lower values. It's not unusual for cancer therapies to cost \$50,000 per year, while treatments for schizophrenia typically cost about \$7,000. In addition to cost, the issue of theft is a growing concern, thus triggering elaborate facility and security solutions. The underworld has become a player in the industry and for organized crime, pharmaceuticals can generate large returns. According to *World Health Organization* estimates, 10 percent of global pharmaceutical sales involve counterfeit goods.

Transportation

An analysis by the Seabury Group indicates that air freight's share of global pharmaceutical transport has plummeted from 17% in 2000 to just 11% today. As the industry refines its supply chain management systems and becomes ever more global, the industry is desperately looking for ways to cut costs. By diverting as much traffic as possible to ocean freight, major cost savings can occur. Another rationale for the mode preference change is that ocean carriage has been more reliable than air. Many industry experts have noted that the air cargo industry has historically shown a lack of skills, standards and training throughout cool-chain logistics.



High value pharmaceutical shipments are good business for the air cargo industry and freight forwarders. The Seabury Group places the value to density ratio for pharmaceuticals at \$450/kilo. The CEO and chairman of Lufthansa Cargo, Karl Ulrich Garnadt says that on the North American air routes 20-30% of

capacity is provided by freighters, the rest moves by belly freight while on the Asian routes thru Shanghai, 80% of capacity is provided by freighters.

The cold chain is very important in the pharmaceutical industry. The testing, production and movement of drugs relies heavily on controlled and uncompromised transfer of shipments. Growing global demand for vaccines and biologic medications is one of the main reasons for the robust growth in the air freight of pharmaceuticals. These products are more temperature sensitive than products of the past and must have precise temperature control to maintain their efficacy. Also a large portion of the pharmaceutical products that move along the cold chain are in the experiment or developmental phase. Clinical research and trials is a major part of the industry that costs millions of dollars, but one that also experiences a failure rate of around 80%. According to the Healthcare Distribution Management Association about 10% of these drugs are temperature sensitive. If these shipments should experience any unanticipated exposure to variant temperature levels, they run the risk of becoming ineffective or even harmful to patients.

According to UPS, of the top selling pharmaceutical products worldwide, seven of the top 10 are expected in the future to require cold train transportation.

Another change affecting airfreight is in the presentation (packaging) of drugs. This is especially true for the newer vaccines, making them more expensive to produce. Supporting the trend toward individualized medicine, Air Cargo World has reported that instead of making large closed vials in quantity, companies are making more vaccines that are in individual syringes. Instead of one vial in a box that contains 10 doses, you now have a box that contains 10 single doses in 10 pre-filled syringes. The volume increases 10-13 times to deliver the same amount of doses.



Trends and Influences

- Pharmaceutical companies have to operate in a highly regulated environment. The degree of regulation depends on the country and the type of product. Pharma companies feel pressure from managed care organizations and employers who push back on prescription drug costs and reimbursement and this is expected to increase. Additional pressure is felt from competitors coming to market with alternative brands or generics and from disgruntled stockholders.

- One of the biggest changes facing the industry is the unprecedented number of drugs that will be coming off patent protection. Between 2013 and 2020, over \$155 billion in brand sales will lose patent protection. While the leaders in the generics market include large US companies, multinational players Teva Pharmaceutical Industries (Israel), and Mylan, and Actavis (India), have emerged as a growing competitive force in the US generics market. Booz Allen reports that this is one of the most disruptive actions that the pharmaceutical industry has faced.
- There are no more blockbuster drugs in the pipeline like Lipitor and Avastin that have been marketed to the general population and have generated billions of dollars in sales. Market analyst, EvaluatePharma is reporting that new product development is down and that ballooning R&D costs and declining R&D productivity have greatly impacted the number of new drugs approved.
- The emphasis on cost containment has become paramount in the industry and with the globalization of the industry and the increasing complexities that this brings, an effective cost cutting move is to outsource the entire logistics function. John C. Lechleiter, Ph.D., Chairman, President and CEO at *Eli Lilly* has stated that traditionally, pharmaceutical companies owned the entire value chain from an idea in a researcher's lab to a pill in a patient's medicine chest, so it is very difficult for a pharma company to become part of a more integrated network even though these networks expand opportunities and lets companies leverage financial resources. But the industry is finally moving towards outsourcing the entire logistics function and as a result 3PLs are assuming a far more influential role in the industry than had been the case in the past. (Eli Lilly Corporate Website)
- The entire supply chain will need to adjust with the advent of personalized medicine which will target certain treatments to smaller patient populations whose genetic tests show they will be receptive to them. It will need to be more flexible so it can compete with generics at their low price point while at the same time deliver critical drugs that have low demand because of the effects of personalized medicine. And, the supply chain will have to adjust to the new sales channels that have opened up with the changes in healthcare delivery.
- The US market is the largest in the world and Europe is 2nd largest for a population of similar size. The markets are highly segmented with many players operating across a wide range of product categories.
- Ensuring the safety and quality of the drugs imported into the US continues to be a major issue. There is really no testing done on the product before it enters the US. The importation of drugs is controlled by the FDA and if the paper work is correct and the drug is on the approved list the product is allowed to enter

the US. Currently the FDA has 13 agents based in China to work on this issue. (USDA website) The issue is just not the integrity of the product but also the protection of the product from theft, counterfeiting and deliberate alteration. Today, materials are procured from multiple countries, manufactured somewhere else, potentially packaged in yet another country and distributed and sold globally. At any stage in this journey the product can be contaminated.

Major Business Players - Examples

Merck & Co, Inc.

Merck & Co., Inc. (Merck) is a global health care company that delivers health solutions through its prescription medicines, vaccines, biologic therapies, animal health, and consumer care products, which it markets directly and through its joint ventures. The Company's operations are principally managed on a product basis and consist of four segments: Pharmaceutical, Animal Health, Consumer Care and Alliances. The Pharmaceutical segment includes human health pharmaceutical and vaccine products marketed either directly by the Company or through joint ventures. Merck is headquartered in the US and has 83,000 employees worldwide. They have 15 manufacturing locations in the US as well as many others scattered around the world. (Merck & Co., Inc. Annual Report 2013)



Eli Lilly and Company

With global headquarters in Indiana, Eli Lilly and Company discovers, develops, manufactures, and sells products in one business segment, pharmaceutical products. The Company also has an animal health business segment. It manufactures and distributes its products through facilities in the United States, Puerto Rico, and 15 other countries. Its products are sold in approximately 130 countries. China is the highest priority geography in Lilly emerging markets, followed by the 'Five Focus' Markets of Korea, Turkey, Russia, Brazil and Mexico. In addition, there are significant opportunities in other markets in Latin America, the Middle East, Africa and Asia where selective investment will occur. (Eli Lilly and Company Annual Report 2013)

AstraZeneca

AstraZeneca is one of the world's leading pharmaceutical companies, producing a powerful range of medicines designed to fight disease in important areas of

medical need. AstraZeneca was formed in 1999 by the merger of Astra AB (an international pharmaceutical group based in Sweden) and Zeneca Group plc (a bioscience business based in the UK) which itself was formed by a demerger from ICI in 1993. This merger brought together two companies with similar research-based cultures and a shared vision of the future of the pharmaceutical industry.

AstraZeneca now employs some over 51,000 people worldwide and is a major player in the ethical pharmaceutical market, producing some of the world's best known medicines. In 2012, sales totalled over \$27B. AstraZeneca has over 30 production sites in 19 countries and sells medicines in over 100 countries. AstraZeneca is the 4th largest pharmaceutical company in the US with 5% of the market by sales. AstraZeneca produces pharmaceutical products in seven key areas: cancer, cardiovascular disease, central nervous system disease, gastrointestinal disease, infection, pain control and anaesthesia, respiratory disease. (AstraZeneca Annual Report 2013)



Summary and Implications

The pharmaceutical world has changed dramatically in the last 10 years, but its supply chain has remained been slow to change. In order for the old traditional industry to compete in the new world order of pharmaceuticals the supply chain has to become more agile and responsive to the issues of regulation, competition and new channels of distribution. Here are some working assumptions that will be important in assessing opportunities for AIAS:

- The global market for pharmaceuticals is growing with the emerging nations having the highest concentrations of growth.
- There is already a large amount of pharmaceutical product, both raw material and finished product, moving between Asia and the U.S.
- An analysis by Seabury indicates that air freight's share of global pharmaceutical transport has dropped from 17% in 2000 to just 11% today.
- Generic drugs will always ship by sea due to their price point, but high end pharmaceuticals continue to be obvious candidates for air freight.
- A majority of the product being moved is in the cold chain and this supply chain segment is undergoing dramatic evolution. Specialized assets are

being developed at and around both seaports and airports, largely operated by specialized divisions of global 3PL companies.

- 3PLs are assuming a more dominate role throughout the industry. Pharmaceutical logistics is such a specialized discipline that drug manufacturers have long been reluctant to outsource to third-party logistics (3PL) service providers, but recent industry trends are making drug manufacturers rethink their strategies and they are turning to 3PLs that understand international shipping, and operate divisions devoted to the pharmaceutical supply chain.
- Companies can no longer afford to treat reverse logistics as an afterthought. It will become a core capability within the most company's supply chain system and this will require more specialized assets.

Manufacturing

- The industry is moving towards a continuous manufacturing model which will lead to increased operational efficiencies. The industry currently has excess outdated manufacturing capacity and will be making decisions in the future as to how their manufacturing footprint will be changing to ensure continued profitability. However the historic industry location concentrations will continue to see investment and reinvestment based upon their skilled labor force and favorable regulatory policies which will severely limit any opportunities for Alaska.

Forward Deployment

- One logistics function unique to the pharmaceutical industry is the work that supports clinical trials. Rather than distribute large quantities of a drug for use in the market at large, manufacturers conducting trials move product to labs and hospitals and, often, directly to patients' homes. The demand for shipments to clinical trial sites tends to ebb and flow, and each project is unique.
- Alaska's location could make it a candidate for staging depot services for clinical trials. This is a fast growing business area which allows a company to supply research investigators all over the world with trial materials in a planned and timely manner.
- Alaska's location also could make it a prime candidate for a reverse logistics/return depot for pharmaceuticals that are being returned for disposal from Asia. This would require assets that support a controlled environment, including security, temperature management, and with appropriate IT traceability capability.

- The pharmaceutical market is growing rapidly in Latin America. Brazil and Mexico are the leading markets with large populations and growing incomes. The BRIC countries as well as Latin American countries are emerging as prime sites for clinical trials which reinforces AIAS as a prime central location for a depot for clinical trial materials.

Toys

Overview

NAICS 3399 This industry comprises establishments primarily engaged in manufacturing dolls, toys, and games, such as complete dolls, doll parts, doll clothes, action figures, toys, games (including electronic), hobby kits, and children's vehicles (except metal bicycles and tricycles). The toys and games market consists of the total revenues generated through the sale of activity toys (including art and craft, building sets, learning and exploration, and sewing and hobby), dolls, games and puzzles (including jigsaw puzzles and card games), infant/pre-school (including intellectual growth education toys and other infant toys), plush (includes soft toys), outdoor & sports toys (includes outdoor games and sports such as cars and bicycles etc.) and other toys (including toys made of plastics, rubber, textile, die-cast miniature model toys and metal toys. This also includes action figures, youth electronics and boy character toys, which includes small racing cars etc.). By and large and for the purpose of this review, toys are classified into lower-cost (in many cases commodity-like) products, and also more sophisticated, generally higher priced products. By their underlying componentry, these more sophisticated products bear underlying resemblance to products in the electronics sector.



Global Market - Global toy sales exceed \$80 billion, according to the US Toy Industry Association (TIA). Major consumer markets include the large developed countries (US, the UK, France, Germany, Australia, Korea, Japan and other growing markets such as Russia and China. China is the world's largest manufacturer and producer of games and toys and the US is the largest consumer country market. The TIA estimates that North American retail sales of traditional toys were approximately \$27 billion in 2013 or about a third of the global market. The Asian and European toy markets are about the same size, with the US and European markets holding steady while the Asian is expanding very quickly. The Asian toys & games market had total revenues of almost \$25bn

in 2012, and reflects a compound annual growth rate (CAGR) of 9.5% between 2008 and 2012. The combined Asian market will soon emerge to be the largest toy market in the world. The top ten country markets by retail sales were: United States; Japan, China, the United Kingdom, France, Germany, Brazil, India, Australia, and Canada. Annual toy spending per child in these markets ranged from a high of \$401 in Australia to a low of \$6 in India.

US Toy Market – The TIA estimates that the annual US toy sales is about \$23 billion with the vast majority of product imported from Asia. While the majority of toys destined for the American market are for consumption in the United States, large-scale production shifted abroad some years ago. However, even though large portions of the major US toy companies' product lines are manufactured outside the United States, these products still incorporate significant US value in terms of the product design, marketing, research and development and corporate support functions. The industry is quite diverse in that while US toy companies have their own toy development divisions, they also work with a network of independent toy inventors and designers that sell their concepts to the larger companies. This supply chain ecosystem creates a dynamism that is distinctive from many other industries (US DoC).

The indigenous US toy and game manufacturing industry includes about 600 companies and has annual revenue of about \$3 billion, including domestic sales and exports. Revenue from toy manufacturing that takes place in the US represents only a portion of revenue recorded by US-based manufacturers, which as referenced above commonly arrange to have toys produced at factories in countries where costs are lower. TIA estimates domestic toy industry related employment at 31,000.



US Market Imports - The top five import sources to the US sales market were China, Japan, Mexico, Denmark and Canada. At its peak several years ago, the Chinese share of imported toys accounted for approximately 89% of all imports (2010). The second-ranked import source was Japan with just 3.2% of the total and other countries represented

even smaller shares. The Chinese share of US toy imports has begun to slowly decrease with its share reduced to about 87% (JoC/Piers) and this trend is seen as likely continuing. The reason for this is largely explained by steadily rising labor and raw material costs in China and the market is demonstrating that many low-cost commodity-class products cannot be competitively sourced in the traditional urban production regions in China, at least allowing for the levels of profitability that was expected previously. Most toy products fit within the

commodity-class category so this is an important issue for the whole of the toy industry. Over the past five years , increasingly toy companies have searched for lower-cost manufacturing settings for commodity products, first in less developed regions in China and then in other countries, namely in Vietnam but also in countries such as the Philippines, Malaysia and Cambodia.

Toys, Dolls, and Games NAICS 33993: Customs Value U.S. Imports for Consumption (most recent full year data)										
Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<i>In 1,000 Dollars</i>										
China	8,742,865	10,428,832	11,660,592	12,053,678	13,439,770	14,592,830	19,446,731	20,677,929	18,330,413	18,979,444
Japan	3,206,034	2,055,828	690,227	604,364	1,270,560	885,981	843,295	758,488	741,681	692,406
Mexico	552,629	1,029,327	395,910	317,211	318,359	312,178	304,603	294,328	276,086	339,744
Denmark	122,514	135,999	89,721	98,434	115,753	129,908	163,019	108,428	205,568	278,733
Canada	193,475	177,410	159,007	141,325	134,937	106,009	89,158	104,653	109,226	240,197
Indonesia	119,832	110,847	107,581	93,180	89,607	77,291	97,998	114,322	121,991	173,598
Taiwan	207,893	202,406	191,513	186,723	172,279	169,196	196,115	170,703	143,869	153,923
Thailand	109,060	101,648	97,252	77,220	76,955	93,301	70,549	91,940	66,706	86,006
Vietnam	309	6,505	5,390	10,851	23,868	28,144	42,103	48,420	73,215	81,545
Hong Kong	194,399	209,715	201,480	196,486	158,266	174,140	127,050	95,891	63,360	69,780
Subtotal	13,449,010	14,458,517	13,598,673	13,779,472	15,800,354	16,568,977	21,380,621	22,465,103	20,132,115	21,095,376
Other:	751,673	603,592	575,198	464,609	443,293	403,022	388,267	355,178	291,870	332,509
Total	14,200,683	15,062,108	14,173,871	14,244,081	16,243,647	16,971,999	21,768,888	22,820,281	20,423,985	21,427,885

TIA & US Department of Commerce

Tariff and Trade Issues

Generally speaking, tariff barriers are no longer significant trade issues as had been the case in the past. The US toy industry faces relatively low foreign tariffs. US toy tariffs were reduced beginning in 1995, and eliminated by 1999, as part of the GATT Uruguay Round "Zero-for Zero" negotiations. Other signatories to the agreement include the European Union, Japan, and Korea. Toy trade between Canada, Mexico and the United States is duty free under the NAFTA agreement. As part of China's accession to the World Trade



Organization (WTO), it eliminated tariffs on most toy categories in 2005. In 2011, Free Trade Agreements were signed with Korea, Columbia, and Panama. After full implementation of its WTO commitments, toy tariffs which ranged from 5 to 20% have been reduced and are now between 5 and 15%. Russia formally joined the WTO in 2012.

Convergence of Factors – Global Recession, Growing Asian Demand and Cost Rises

The Asian (primarily Chinese) toy market grew rapidly through the 20 year period prior to the current/recent recession and built expansive industrial capacity to support vastly increased demand from abroad. Due to substantially lower overseas demand during the period from 2007-2010, Chinese toy making companies increased their emphasis to sell their products to the rapidly growing domestic Chinese market. The rising influence of the Chinese domestic consumer market lessened the negative impact to the native industry, but combined with rising labor costs and rapidly increasing raw materials costs the industry has increasingly been relocating production to the interior of China and to other countries as indicated above.

Geographic Concentrations

In China the main regions for toy and games manufacturing are Guangdong, Zhejiang and Jiangsu provinces. Shanghai, Shandong and Fujian are also production centers for certain items, but the large-scale toy manufacturing centers are to the north and south of Shanghai and around Guangzhou with Guangdong being by far the largest. All of these production centers are served primarily by the airports and seaports in Hong Kong and Shanghai, but also by other proximate hubs.

Guangdong

Total manufacturers: 5000+

Main export category: plush toys, electronic toys, plastic toys

Export value: \$17 billion

Jiangsu

Total manufacturers: 700

Main export category: plush toys

Export value: \$1.7 billion

Zhejiang

Total manufacturers: 1000

Main export category: wooden toys, bicycles

Export value: \$1.6 billion

Shanghai

Total manufacturers: 700

Main export category: bicycles, strollers

Export Value: \$1 billion

Shandong

Total manufacturers: 550

Main export category: plush toys

Export value: \$3.5 billion

Fujian

Total manufacturers: 500

Main export category: electronic toys, plastic toys

Export value: \$2.2 billion

Source: TJPA

Major Business Players

The global toy industry is largely comprised of two categories of company types, 1) home market brand manufacturers and 2) production center manufacturers. Home market brand manufacturers are companies like Mattel in the US, with its corporate body in the US but most of its manufacturing operations outsourced in Asia. All of the companies shown below sell into the US market and most manufacture the majority of their product in Asia. Production center manufacturers are (largely) Asian based firms that operate design and manufacturing facilities in Asia and sell directly to an importer for distribution into the home market.



Major Global Toy Manufacturing Firms

Company	Base of Operations
Mattel	USA
Hasbro	USA
MGA Entertainment	USA
LEGO	Denmark
Namco Bandai	Japan
Sanrio	Japan
Steiff	Germany
Microsoft	USA
Nintendo	Japan
Sony	Japan
Dream International Limited	Hong Kong
Hong Kong Playmates Co. Ltd	Hong Kong
Guangdong Alpha Animation and Culture, Ltd.	China
Xinghui Auto Model Co., Ltd.	China
Goldlok Toys Holdings Co., Ltd.	China
Guangdong Huawei Toys Craft Co., Ltd.	China

Source: GLDPartners

Mattel



Mattel designs, manufactures and markets a wide variety of toy products on a worldwide basis. Brands are grouped in the following categories: Mattel Girls & Boys Brands, Fisher-Price Brands and American Girl Brands. Mattel brands include Barbie, Polly Pocket, Little Mommy, Disney Classics, Monster High, Hot Wheels, Matchbox and Tyco R/C vehicles and play sets, CARS, Radica, Toy Story, Max Steel, WWE Wrestling, and Batman, among others. Fisher-Price brands include Fisher-Price, Little People, BabyGear, Imaginext, View-Master, Sing-a-majigs, See 'N Say, Dora the Explorer, Go Diego Go, Thomas and Friends, Mickey Mouse Clubhouse and Power Wheels. American Girl is a direct marketer and retailer of dolls, accessories, and publications in the U.S. and Canada. Brand names include My American Girl and Bitty Baby. Mattel operates in the U.S. and internationally. Revenues from the international segment provided 44% of

consolidated gross sales in 2012. In the international segment, the geographic revenue breakdown for Mattel was as

: Europe, 54% of sales; Latin America, 32%; Asia Pacific, 14%. Excluding the company's international sales, Mattel has approximately a 20% market share in the US toy industry, making it the largest U.S. toy manufacturer. Buyer concentration reduces the bargaining power of Mattel with regard to negotiating sales prices for its products, and raises the risk to the company if its customers have difficulty meeting financial obligations or selling products, Mattel depends on a relatively small retail customer base to sell the majority of its products, given that the company's three largest customers, Wal-Mart at \$1.2 billion, Toys "R" Us at \$700 million, and Target at \$500 million, accounted for approximately 37% of Mattel's consolidated net sales of \$6.4 billion. (Mattel Annual Report 2013)

Hasbro



Hasbro is a worldwide leader in children's and family leisure time and entertainment products and services. Some of the company's widely recognized core brands are Transformers, G.I. Joe, Nerf, Monopoly, Playskool, Supersoaker, Battleship, Tonka, Play-Doh, My Little Pony, Milton Bradley, Parker Brothers, and Magic: The Gathering. Hasbro markets its brands under several product categories: boy's toys (39% of 2012 net revenues), such as action figures, sports products, and licensed products based on popular movie, television and comic book characters; games and puzzles (29%), including traditional board games, role-playing games, jigsaw puzzles, and electronic learning aids; girls' toys (19%), comprised mainly of plush products; and preschool toys (13%).

The company's growth strategy is to build its core brands through development of a wide range of innovative toys and games, entertainment offerings and licensed products. Hasbro operates in the US and internationally. International operations contributed 44% of net revenues in 2012. In recent years, the company has expanded its operations in emerging markets, primarily in China, Brazil, Peru, Colombia, Russia, Korea, Romania and the Czech Republic. Hasbro licenses certain of its trademarks, characters and other property rights to third parties for use in connection with digital gaming, consumer promotions and the sale of non-competing merchandise, such as apparel, publishing, home goods and electronics. In the digital licensing category, Electronic Arts, Inc. has worldwide rights to create digital games for mobile phones, gaming consoles and personal computers based on Monopoly, Scrabble, Yahtzee, Nerf, Tonka, GI Joe and Littlest Pet Shop.

An important trend within the toy industry is that many children have been moving away from traditional toys and games at a younger age. As a result, traditional toy companies now also face competition from entertainment offerings of other companies, such as makers of video games and consumer electronic products. Hasbro has been fairly successful in keeping up with this trend. Hasbro depends on a relatively small retail customer base to sell the majority of its products. In 2012, Wal-Mart, Target and Toys 'R Us accounted for approximately 17%, 11% and 10%, respectively, of the company's net revenues. Though not as severe as Mattel, such buyer concentration reduces the bargaining power of Hasbro with regard to negotiating sales prices for its products and raises the risk to the company if its customers have difficulty meeting financial obligations or selling products.

This need to increasing seller outlet diversity is a critical issue for the whole of the toy industry and impacts its outlook significantly. The advent of various new e-commerce toy retail channels are a significant evolution and will grow, albeit still significantly linked to some of those large traditional retailers.

Supply Chain

The global toy industry supply chain is characterized by several sharp distinctions. It is important to acknowledge that the global toy industry has for some time been largely centered in China. On the one hand, the toy industry faces very significant pressures caused by the fluctuations of raw materials prices and exchange rate, the rising of Asian (mostly Chinese) labor cost and the continuing (relatively) depressed overseas demand caused by the European and American debt crisis. On the other hand, it sees huge development opportunities brought by the rapid rising of the foreign emerging (mostly Asian) markets and the continuous upgrading of the domestic consumption market. And yet again from another perspective, the industry is undergoing some rather significant and fundamental product mix changes. Like many things the toy industry is increasingly focused on the use of technology and electronics for either fun or learning. As market offerings for higher-priced items such as child-focused tablets increases, issues like transport-period, inventory carrying cost, and quick-response requirements are impacting how the industry functions. The European and American markets are huge and are vitally important, but will incrementally become less dominant in their importance to Asian manufacturers.

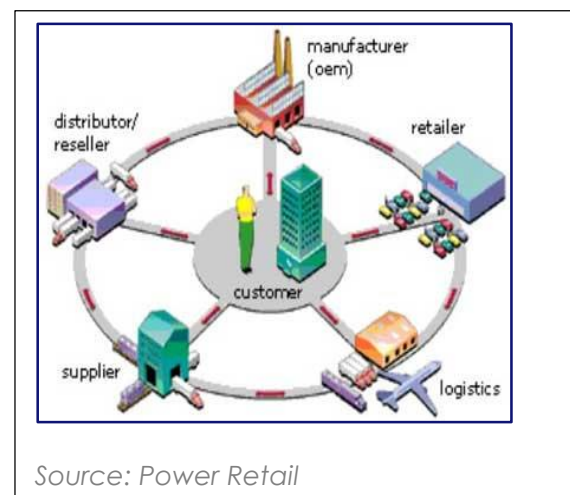
The supply chain management practice in the industry has evolved quite a lot and is continuing to undergo improvements in efficiency. At present, there are generally three supply chain management practices for toy retailers in terms of global ordering behaviors. This includes the following manufacturing-

ordering/replenishment-delivery systems: 1) one-off, 2) just-in-time (JIT), and 3) the mixed model. This has evolved from essentially a historic model which was a traditional push/mass manufacturing model which yielded slow-responsiveness in the toy supply chain. In this model, an order to the manufacturing operation would occur 6-10 months ahead of delivery and would require the retailer to estimate specification and level of demand far ahead of schedule. This system is still utilized to a degree but most large retailers are highly engaged in managing retail replenishment to manufacturing schedules so as to minimize inventory and transportation costs. Like many other retail-driven supply chains, there are still modest levels of sophistication in supply chain management information to manage known and unanticipated volatility and seasonality challenges. This is likely to change dramatically in the coming decade and will result in substantial techniques to manage ordering, manufacturing timing, inventory management and transportation. Justifying their cost, third-party logistics firms will likely be driving much of this evolution.

The important challenge is to refine the match between manufacturing practices with retailer supply chain SCM-practices. (Chee Yew Wong, Jan Stentoft Arlbjörn, John Johansen) Therefore, it is important to review gaps associated with extreme volatility and seasonality and understand if the change inherent in the industry product structure and the evolving supply chain system will allow for an opportunity for either forward deployment (warehouse and distribution) from Alaska, or some sort of additive or postponed manufacturing process in between the point of primary manufacture and the final retail region.

Trends

- Despite its rapid growth in recent decades, many of the advantages that have fueled the expansion of Chinese manufacturing are beginning to deteriorate. Chinese wages have experienced rises of 8-17% per year and the value of the Chinese Yuan has risen quite significantly. Though the gap between U.S. and Chinese wages is still significant, it is narrowing rapidly which is making inventory and shipping costs more of a consideration.
- The impact of China and Hong Kong's decline in market share has been spread across a number of much smaller toy exporting countries. The next



largest source of toy imports after China and Hong Kong is Vietnam, which increased its market share position from 1.3% to 1.5%. Though this may sound insignificant, to put in perspective this increase translates to the shipment of 765 TEUs via ocean carrier or the equivalent of approximately 38 air cargo freighter loads (by volume measure only).

- The Chinese toy consumption market is large and becoming increasingly attractive to global toy companies. This domestic market is attracting new foreign inward investment and this is causing a change in the business “ecosystem” that has grown-up largely to support foreign sales. Foreign brands like LEGO Group plans its first factory in China, and some local toy manufacturers have already claimed it could lead to tougher Chinese domestic competition. (South China Morning Press) The LEGO factory will be built in Jiaxing, about 100 Km from Shanghai, where the group is also planning to locate a regional distribution center for Asia. Reuters reported it could create about 2,000 jobs once fully operational in 2017. The Company's strategy is to have production close to their newest core markets. The company has indicated that having full control of the production process is essential to deliver products of a consistent high quality and safety.
- Reshoring manufacturing from Asia to the US is a small but growing trend. As an example, K'Nex Brands who is a maker of a family of mostly “connect and build” toy sets, such as K'Nex, Lincoln Logs, and Tinker Toys has completed a US reshoring strategy. Founded in 1956, the company had moved most of its toy production to China by the late 1990s, but the company still made other products for customers, such as coffee filters and plastic parts for windows that could be produced using highly automated processes. When the most recent recession began, demand for those items fell dramatically and reshoring plans began in large part as a way to keep current factory workers busy. The company relentlessly worked to design out costs and adopted a view that if they couldn't make it, they engineered it out of the product. It redesigned its products to reduce labor requirements, such as changes to plastic track components that enabled them to be snapped together rather than using a pin inserted by hand in China. Other parts became part of a new “customer-assembly process” that was previously done by Chinese workers. At the same time, there were certain items that needed to be sourced from China (small battery-powered motors for example) because the company can't find a competitive US supplier. To help keep costs down, the company recently acquired a robot for some packaging tasks. The family-owned, \$100 million manufacturer cited the need for greater market responsiveness as the main driver of the change, as well as better control of quality and materials, which impact customer satisfaction and safety. The

move of production back to the company's factory in Pennsylvania required rethinking product design in some cases and even a bit of "outsourcing to the customer" where the customer will need to perform some of the assembly work that was previously done as part of the manufacturing process, reducing labor content. But while it has a goal of moving 100% of its production back to the US, the company is finding many challenges. As others trying to keep or bring back production to the US have reported, perhaps the chief issue is finding suppliers in a domestic market that simply had lost most of its supplier base for critical parts. (SCDigest and WSJ)

- The trend toward customer and market-specific customization of product will emerge in the toy sector, where supply chains will be required to configure to accommodate smaller lot, product specific alterations, sometimes on a quick-turnaround basis. This will be partly driven by the ability of the development of the e-commerce channel and transportation considerations will be an even more important part of toy sales and supply chain management.
- There will be a continuing shift to higher-spec technology products as low-cost technology applications are adapted throughout the toy category. Overall, this will push the overall price-point of the average toy to higher levels. The sourcing and supply chain system will need to accommodate and integrate very low cost parts with higher technology components (boards, screens, etc.) that will most likely be sourced from a different location.
- The US and the EU will continue to be key markets despite weakened demand from these areas. Nevertheless, more exporters will give increasing importance to non-traditional destinations.
- Toys and games suppliers in China have withstood challenging times since the recession began in 2007. Since 2010 though, both internal and external pressures have eased somewhat. The rate of increase, which reached 30% in some markets in 2010, is significantly lower now and there remains overcapacity. Particularly in 2012 and 2013, it has been a time of adjustment and balance calibration for China's toy industry. On the one hand, the toy industry faces the pressure caused by the fluctuations of raw materials prices and exchange rate, the rising of labor cost and the continuous depressed overseas demand caused by the European and American recession. On the other hand, it faces huge development opportunities brought by the fluctuation but rising trend of foreign emerging markets and the continuous upgrading of the domestic consumption market.
- In order to enhance its competitive edge and bargaining power against other countries, Hong Kong toys manufacturers have been actively seeking low-cost offshore production facilities not only in the PRC but also in other low

production cost countries such as Vietnam, Indonesia, Malaysia, the Philippines and Thailand.

- The issue of social responsibility is now important and high profile to brands. Toys"R"Us has developed and maintains *Standards for Partner Conduct* which require that anyone working on behalf of the company, including business partners, service providers, independent contractors and each of their subcontractors, comply with all laws and regulations in each country in which it operates, or in which Toys"R"Us operates, as well as with company procedures and policies. The *Standards for Partner Conduct* requires that all Toys"R"Us Partners adhere to an absolute prohibition on the use of involuntary labor of any kind, including child labor and indentured labor. Working conditions must adhere to all applicable laws regarding safe, healthy and clean work site conditions. (Toys R Us website)
- The ASEAN and the Middle East markets are emerging as small but high-growth markets.
- Product enhancements will include customizing designs based on specific locations. Dolls and stuffed toys with physical features similar to the user market and sporting folk costumes are going to be offered.
- New toys and games from China will emphasize better aesthetics and functionality. Electronic features such as lights and sounds, and realistic models are going to be mainstream. Makers will also be developing versions that interact with tablets and Web-based applications.
- There are other issues that suppliers are contending with, including product testing fees. These costs are escalating, with the increases averaging 15-30% annually in some cases. A vastly larger number of substances are now required to be monitored as companies work toward meeting the EU's new toy safety directive and US and Canada child safety regulations

Summary and Implications

The toy business is undergoing substantial change and change will continue over the next decade. The industry has a heavily-weighted last quarter-oriented supply chain system and needs to move extremely large product volumes in a rather short period of time. Reflecting these complexities, inventory cost management is of high concern for toy makers, wholesale manufacturers and retailers. The toy industry's supply chain dynamics supporting North and South American markets are evolving to support more refined replenishment systems. Overall, this is a work-in-progress and is not close yet to being a stable and mature system.

By all accounts, Asia is expected to remain the primary manufacturing hub for most inexpensive toys and also for the growing higher-spec electronics-based

toy product sub-sector. China will not remain the overwhelmingly dominant production center that it has been for several decades as Vietnam, Indonesia and other Southeast Asia and South Asian countries will continue to gain market share. The geographic dispersion of the Asian toy market will require increasingly more complex supply chain management practices because of multiple sourcing points and because of longer distances from global logistics hubs.

In terms of opportunity for Alaska, here is a summary of the range of plausible opportunities. These opportunities probably are not all equally realistic, but there is some reason to suggest that there may be some investment possibilities under the right circumstances.

Manufacturing

- Overall, there does not seem to be a meaningful set of opportunities for pure toy manufacturing activity in Alaska. Alaska does not have the proper mix of raw materials access and lower cost and plentiful labor to establish the platform for a manufacturing value proposition.
- The Asian cost advantage over North America will remain but the sourcing points will change from being dominated by the major traditional toy manufacturing regions. This is pertinent to AIAS because growth at new sourcing centers will impact transport routing from Asia to the US. Still, as will be expected in this sector, the vast majority of goods produced will continue to transit via ocean vessel. With that said, high-spec products and customization will require some increasing emphasis on fast delivery and last minute customization for some products.
- In theory there is some modest chance for low-value-add manufacturing activity on the basis that Alaska provides a consolidation point for multi-market Asian origin shipments, but still the cost disadvantage will likely outweigh and supply chain/transport advantage.
- Conclusion: Low-probability for toy manufacturing in Alaska

Forward deployment

- There is some but limited potential for situational non-manufacturing forward deployment activities in Alaska.
 - To the extent that there were opportunities, it would most likely be as a result of the increasing practices of multi-source origin supply chains for higher-priced products and the future trend for last minute product customization.

- For lower-priced goods, most products will continue to transit via vessel and there is little reasonable chance for mode shift to air cargo and therefore an Alaska investment.
- Due to the trend to multi-source origins, the following could be possible:
 - Given that some high-end toy products reflect similar supply chain characteristics as with the electronics industry, for higher-priced toys there is a small chance for forward deployment component assembly for electronic and chassis components that are sourced from multiple Asian markets. Most toy products from this class will be relatively lower-specification electronic products. Related to higher-priced toys and games, a theoretical central consolidation point base for multiple-origin product for sorting, packaging may be strategically valuable.
 - There will be similar opportunities for/around late-stage customer driven product customization practice, where the competitive market will dictate that product will require final stage customization and delivery to the customer within 1-2 days. This probably cannot happen efficiently in Asia, at least given existing practice.
 - For higher-priced non-electronic products, there could be some chance that bulk quantity shipments-inbound could require sorting, multi-product bundling, labelling and packaging at a central transit-stop location. This may be a low possibility, but could be enhanced if late-stage client-specific (retailer, perhaps end-user) customization were to take place.
A location for market-specific product bundling or picking readied onsite for quick-shipments requiring time-certain stocking replenishment could be offered.
 - AIAS could provide a western-market edge (referring to US market) distribution point so as to avoid the cost and time of transit backtrack miles if sending from a domestic distribution point in the central or eastern US. By that logic, asset/route competition would be markets like Seattle, Portland, Vancouver or Los Angeles.
 - The increasing use of e-commerce selling model will require more forward deployment than ever before especially in November and December. Taking advantage of integrator presence, AIAS could potentially serve as hub-point allowing for 8-12 hour delivery windows from a westernmost US supply point.

- Role of the third party logistics provider – Increasingly many of the evolutionary changes described above will be driven by outsourced practice management. 3PL's will increase their visibility in the Asia to North America market and will innovate alongside their clients.
- Limitations: Due to local limitation issues concerning physical asset size and labor force, project scale may be a challenge in Alaska.
- Latin America - AIAS could theoretically offer a transit-stop location for the Latin America market by providing a feeder supply system for major distribution centers in key markets. If part of a multi-stop system, the reach could be throughout Latin America but will be driven by the carrier's overall load/profitability formula which will take into account the market for a return load either to the US or on to Asia. It will be important to build the business case for the secondary leg (for example the DFW-Latin American market) in both directions and this will undoubtedly require overlapping market sector business.



Source: GLDPartners

AIR CARGO DRIVEN COMPETITIVENESS BENCHMARKING REPORT

A customized competitiveness assessment model was developed to illustrate how a corporate decision maker might initially assess location-influenced site options for a real-world project example. This work was based upon readily available data and prevailing industry knowledge. This model benchmarked ANC against 6 competitor air freight hubs which illustrates how various location factors influence location decisions, identify location strengths, and suggest areas for improvement.

Methodology

The framework for the competitiveness assessment model included:

- A specific project investment scenario was defined for each industry segment, including product mix, employment, facility size, supply chain requirements and transport requirements.
- A series of review factors were defined and organized by the broad categories of:
 - Cost
 - Shipping cost
 - Deicing cost
 - Time-in-Transit
 - Air cargo time
 - Shipping frequency
 - Late parcel pick-up
 - Reliability
 - Number of air cargo carriers
 - Labor relations
 - Weather risks
 - % of airport arrivals/departures cancellations
 - Business Environment/Infrastructure
 - Availability of warehouse/flex space on the airport
 - Availability of ready to develop land
 - Cost of new industrial construction
 - Taxes
 - Foreign Trade Zone (FTZ)
 - Deal closing fund
 - Fast track site permitting
 - Availability of sector workforce

- Cost of sector workforce
- Cost comparisons for each specific profile were developed from a mix of public and proprietary sources.
- Qualitative criteria was selected by the GLDPartners team based on interviews, research & past deal and sector experience.
- Relative weights were developed among the 4 main categories and for each criterion within a category as a proportion of 100. Weights vary for each supply chain profile depending upon nature of the scenario.
- For each profile, candidate locations were scored based on quantitative factors using a 1-10 scale (with 10 being the best score).

The six major air freight hubs for comparison were:

- West Coast air freight hubs
 - Seattle, Washington
 - Los Angeles, California
 - San Francisco, California

All three of these hub regions are established in one or more of the key sectors/supply chains

- ANC Integrator headquarter hubs
 - Memphis, Tennessee
 - Louisville, Kentucky

Both UPS and FedEx perform value-added activity for customers in their headquarter hubs which tie into their major sorting hubs at AIAS.

- West Coast Canadian air freight hub
 - Vancouver, British Columbia

747-8s and 777s have the ability to over-fly ANC with direct flights into Vancouver which is beginning to present itself as a major competitor.

Findings and Conclusions

After a review of the supply chains practices and the changes occurring within each of the six industry sectors and a filter review of air freight hub to air freight hub competitiveness, GLDPartners believes that AIAS's best opportunity to compete for value added economic activity is in these four key segments:

- Pharmaceuticals
- Aerospace
- Automotive
- Electronics

Even though toys and fast fashion represent large volumes of product moving through ANC, these sectors do not represent the best opportunities for value added activity at this time.

Fast fashion has radically changed the cost, quality and the risk of producing clothes. Manufacturers are investing heavily in manufacturing facilities, logistics centers, and new stores and have aggressive expansion plans for new markets. But the fast fashion industry is an evolving phenomenon and there is much growth expected in the Asia-North America supply chain system. For that reason, we feel that Alaska should watch the industry carefully over the next several years to determine if fast fashion trend volumes in this trade lane are sufficiently expanding.

As for the toy industry, 86% of the world's toy production is currently done in China but much of this work is migrating at an increased pace to lower cost markets. (Toy Production in China, Reuters) Even though an increasing proportion of toy sales include products with electronic components, the value-added potential for this industry is not sufficient for Alaska to pursue.

All the sectors selected have supply chains that are driven by international and domestic air freight both inbound and outbound. Reliability, time in transit, airport delays and cancellations are all important location factors that will influence logistics location decisions in these sectors. In each of the logistics factors considered, ANC generally enjoys an advantage over all the competitors in this regard.

ANC's rankings in the Business Environment/Infrastructure category is where the competitive advantage is weakened. ANC is hampered by the lack of an existing building inventory, high construction costs, perceptions associated with a high unionization rate, a small workforce with a limited skill set range, a limited state incentive policy, and finally the absence of a manufacturing legacy which understands the economic importance of value added manufacturing activity. Two strong positives for ANC in Business Environment/Infrastructure are the existence of a FTZ on the airport and one of the most favorable business tax structures in the United States.

Pharmaceuticals

Pharmaceuticals proved to be the strongest sector reviewed. It is one of the fastest growing sectors in the global economy and at the same time is experiencing much turmoil in its business practices. These combined dynamics are causing significant facility, supply chain and logistics changes in global operations.

Operational risks in the pharmaceutical industry are very high. Shipments typically are small, but have very high value with a hundred pounds of product potentially worth millions of dollars. They are targeted for theft, diversion and counterfeiting. But they can also face both strict temperature and regulatory requirements and hurdles. For instance, many common childhood vaccines (polio, measles, mumps, rubella, etc.) must be kept at 2° to 8°C and may not be frozen; biologicals and other medicines also have strict temperature requirements. If the temperature protocols are broken, the medications may become less potent, completely inactive, or even harmful which in most cases leads to the destruction of the drugs.

As the industry continues to change, pharmaceutical air freight shippers are shifting from parcel to freight, with more heavy bulk freight shipments and they are moving goods from priority to deferred delivery. For international deliveries, this shifts delivery times from one- to two-day priority service to three- to five day deferred delivery. Critical products — biologics and clinical specimens --- will continue to use priority shipping, but overall, shipping is becoming more episodic, based upon field inventory rather than set schedules,

In the Pharmaceutical profile, the scenario featured:

Activity	Pharmaceutical reverse logistics center
Facility	15,000 SF building, 1,000 SF office, 3 loading docks, 15 foot ceilings, climate control requirements, level floor, redundant power, no special water or gas requirements
Supply Chain	Eastbound movement/reverse logistics for pharmaceuticals handling a combination of product returns, of expiring or overstocked product recalls initiated by manufacturers or by FDA for product defects Shipment: 250Kg combination of product returns of expiring or overstocked product recalls
ANC Location	On-reservation
Sourcing Locations	Shanghai, Beijing, Tokyo
Destination Locations	Chicago, Newark
Land Requirements	1.5- 2 acres

As seen in the figure below, ANC has both the highest qualitative and quantitative scores besting the nearest competitor, Seattle, by almost a full point.

Pharmaceuticals Site Decision Factors	YVR	SEA	LAX	SDF	MEM	SFO	ANC
Cost	1.43	1.49	1.50	1.44	0.80	1.50	1.40
Time In Transit	0.92	0.85	1.27	0.89	0.82	0.89	1.67
Reliability	1.58	1.61	1.62	0.95	0.85	1.35	1.90
Business Environment/Infrastructure	1.64	2.16	1.68	1.88	3.36	1.08	1.96
TOTAL	5.56	6.10	6.07	5.16	5.83	4.82	6.92

Based upon the competitiveness modelling, reverse logistics/returns and clinical trial component distribution & associated logistics represent the best opportunities for AIAS.

Reverse logistics, which was once thought to be a very minor piece of the supply chain, has now evolved and is considered a significant part of managing the product flow for major pharmaceutical companies whether they are managed internally or outsourced to a professional returns company. Historically specialty returns companies have had a lock on the reverse logistics market because of their knowledge of the industry. But with the magnitude of the global market and the move by the industry for cost containment, pharmaceutical manufacturers are now combining commercialized products and clinical trial compounds under one logistics contract for greater savings. They're also beginning to consolidate return shipments and use shared, secure facilities.

Recent publications indicate that manufacturers currently spend up to 4% of the cost of goods sold on non-value-added distribution functions like returns and reverse logistics. Three to four percent of product going out from pharmaceutical warehouses ultimately comes back. Some of this is redistributed, and some returned for disposition and destruction by a 3rd party processor or manufacturer. And, the magnitude of the global market is enhancing outsourcing to 3PLs for shared use, secured facilities for clinical trial compounds and consolidated returns shipments.

With such a large amount of product going through the reverse supply chain, returns should be an ideal touch point for new activities that positively impact revenue and at the same time support a safer pharmaceutical supply chain.

Target Companies

National Pharmaceutical Returns, Achieva Group Returns, PharmaLink, Guaranteed Returns, Return Solutions, EXP Pharmaceutical Services, Woodfield Distribution, Inmar, UPS Supply Chain Solutions, FedEx, DHL, and GENCO.

Aerospace

Aerospace is also a very strong sector which is enjoying robust growth. To keep the airplanes flying, service and managing replacement parts is conducted over a global footprint. Increasingly these parts are supplied from manufacturers spread across a broad geography making quick fulfilment even more complex. These pressures are elevating supply chain management to an unprecedented level. This added pressure is prompting companies to outsource to 3PL providers to manage inbound material movements, production and maintenance, repair and overhaul (MRO) activity. This includes providing visibility to an order and parts level, determining total landed costs and synchronizing the flow of materials from suppliers.

The practice of service parts logistics is becoming much more important as the industry matures. After-sales service is a high margin business and accounts for a large portion of corporate profits. Since the product lifecycle is quite long, aerospace companies are finding more opportunities pursuing after sales services and are looking for locations to serve their global customers

Reverse logistics also plays a very critical role in the aerospace supply chain. Governments impose strict rules about tracing the location and history of airplane parts – actually down to the serial number. Parts are very high value and have a limited lifecycle so that reverse logistics becomes as much a part of the supply chain as original distribution.

In the Aerospace profile the scenario included:

Activity	North America spare parts logistics distribution center
Facility	Description: 60,000 sq ft warehouse, 3,000 sq ft office, 5 loading docks, 30 foot ceiling height, high climate control, level floor, redundant power, (automated picking systems) no special water or gas requirements
Supply Chain	3PL operation supporting, one MRO, standard spare parts and sensitive and high volume part lines, high density storage, elevated order picking system supporting OEM
ANC Location	On-reservation
Sourcing Locations	Multiple points Japan and Korean
Destination Locations	Phoenix, Miami, Sao Paulo, New York, Lisbon, Beijing
Land Requirements	7+ acres
Modelled Origin - Stop - Final Destination	NRT-XXX-LAX

As seen in the figure below ANC has the third highest overall score but is edged out by MEM and LAX. MEM is the clear leader in this profile due to their strong showing in Business Environment/Infrastructure. LAX scored modestly ahead of ANC in part due the modelled scenario which has Los Angeles as the end-destination. This score puts ANC very much in the mix with their excellent air infrastructure and central location to serve both the Asian and European markets.

Aerospace Products Site Decision Factors	YVR	SEA	LAX	SDF	MEM	SFO	ANC
Cost	1.43	1.49	1.50	1.49	0.80	1.50	1.40
Time In Transit	1.06	1.19	1.58	0.40	0.40	1.35	1.62
Reliability	1.53	1.64	1.60	1.09	1.04	1.34	1.71
Business Environment/Infrastructure	2.00	1.84	1.72	2.12	4.92	1.22	1.52
TOTAL	6.02	6.16	6.40	5.05	7.15	5.91	6.25

Based upon the competitiveness modelling, the best opportunities for AIAS in Aerospace are activities in the forward and reverse supply chains---inbound materials movement for materials production and MRO activity and outbound spare parts movement including reverse logistics.

Aerospace companies are no longer holding inventory at their site or tasking this activity to their vendors. They are outsourcing the management of these activities to 3PLs. To perform these functions a 3PL will require a location that gives them global reach, speed, visibility, and 24/7 service. Flexibility will be essential with the ability to strategically supply parts in the right places, both inbound and outbound while placing price second to customer service.

Target Companies

New Breed Logistics, Samtak, PALCO, Kuehne and Nagel, CEVA Logistics, DHL, UPS Supply Chain Solutions, and FedEx

Automotive

Automotive is a sector that is undergoing unparalleled expansion and a transformational shift as the auto industry is restructuring and growing through innovative technologies. Asia is the dominate market in the world with sales and production booming in China and new auto investment being made in the so-called MIST (Mexico, Indonesia, South Korea, and Turkey) countries.

Transformational technologies are challenging the core competencies of the traditional auto industry as the industry strengthens its ties with technology companies in the Silicon Valley. As a key part of the economy, the auto industry is one of the most innovative sectors. BMW, Nissan-Renault, Ford and Toyota have opened large research and development offices in Silicon Valley since 2012 and General Motors, Honda and Volkswagon have been there even longer than that. The ever-increasing demand for comfort, connectivity and safety in cars is fuelling unprecedented levels of electronics.

The US auto industry continues to surpass expectations for a stable market but it is being cannibalized by new entrants into the market. Mexico's auto sector is large and rapidly growing into a global export center as the 7th largest exporter. The future is bright for the automotive sector and there are great expectations for increased product quality, connectivity, in-car entertainment options and fuel efficiency.

In the Automotive profile, the scenario featured:

Activity	High-velocity, high end electronics and component distribution
Facility	60,000 sq ft building, 3,000 sq ft office, 7 loading docks, 30 ft ceiling height, high climate control, level floor, redundant power, (automated pick systems), no special water, gas requirements
Supply Chain	Factory assembly line inventory management facility supporting new vehicle assembly plants Located throughout North America (US, Canada and Mexico)
ANC Location	On-reservation
Sourcing Locations	Seoul
Destination Locations	Detroit, Atlanta, Kansas City, Hermosillo, Guadalajara, Monterrey
Land Requirements	7+ acres

As seen in the figure below ANC was second only to Seattle which had slightly higher scores in cost, reliability and business environment/infrastructure. The nearest competitors are Vancouver and Louisville. Once again this score places AIAS very much as a contender for certain niche projects in the auto industry

Automotive Products Site Decision Factors	YVR	SEA	LAX	SDF	MEM	SFO	ANC
Cost	1.43	1.49	1.50	1.44	0.80	1.50	1.40
Time In Transit	0.64	1.05	1.02	0.75	0.61	0.68	1.62
Reliability	1.49	1.70	1.64	1.19	1.16	1.98	1.58
Business Environment/Infrastructure	2.22	2.34	1.12	2.28	2.60	0.88	1.38
TOTAL	5.78	6.57	5.28	5.66	5.17	4.72	5.98

Based upon the results of the competitiveness modelling, the best opportunities for ANC in the automotive sector are forward deployment centers for high-value technology components, final inspection and customization for expedited special order technology components.

The automotive industry has always relied on air-freight for its just-in-time deliveries and lean inventory strategies. In fact the auto industry has heavy fines and penalties for their suppliers if manufacturers must halt production because of

the lack of materials or supplies. Fines could be tens of thousands of dollars for every day of delay.

The current trends in the industry are having a mixed and constantly changing impact on the industry's demand for air cargo services. But the net result is that there are business opportunities for the airlines and the 3PLs that are active in the movement of components for production lines, after-market spare parts and on occasion compete new cars as the tier one suppliers export their products from North America to Asia and Asian imports to the US and Mexico.

Target Companies

CEVA Logistics, Schneider Logistics, Ruder Logistics, Penske Logistics, Excel Logistics, Kuehne & Negal Logistics, Schenker Logistics, DHL, TNT, Panalpina, UPS Supply Chain Solutions, Nippon Express, CHRobinson, NYK Logistics, BAX, UTI, CaterpillarLogistics, APL Logistics, Wilson Logistics, Denso, Aisin Seiki, Magna, LG Chem, Johnson Controls, Delphi, TRW, and Visteon

Electronics

Electronics is a traditional sector that is going through several fundamental shifts that are reshaping the role of air freight and how logistics providers are approaching this sector. Miniaturization, enhanced memory capacity, and the integration of technologies are having a disruptive effect on air cargo in the electronics industry by reducing size, cost and weight of products. The product lifecycles are getting ever shorter and the margins tighter, increasing pressures to lower costs and manage materials and supplies more efficiently. Further complicating the landscape is that electronics companies sell into so many vertical markets each with its own unique needs.

The supply chain complexities of a global market, so many product lines and so many components sourced from global locations creating a complex and costly supply chain, are forcing more electronics firms to outsource their logistics to 3PLs. But this outsourcing has not been without its issues. There remains much discontent with just less than 70% of the electronics manufacturers happy with their 3PL experiences. There seems to be a gap between the services that 3PLs are offering and what the manufacturers feel are the value added services that they need.

It is this perceived void that has prompted contract manufacturers (especially in emerging markets) to begin offering services that are traditionally offered by 3PLs. Contract manufacturers play a major structural role in the electronics

sector. Operating in an environment that requires ever increasing cost-cutting measures, supply chain stability and manufacturing flexibility, contract manufacturers are a critical partner and the lines between contract manufacturers and 3PLs are blurring. Contract manufacturers see this as a logical expansion of their services as well as a higher margin opportunity.

Meanwhile the location of manufacturers is shifting. In China production is moving from the coastal region to the western region and also out of China to less expensive locations in Southeast Asia. Manufacturers and distributors are expanding their focus on developing markets in Asia and Latin America to offset the slower growth in Europe and North America. Markets worldwide are in transition which is also affecting the air cargo industry.

In the Electronics profile the scenario features

Activity	Multiple-source forward deployment final assembly
Facility	50,000 sq ft building, 2,500 sq ft office, 5 loading docks, 30 ft ceiling height, medium climate control requirements, no special water, gas requirements
Supply Chain	Increasing source parts suppliers are disbursed and ANC can provide a higher-cost but very efficient central points for 1) final assembly, 2) customization, 3) inventory management for high-end products
ANC Location	On-reservation
Sourcing Locations	Shanghai, Zhengzhou
Destination Locations	Los Angeles, Memphis, Louisville, New York
Land Requirements	7+ acres
Modelled Origin - Stop - Final Destination	PVG-XXX-LAX

As seen in the figure below ANC is very much in the middle of the pack for this industry. SEA, LAX, and YVR all have better overall scores, but ANC is far ahead of MEM, SDF and SFO. Seattle's #1 position is secured by higher scores in reliability and business environment while LAX barely edged out ANC in each factor. YVR's business environment is the only factor that scores higher than ANC. This historically air dependent industry has been experiencing a mode shift to ocean to cut costs and is forecasted to continue to find ways to cut costs. Currently so much electronics freight transits ANC that it is imperative that ANC fight to maintain this business and find a way to add value.

Electronic and Computer Products Site Decision Factors	YVR	SEA	LAX	SDF	MEM	SFO	ANC
Cost	1.41	1.47	1.50	0.75	0.78	1.50	1.70
Time In Transit	0.92	1.05	1.83	0.40	0.40	1.14	1.46
Reliability	1.49	1.70	1.64	1.19	1.16	1.48	1.58
Business Environment/Infrastructure	2.20	2.32	1.38	2.40	2.84	1.10	1.32
TOTAL	6.02	6.54	6.35	4.74	5.18	5.22	5.76

Based upon the results of the competitiveness modelling, the best opportunities for AIAS are:

- Forward deployment component assembly for electronics/high tech components that are sourced from multiple Asian markets,
- Final configuration and packaging of products as the first point of arrival in the US, also known as a postponement strategy,
- Serving as a hub-point allowing for 8-12 hour delivery windows from a westernmost US supply point with inventory build-up periods in September and October.

Postponement strategies are favored by manufacturers because they both reduce inventories and provide the opportunity for a high level of customization. Final configuration, including packaging is postponed until the product is in or close to the market where the product is consumed.

Air cargo will always play a vital niche role in the electronics industry; perhaps not the mode of choice as in the past but as the most viable option in the certain situations as described above.

Targets

Menlo Worldwide Logistics, ATC Logistics and Electronics, Avnet, Arrow Electronics, Ingram, LEGACY Supply Chain Solutions, UPS Supply Chain Solutions, Excel Logistics, Kane 3PL, and Kenco Logistics

SUMMARY AND RECOMMENDATIONS

Changes in global supply chain business patterns are causing modifications to the fundamental business structure of a number of industries. Changes in location-specific manufacturing, sourcing hub locations, new customer location markets and labor availability/cost are all driving supply chain pattern changes. This is becoming evident in a range of industry verticals that have been previously sourced and built in Asia and sold in North America where simplistic supply chain systems are being made more complex to adapt to new change dynamics. These dynamics could provide a window of opportunity for new settings like Alaska to capitalize on its location, unique air cargo transport service and infrastructure to attract logistic-enabled investment.

In the past, the supply chain make-up of key industries would clearly not have presented such an opportunity for Alaska. Depending on the industry, over the past 20-40 years, most Asia-North America supply chains were functioning very efficiently - manufacturing in Asia and utilizing a fairly straight-forward logistics system to get product to their respective consumption markets. In some cases, current industry analytics demonstrate that certain global supply chains will require new logistics solutions to support changing sourcing, rising costs, challenging labor environments and generally more complex market dynamics. Given the pattern and speed of these changes in some sectors, there is an opportunity for new location logistics solutions such as Alaska to provide solutions to the evolving pressures facing a spectrum of manufacturing industries.

The following are some important factors that will govern the magnitude and timing of the opportunity.

- Typically, supply chain changes within a given industry evidence themselves incrementally over a period of time. There are usually not obvious watershed changes that make the need immediately obvious for gross changes in facility locations. Instead, these things occur over a period of years.
- By necessity, most supply chain managers and their superiors are relatively risk-averse and will only recommend changes to the in-place system when it is evident that cost control, supply chain efficiency and/or customer fulfillment has broken down.
- Alaska will be considered an “in-market” location, in that it is a US state and not an Asian location. Most supply chain managers will begin with a perception that it is critical to locate in-market logistics assets near to customers.

- Introducing new solutions that do not follow this will be an extraordinary challenge, and the magnitude of this should not be underestimated.
- The benefit of flexible, strategic business locations will need to be proven to the supply chain manager and described in detail and customized for the target company.
 - This will work best coming from an entity that has going-in high-levels of subject matter credibility.
 - For most supply chain managers, Alaska will represent an out of the box, wholly new business proposition that would almost certainly not have been considered in the past.
- As such, for each proposition the Alaska location will require a thoroughly detailed business proposition, beginning with an understanding of the company's operational and competitive challenges and the product solution.

To make headway, the target must immediately be convinced that Alaska can realistically meet the company's cost and time requirements. Concerns about labor and property will be important but will follow the underlying global supply chain proposition.

- There will likely be no second chances to present and convince so it is imperative that there be strong research and business propositioning preparation.
- Competitiveness analytics demonstrate that Alaska has some clearly evident advantages and disadvantages when reviewing it versus other likely competitor locations.
 - Alaska's advantages are significant but it will need to carefully address certain challenges such as available property and labor readiness to be considered a serious player in this category of global commerce.
- When clients are ready to implement a project they will require in-place assets or property products that can be guaranteed within a short and clearly defined period.

Delivery Recommendations

Business Objectives

As this is complex work and will involve collaboration by a multitude of players, it is important to be very clear about the business objectives to assure that everyone involved understands the target outcomes. "Core" objectives are distinguished from "corollary" objectives, in that core objectives represent

central outcomes and corollary objectives represent key factors that will heavily influence the success of the core objectives.

Core Objectives - Attract new capital investment and jobs to Alaska, and reinforce air service for AIAS cargo business. This would occur from securing investment from the following investment targets:

- 1 Third-party logistics firms servicing target supply chains, and others on an opportunistic basis
- 2 Global manufacturing concerns with Asian – North America supply chains
- 3 Specialty logistics service providers

Corollary Objectives – Factors that will influence the likelihood of success of the core objectives

- 1 Create a credible “solutions oriented” business development organization/ capacity
- 2 Produce highly developed business propositions for direct business development activity
- 3 Assure well-located property assets are available for delivery
- 4 Attending to issues that are identified as challenges in the competitiveness assessment
- 5 Generate a seamless business partnership between economic development, local government, State government, airports and air cargo carriers.

Business Strategy Foundations

There are some specific ingredients that will be necessary for the AIAS-Alaska economic development proposition to be successful. It will be important that:

- Alaska monetize its existing air service connectivity and its “globally strategic location”.
 - Its “strategic location” needs to be profiled within specific supply chains and translated to dollars and cents, time savings, better customer fulfilment, more flexible manufacturing, etc.
- The effort must be built with recognition that success probably won't come immediately.
 - Businesses almost always reconsider and redefine their underlying supply chains over period of time.
 - Alaska is representative of a new set of solutions, in other words clients will probably not have familiarity with Alaska as an option and there will need to be a process to educate and consult.

- A credible business brand must be established early and sustained.
- Alaska will not see success by solely implementing a broad or generic marketing strategy, instead direct and customer-specific business development will be required, complemented by a supportive and professional brand.
 - Delivery of the business proposition should have high-levels of sophistication and specificity, including a dossier summary of the target company's supply chain and a set of specific suggestions offering location, transportation, labor and overall operational and transport cost advantages.
- A well-developed integrated proposition should include the complete support of the State government.
- ALAS must be a visible and strong part of the business development activity, showing to the prospect a fully integrated and highly coordinated program.
- Onsite and offsite property/infrastructure product assets must be in-place, or near-ready. It will be critically important that the implementing entity develop a tight working partnership with both public and private asset owners toward producing modern and customized physical assets.
- The entity implementing this business strategy must prepare a very clear offer in terms of labor availability, skills cost and the Alaska work ethic.

Risk Management

It must be recognized that success will not necessarily come easy and there are a number of important risks associated with this work. Essentially, Alaska is looking to do something that most other competitors haven't attempted. With its unique advantages though, Alaska has some special opportunities that others don't have. Its success is dependent on being able to proactively "move the needle" and; for that to be successful, it must understand key risks and establish a business program that minimizes those risks.

Risk	Prospects won't intuitively understand the value proposition as pertinent to their situation
Mitigation	Proactively define the proposition, including a full assessment of the prospect's supply chain and the key elements of the Alaska solution
Risk	No suitable onsite or nearby properties ready to deliver
Mitigation	Within 12 months - Development planning for key sites and agreements with ANC to be ready for and advance development at the appropriate time.

	18-24 months – First building sites and all associated infrastructure approved
	36 months - At least one building asset in-place
Risk	Concern about Alaska's ability to fulfil project labor requirements
Mitigation	A complete inventory of key skillsets in the market, by specific skill area. Program promise to deliver certain quantities of labor skillset
Risk	Certain operational costs in Alaska will be a negative and differentiating factor in final decision-making
Mitigation	Detailed all-in costings provided to illustrate the bottom-line advantage and some in-place capacity to incent key projects
Risk	Lack of solution brand awareness negatively impacts business marketing
Mitigation	Development of marketing to parallel direct business development; earned media, speaking opportunities at global trade events, strategic advertising, insertion into relevant studies, trade journal reports
Risk	Oil price variations may challenge the ability to develop continuity for business propositions.
Mitigation	Create fuel cost sensitivity analysis for logistics lanes that can demonstrate the all-in Alaska advantage.

Approach

From past experience and from extensive interaction with industry leaders, it is evident that at least in the short-term, Alaska probably won't be an obvious choice for logistics-enabled site selection projects. As such, Alaska will need to confidently assert itself to industry decision-makers by demonstrating a keen knowledge and understanding of the pressures on the industry, and also offering a set of business specific solutions.

- Proactively position Alaska as a strategic investment location asset to companies experiencing changing Asia-North America supply chain dynamics
- Be perceived as a consultative business solutions provider/advisor offering tangible results in the context of cost reduction, time-to-need advantages, increased reliability, etc.
- Modest reliance on generic marketing, but developing a legitimate brand is important as decision-makers will need to justify to superiors, boards and shareholders

- Create brand that creates authority and credibility right away (limited window to gain credibility)
- Substantial emphasis on industry knowledge, competitive pressures, sourcing and overall supply chain trends offering specific business propositions: supply chain specific

Product - COMPREHENSIVE PRODUCT CONCEPT

Ultimately, success will require that the Alaska business proposition needs to satisfy an investing company's practical operational requirements. Alaska's success in attracting new logistics-enabled economic development projects will depend on constructing an all-in competitive "product".

It is important to recognize that in the eyes of the target company, the Alaska product is a combined package that includes the following two main components:

1 A forward-looking supply chain solution enhancing operational efficiency, competitiveness

This includes measurement of operating flexibility, customer responsiveness, transport time, air service availability (routes, carriers, aircraft, frequency and cost) and measurement of reliability factors

2 A tangibly lower-cost "all-in" operating solution

This includes:

- Transport costs – an overall ground and air transportation cost system that is demonstrably lower than other alternatives
- Labor force – gross availability, skills development, cost, productivity and unionization
- Property – ready and appropriate buildings for the specific operational needs, expansion availability, cost, and location. Ownership options and lease flexibility are important factors.
- Taxes – government fees and taxes, including such costs associated with income, inventory and capital equipment
- Utilities – availability, capacity, redundancy and cost

Provision of an overall advantageous financial proposition will be extremely important. The all-in financial package will include certain costs that are fixed and/or uncontrollable, but will also include some elements that could be adjustable or altered. An example of this in theory might be costs associated with land and/or buildings on the airport property. Further, though understood to be minimal in Alaska, public incentives may be important to narrow a gap that

might exist or to close a deal. To be clear, these tools are evident in most of the places that Alaska will compete with. This will not be about Alaska subsidizing a company's operations, but there will be situations where having modest tools will be important to finalize a deal.

Delivery Requirements - Tactics

In order to develop this business, Alaska must craft a business development capacity that is unlike anything that exists currently. The go-to-market proposition must be uniquely skilled in the areas of supply chain management in key sectors, transport and logistics and deal making. Key success factors will include:

- High-level industry contacts and the evidence of key skills and industry background
- Credibility will need to be earned immediately
- Realizing that most targets will have very little experience in the “economic development” space, the target will need to perceive the AIAS solution as a meaningful and realistic solution very quickly
- Relationships will be paramount as the logistics world in and outside of the target sector is relatively small and word travels quickly
- Development of the brand as a legitimate business player/solution is a key foundation – and this is developed by presence and visibility at trade events, through direct calls, speaking engagements, articles in key journals (American Shipper, etc.)
- Development of specific business proposition for presentation to the target will be required, including the detailing discussed earlier.
- It is likely that success will occur from direct propositions.

Timeline

At Initiation

- Agreement on participation and roles – AEDC should lead business development, via a partnership with the AIAS
- Review of delivery entity structures, options:
 - a) Within AEDC – as a new program
 - b) Alongside AEDC – managed by AEDC but marketed and seen externally as a purpose-built organization
 - c) Independent body – founded by AEDC and AIAS but with its own new governance and operating structure
 - d) AIAS leads in creating entity; operating and delivery capacity from AEDC

- Agreement between AEDC and AIAS on: goals, individual responsibilities, start-up resources, delivery body governance, on-airport development strategy
- Agreement with State government identifying support from key agencies and the Governor's Office about importance, support and partnership
- Agreement with Municipality of Anchorage regarding industrial land strategy, development approvals, key transport infrastructure, workforce development

Year One

- Create organizational delivery capacity
 - Entity structure in-place; including governance, staff, operating resources, business plan
 - First-phase brand developed
- Initial roll-out of brand completed, internal to market and to key core external audiences
- Create targeted prospect list – 3PLs
 - Focus on pharma and automotive as top priorities
 - Meet, brief and review client matches with top 20 3PLs in the Asia-North America space
- Develop ongoing industry intelligence tracking system
- On airport development site identification, agreement on development strategy, delivery flexibility

Objective:

- Agreement on at least one on-airport development asset, Airport master plan agreement on subsequent development; agreement on public/private delivery strategy (terms, operational protocols, development parameters, partnership)
- Assessment of suitable sites/property owner collaboration interest and corresponding infrastructure for at least one site within 3 miles of ANC.

Year Two

- Extend business development focus to manufacturers and specialty logistics firms with an extended focus on pharma, automotive and electronics
 - Produce go-to-market business propositions to highest probability targets
 - Gain serious consideration from 4-5 prospects
 - Have one deal under development/in negotiation
- Development business plan complete on one development site on-airport; development plans, infrastructure and delivery partners agreed

- Brand is matured and business sector strategy merged for refinement to key sectors
 - “Alaska Supply Chain Solution” brand is well-recognized to key audiences
 - 3PL's, key industry supply chain players, specialty logistics firms, investors, key press outlets

APPENDIX A

Trade Flow Data – North America – Asia (2013)

Source USTRA, US Census

		NAICS	Exports to Australia	Imports from Australia	Total Trade	
Australia			31,200,000,000	9,535,000,000	40,735,000,000	Total
Apparel		315	109,000,000	7,100,000	116,100,000	
Chemicals		325	3,111,000,000	734,000,000	3,845,000,000	
Computer and Electronics		334	3,087,000,000	510,000,000	3,597,000,000	
Electrical Equipment		335	883,000,000	78,000,000	961,000,000	
Machinery, Non Electronic		333	9,026,000,000	425,000,000	9,451,000,000	
Transportation Equipment		336	5,898,000,000	647,000,000	6,545,000,000	
Goods Returned		980	0	664,000,000	664,000,000	
Misc Manufactured		339	1,796,000,000	712,000,000	2,508,000,000	
			23,910,000,000	3,777,100,000	27,687,100,000	Selected Categories

		NAICS	Exports to Bangladesh	Imports from Bangladesh	Total Trade	
Bangladesh			501,000,000	4,915,000,000	5,416,000,000	Total
Apparel		315	1,345,000	4,473,000,000	4,474,345,000	
Chemicals		325	51,328,000	543,000	51,871,000	
Computer and Electronics		334	33,061,000	416,000	33,477,000	
Electrical Equipment		335	20,471,000	671,000	21,142,000	
Machinery, Non Electronic		333	66,224,000	2,195,000	68,419,000	
Transportation Equipment		336	20,247,000	28,000	20,275,000	
Goods Returned		980	0	85,955,000	85,955,000	
Misc Manufactured		339	8,798,000	18,602,000	27,400,000	
			201,474,000	4,581,410,000	4,782,884,000	Selected Categories

		NAICS	Exports to Burma	Imports from Burma	Total Trade	
Burma			65,789,000	38,000	65,827,000	Total
Apparel		315	0	0	0	
Chemicals		325	2,263,000	0	2,263,000	
Computer and Electronics		334	4,082,000	0	4,082,000	
Electrical Equipment		335	217,000	0	217,000	
Machinery, Non Electronic		333	2,762,000	0	2,762,000	
Transportation Equipment		336	40,664,000	0	40,664,000	
Goods Returned		980	0	38,000	38,000	
Misc Manufactured		339	1,962,000	0	1,962,000	
			51,950,000	38,000	51,988,000	Selected Categories

		NAICS	Exports to Cambodia	Imports from Cambodia	Total Trade	
Cambodia			226,217,000	2,691,000,000	2,917,217,000	Total
Apparel		315	548,000	2,537,000,000	2,537,548,000	
Chemicals		325	4,229,000	24,000	4,253,000	
Computer and Electronics		334	6,388,000	386,000	6,774,000	
Electrical Equipment		335	763,000	261,000	1,024,000	
Machinery, Non Electronic		333	14,592,000	13,000	14,605,000	
Transportation Equipment		336	159,286,000	21,743,000	181,029,000	
Goods Returned		980	0	699,999	699,999	
Misc Manufactured		339	4,016,000	11,988,000	16,004,000	
			189,822,000	2,572,114,999	2,761,936,999	Selected Categories

		NAICS	Exports to China	Imports from China	Total Trade	
China			110,593,000,000	425,643,000,000	536,236,000,000	Total
Apparel		315	55,889,000	32,104,000,000	32,159,889,000	
Chemicals		325	12,962,000,000	15,748,000,000	28,710,000,000	
Computer and Electronics		334	13,910,000,000	158,417,000,000	172,327,000,000	
Electrical Equipment		335	1,998,000,000	30,451,000,000	32,449,000,000	
Machinery, Non Electronic		333	9,893,000,000	23,363,000,000	33,256,000,000	
Transportation Equipment		336	15,719,000,000	12,248,000,000	27,967,000,000	
Goods Returned		980	0	1,630,000,000	1,630,000,000	
Misc Manufactured		339	2,050,000,000	36,587,000,000	38,637,000,000	
			56,587,889,000	310,548,000,000	367,135,889,000	Selected Categories

		NAICS	Exports to Hong Kong	Imports from Hong Kong	Total Trade	
Hong Kong			37,480,000,000	5,440,000,000	42,920,000,000	Total
Apparel		315	91,929,000	167,241,000	259,170,000	
Chemicals		325	2,034,000,000	63,777,000	2,097,777,000	
Computer and Electronics		334	9,212,000,000	957,000,000	10,169,000,000	
Electrical Equipment		335	917,000,000	174,000,000	1,091,000,000	
Machinery, Non Electronic		333	1,244,000,000	117,000,000	1,361,000,000	
Transportation Equipment		336	3,113,000,000	46,466,000	3,159,466,000	
Goods Returned		980	0	2,153,000,000	2,153,000,000	
Misc Manufactured		339	6,244,000,000	997,000,000	7,241,000,000	
			22,855,929,000	4,675,484,000	27,531,413,000	Selected Categories

		NAICS	Exports to India	Imports from India	Total Trade	
India			22,336,000,000	40,518,000,000	62,854,000,000	Total
Apparel		315	10,375,000	3,205,000,000	3,215,375,000	
Chemicals		325	3,514,000,000	7,226,000,000	10,740,000,000	
Computer and Electronics		334	2,212,000,000	1,091,000,000	3,303,000,000	
Electrical Equipment		335	449,000,000	571,000,000	1,020,000,000	
Machinery, Non Electronic		333	2,116,000,000	1,977,000,000	4,093,000,000	
Transportation Equipment		336	1,723,000,000	940,000,000	2,663,000,000	
Goods Returned		980	0	378,000,000	378,000,000	
Misc Manufactured		339	3,224,000,000	7,466,000,000	10,690,000,000	
			13,248,375,000	22,854,000,000	36,102,375,000	Selected Categories

		NAICS	Exports to Indonesia	Imports from Indonesia	Total Trade	
Indonesia			8,014,000,000	17,997,000,000	26,011,000,000	Total
Apparel		315	9,160,000	4,961,000,000	4,970,160,000	
Chemicals		325	1,151,000,000	618,000,000	1,769,000,000	
Computer and Electronics		334	302,000,000	1,612,000,000	1,914,000,000	
Electrical Equipment		335	184,000,000	370,000,000	554,000,000	
Machinery, Non Electronic		333	922,000,000	142,000,000	1,064,000,000	
Transportation Equipment		336	1,654,000,000	251,000,000	1,905,000,000	
Goods Returned		980	0	110,000,000	110,000,000	
Misc Manufactured		339	70,000,000	1,147,000,000	1,217,000,000	
			4,292,160,000	9,211,000,000	13,503,160,000	Selected Categories

		NAICS	Exports to Japan	Imports from Japan	Total Trade	
Japan			70,046,000,000	146,387,000,000	216,433,000,000	Total
Apparel		315	349,000,000	41,000,000	390,000,000	
Chemicals		325	11,494,000,000	12,195,000,000	23,689,000,000	
Computer and Electronics		334	9,245,000,000	19,450,000,000	28,695,000,000	
Electrical Equipment		335	1,331,000,000	5,527,000,000	6,858,000,000	
Machinery, Non Electronic		333	4,162,000,000	26,578,000,000	30,740,000,000	
Transportation Equipment		336	10,845,000,000	59,893,000,000	70,738,000,000	
Goods Returned		980	0	2,541,000,000	2,541,000,000	
Misc Manufactured		339	5,456,000,000	2,853,000,000	8,309,000,000	
			42,882,000,000	129,078,000,000	171,960,000,000	Selected Categories

		NAICS	Exports to Laos	Imports from Laos	Total Trade	
Laos			33,249,999	25,042,000	58,291,999	Total
Apparel		315	0	11,309,000	11,309,000	
Chemicals		325	4,727,000	750,000	5,477,000	
Computer and Electronics		334	1,917,000	0	1,917,000	
Electrical Equipment		335	544,000	0	544,000	
Machinery, Non Electronic		333	5,942,000	0	5,942,000	
Transportation Equipment		336	5,376,000	0	5,376,000	
Goods Returned		980	0	2,808,000	2,808,000	
Misc Manufactured		339	5,851,000	5,379,000	11,230,000	
			24,357,000	20,246,000	44,603,000	Selected Categories

		NAICS	Exports to Macau	Imports from Macau	Total Trade	
Macau			345,440,000	94,346,000	439,786,000	Total
Apparel		315	838,000	43,215,000	44,053,000	
Chemicals		325	3,991,000	20,550,000	24,541,000	
Computer and Electronics		334	39,562,000	5,292,000	44,854,000	
Electrical Equipment		335	7,712,000	1,245,000	8,957,000	
Machinery, Non Electronic		333	18,174,000	3,470,000	21,644,000	
Transportation Equipment		336	109,854,000	168,000	110,022,000	
Goods Returned		980	0	7,021,000	7,021,000	
Misc Manufactured		339	54,284,000	6,555,000	60,839,000	
			234,415,000	87,516,000	321,931,000	Selected Categories

		NAICS	Exports to Mongolia	Imports from Mongolia	Total Trade	
Mongolia			665,000,000	42,104,000	707,104,000	Total
Apparel		315	658,000	356,000	1,014,000	
Chemicals		325	3,057,000	8,000	3,065,000	
Computer and Electronics		334	17,019,000	316,000	17,335,000	
Electrical Equipment		335	7,194,000	36,000	7,230,000	
Machinery, Non Electronic		333	194,898,000	5,000	194,903,000	
Transportation Equipment		336	405,000,000	0	405,000,000	
Goods Returned		980	0	32,821,000	32,821,000	
Misc Manufactured		339	935,000	116,000	1,051,000	
			628,761,000	33,658,000	662,419,000	Selected Categories

		NAICS	Exports to Philippines	Imports from Philippines	Total Trade	
Philippines			8,059,500,000	9,580,000,000	17,639,500,000	Total
Apparel		315	7,264,000	1,163,000,000	1,170,264,000	
Chemicals		325	472,000	197,000	669,000	
Computer and Electronics		334	3,187,000,000	4,261,000,000	7,448,000,000	
Electrical Equipment		335	135,581,000	335,000,000	470,581,000	
Machinery, Non Electronic		333	430,000,000	302,000,000	732,000,000	
Transportation Equipment		336	632,000,000	487,000,000	1,119,000,000	
Goods Returned		980	0	162,720,000	162,720,000	
Misc Manufactured		339	70,364,000	272,400,000	342,764,000	
			4,462,681,000	6,983,317,000	11,445,998,000	Selected Categories

		NAICS	Exports to Singapore	Imports from Singapore	Total Trade	
Singapore			30,560,000,000	20,224,000,000	50,784,000,000	Total
Apparel		315	34,780,000	27,154,000	61,934,000	
Chemicals		325	3,837,000,000	8,019,000,000	11,856,000,000	
Computer and Electronics		334	5,909,000,000	5,293,000,000	11,202,000,000	
Electrical Equipment		335	906,000,000	466,000,000	1,372,000,000	
Machinery, Non Electronic		333	4,822,000,000	1,420,000,000	6,242,000,000	
Transportation Equipment		336	4,954,000,000	808,000,000	5,762,000,000	
Goods Returned		980	0	2,467,000,000	2,467,000,000	
Misc Manufactured		339	1,186,000,000	659,000,000	1,845,000,000	
			21,648,780,000	19,159,154,000	40,807,934,000	Selected Categories

		NAICS	Exports to South Korea	Imports from South Korea	Total Trade	
South Korea			42,317,000,000	58,880,000,000	101,197,000,000	Total
Apparel		315	118,000,000	233,000,000	351,000,000	
Chemicals		325	6,931,000,000	2,453,000,000	9,384,000,000	
Computer and Electronics		334	6,995,000,000	13,407,000,000	20,402,000,000	
Electrical Equipment		335	998,000,000	3,743,000,000	4,741,000,000	
Machinery, Non Electronic		333	6,152,000,000	5,154,000,000	11,306,000,000	
Transportation Equipment		336	4,964,000,000	16,844,000,000	21,808,000,000	
Goods Returned		980	0	672,000,000	672,000,000	
Misc Manufactured		339	879,000,000	694,000,000	1,573,000,000	
			27,037,000,000	43,200,000,000	70,237,000,000	Selected Categories

		NAICS	Exports to Taiwan	Imports from Taiwan	Total Trade		
Taiwan			24,370,000,000	38,860,000,000	63,230,000,000	Total	
Apparel		315	27,943,000	423,000,000	450,943,000		
Chemicals		325	3,914,000,000	1,360,000,000	5,274,000,000		
Computer and Electronics		334	5,110,000,000	15,792,000,000	20,902,000,000		
Electrical Equipment		335	421,000,000	1,424,000,000	1,845,000,000		
Machinery, Non Electronic		333	4,752,000,000	3,015,000,000	7,767,000,000		
Transportation Equipment		336	1,289,000,000	3,380,000,000	4,669,000,000		
Goods Returned		980	0	676,000,000	676,000,000		
Misc Manufactured		339	493,000,000	1,756,000,000	2,249,000,000		
			16,006,943,000	27,826,000,000	43,832,943,000	Selected Categories	

		NAICS	Exports to Thailand	Imports from Thailand	Total Trade		
Thailand			10,952,000,000	26,126,000,000	37,078,000,000	Total	
Apparel		315	7,125,000	1,105,000,000	1,112,125,000		
Chemicals		325	1,734,000,000	424,000,000	2,158,000,000		
Computer and Electronics		334	2,471,000,000	10,585,000,000	13,056,000,000		
Electrical Equipment		335	202,000,000	543,000,000	745,000,000		
Machinery, Non Electronic		333	1,098,000,000	795,000,000	1,893,000,000		
Transportation Equipment		336	1,103,000,000	949,000,000	2,052,000,000		
Goods Returned		980	0	281,000,000	281,000,000		
Misc Manufactured		339	539,000,000	2,654,000,000	3,193,000,000		
			7,154,125,000	17,336,000,000	24,490,125,000	Selected Categories	

		NAICS	Exports to Vietnam	Imports from Vietnam	Total Trade		
Vietnam			4,623,000,000	20,266,000,000	24,889,000,000	Total	
Apparel		315	5,045,000	7,130,000,000	7,135,045,000		
Chemicals		325	446,000,000	135,000,000	581,000,000		
Computer and Electronics		334	908,000,000	1,550,000,000	2,458,000,000		
Electrical Equipment		335	89,099,000	361,000,000	450,099,000		
Machinery, Non Electronic		333	349,000,000	263,000,000	612,000,000		
Transportation Equipment		336	195,000,000	503,000,000	698,000,000		
Goods Returned		980	0	25,610,000	25,610,000		
Misc Manufactured		339	79,274,000	696,270,000	775,544,000		
			2,071,418,000	10,663,880,000	12,735,298,000	Selected Categories	

Examples of Products in Each 3 Digit Classification

Apparel	hosiery, dresses, pants, outerwear, hats, shirts, undergarments
Chemicals	petrochemical, industrial gas, synthetic dye, resin, plastics material, cellulose fiber, pesticide, pharmaceutical and medicine, pharmaceutical preparation, in-vitro diagnostics, biological products, paint, adhesives, soap, explosives
Computer and Electronics	computers (various), storage devices, computer parts, displays, radio and TV broadcasting, GPS, televisions, sound equipment, semiconductor manufacturing, navigation, electromedical, measuring and control devices, aeronautical and nautical equipment and guidance systems, clocks
Electrical Equipment	lighting, household appliances, tools, motor and generator, industrial control, battery
Machinery, Non-Electronic	agricultural implement, construction machinery, mining and oil field machines, industrial machinery (various), semiconductor machinery, optical and lens, photographic, HVAC, metalworking, machine tool/dye, power transmission, pump, measuring, handtools
Transportation Equipment	motor vehicle, light and heavy truck, trailers, motor vehicle parts, engine, transmissions, lighting, aerospace, aircraft, aircraft parts and engines, guided missile and space, railroad rolling stock, ship building, military vehicle
Misc Manufactured	medical equipment, laboratory and apparatus, medical instruments, surgical supplies, orthodontic goods and supplies

APPENDIX B

Sector Competitiveness Assessments

Factor		Group Weight		Ind. Weight											
YVR		SEA		LAX		SDF		MEM		SFO		ANC			
Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor		
Cost		10	9.00	10	9.00	10	9.00	10	9.00	5	4.50	10	9.00	10	9.00
Shipping Cost		5	0.50	9	0.90	10	1.00	6	0.60	8	0.80	10	1.00	3	0.30
Deicing Cost			9.50		9.90		10.00		9.60		5.30		10.00		9.30
Total			1.43		1.49		1.50		1.44		0.80		1.50		1.40
Group Wtd Total															
Time in Transit		9	3.15	9	3.15	9	3.15	0	0.00	0	0.00	10	3.50	8	2.80
Air cargo time		3	1.35	4	1.80	7	3.15	0	0.00	0	0.00	5	2.25	10	4.50
Shipping frequency		4	0.80	5	1.00	8	1.60	10	2.00	10	2.00	5	1.00	4	0.80
Late Pick Up			5.30		5.95		7.90		2.00		6.75		6.00		8.10
Total			1.06		1.19		1.58		0.40		0.40		1.35		1.62
Group Wtd Total															
Reliability		3	0.60	4	0.80	7	1.40	0	0.00	0	0.00	5	1.00	10	2.00
Number of air cargo carriers		1	0.20	6	1.20	7	1.40	6	1.20	8	1.60	7	1.40	2	0.40
Labor Relations		8.5	1.28	8.5	1.28	7	1.05	6	0.90	5	0.75	8.5	1.28	6.5	0.98
Weather Risk/Natural Disaster		9	4.05	7.3	3.29	5.7	2.57	5	2.25	4	1.80	3.7	1.67	7.7	3.47
% Airport Arrivals/Departures Cancellations			6.13		6.56		6.42		4.35		4.15		5.34		6.84
Total			1.53		1.64		1.60		1.09		1.04		1.34		1.71
Group Wtd Total															
Business Factors/Infrastructure		10	2.00	10	2.00	10	2.00	10	2.00	10	2.00	10	2.00	0	0.00
Availability of warehouse/ flex space on airport		5	0.50	5	0.50	0	0.00	0	0.00	10	1.00	0	0.00	5	0.50
Availability of Developable Land on Airport		2	0.20	6	0.60	4	0.40	8	0.80	10	1.00	0	0.00	4	0.40
Cost of Construction		10	0.50	8	0.40	0	0.00	4	0.20	6	0.30	0	0.00	10	0.50
Taxes		10	1.00	0	0.00	0	0.00	0	0.00	0	0.00	10	1.00	10	1.00
FTZ on the Airport		0	0.00	0	0.00	0	0.00	0	0.00	10	1.00	0	0.00	0	0.00
Deal Closing Fund		4	0.20	10	0.50	2	0.10	4	0.20	2	4.00	2	0.10	4	0.20
Air Cargo Infrastructure (Logistician)		4	0.60	2	0.30	4	0.60	6	0.90	10	1.50	2	0.30	2	0.30
Sector Workforce Availability (material handlers,laborers, stockers		0	0.00	2	0.30	8	1.20	8	1.20	10	1.50	6	0.90	6	0.90
Cost of Workforce			5.00		4.60		4.30		5.30		12.30		4.30		3.80
Total			2.00		1.84		1.72		2.12		4.92		1.72		1.52
Group Wtd Total															
YVR	5	SEA	4	LAX	2	SDF	7	MEM	1	SFO	6	ANC	3	6.25	
Fully Weighted Score														6.25	

GLDPartners Competitiveness Assessment

Sector Automotive

Date Updated: 6/24/14

Scenario Description

Activity: High-velocity, high-end electronics components distribution
 Facility Description: 60,000 sq ft building, 3,000 sq ft office, 7 loading docks, 30 ft ceiling height, high climate control, level floor, redundant power, (automotive pickup systems), no special water, gas requirements
 Supply Chain Proposition: Factory assembly line inventory management facility supporting new vehicle assembly plants located throughout North America (US, Canada and Mexico)

ANC Facility Location: On-reservation
 Sourcing Location: Seoul
 Destination Locations: Detroit, Atlanta, Kansas City, Hermosillo, Guadalajara, Monterrey
 Land Requirement: 7+ acres
 Modelled Origin - Stop - Final Destination: ICN - XXX - DTW

Factor	Group Weight		Ind. Weight		YVR		SEA		LAX		SDF		MEM		SFO		ANC	
	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor
Cost	10	9.00	10	9.00	10	9.00	10	9.00	10	9.00	10	9.00	10	9.00	10	9.00	10	9.00
	5	0.50	9	0.90	10	1.00	6	0.60	8	0.80	10	1.00	3	0.30	10	1.00	3	0.30
	Total	9.50	1.43	1.49	1.50	1.50	1.44	1.44	1.50	1.50	1.44	1.44	1.50	1.50	1.50	1.50	1.40	1.40
Time in Transit	3	1.05	7	2.45	1	0.35	5	1.75	3	1.05	3	1.05	8	2.80	3	1.05	8	2.80
	3	1.35	4	1.80	7	3.15	0	0.00	0	0.00	0	0.00	5	2.25	5	2.25	10	4.50
	4	0.80	5	1.00	8	1.60	10	2.00	10	2.00	10	2.00	5	1.00	5	1.00	4	0.80
Reliability	3	0.45	4	0.60	7	1.05	0	0.00	0	0.00	0	0.00	0	0.00	5	0.75	10	1.50
	1	0.25	6	1.50	7	1.75	6	1.50	8	2.00	8	2.00	7	1.75	7	1.75	2	0.50
	8.5	2.13	8.5	2.13	7	1.75	6	1.50	5	1.25	5	1.25	8.5	2.13	8.5	2.13	6.5	1.63
Business Factors/Infrastructure	9	3.15	7.3	2.56	5.7	2.00	5	1.75	4	1.40	3.7	1.30	4	1.40	3.7	1.30	7.7	2.70
	Total	5.98	1.49	1.70	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.58	1.58
Business Factors/Infrastructure	10	1.50	10	1.50	10	1.50	10	1.50	10	1.50	10	1.50	10	1.50	10	1.50	0	0.00
	5	0.75	5	0.75	0	0.00	0	0.00	0	0.00	0	0.00	10	1.50	0	0.00	5	0.75
	2	0.20	4	0.40	4	0.40	4	0.40	4	0.40	4	0.40	8	0.80	0	0.00	4	0.40
Business Factors/Infrastructure	10	0.50	8	0.40	0	0.00	4	0.20	6	0.30	0	0.00	6	0.30	0	0.00	10	0.50
	10	1.50	10	1.50	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	10	1.50
	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	10	1.00	0	0.00	0	0.00
Business Factors/Infrastructure	4	0.80	6	1.20	2	0.40	10	2.00	2	0.40	2	0.40	2	0.40	2	0.40	0	0.00
	3	0.30	1	0.10	5	0.50	10	1.00	10	1.00	10	1.00	10	1.00	3	0.30	3	0.30
	Total	5.55	2.22	2.34	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	3.45	3.45

Fully Weighted Score		5.78	6.57	5.28	5.66	5.17	4.72	5.98
YVR	3	SEA	LAX	SDF	MEM	SFO	ANC	
		1	5	4	6	7	2	

GLDPartners Competitiveness Assessment
Sector Electronics

Date Updated: 6/25/14

Scenario Description

Activity: Multiple-source forward deployment final assembly
 Facility Description: 50,000 sq ft building, 2,500 sq ft office, 5 loading docks, 30 ft ceiling height, medium climate control requirements, no special water, gas requirements
 Supply Chain Proposition: Increasing source parts suppliers are disbursed and ANC can provide a higher-cost but very efficient central points for 1) final assembly, 2) customization, 3) inventory management for high-end products
 ANC Facility Location: On-reservation
 Sourcing Locations: Shanghai, Zhengzhou
 Destination Locations: Los Angeles, Memphis, Louisville, New York
 Land Requirement: 7+ acres
 Modelled Origin - Stop - Final Destination: PVG - XXX - LAX

Factor	Group Weight		Ind. Weight	YVR		SEA		LAX		SDF		MEM		SFO		ANC	
	Rating	Wt Factor		Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor
Cost	10	9.00	10	9.00	10	9.00	5	4.50	5	4.50	5	4.50	10	9.00	10	9.00	
	4	0.40	8	0.80	10	1.00	5	0.50	7	0.70	10	1.00	3	0.30	10	1.00	
		9.40		9.80	10.00		5.00		5.20	10.00		5.70		9.30		9.30	
		1.41		1.47	1.50		0.75		0.78	1.50		1.14		1.40		1.40	
Time in Transit	7	2.45	7	2.45	10	3.50	0	0.00	0	0.00	0	0.00	7	2.45	7	2.45	
	3	1.35	4	1.80	9	4.05	0	0.00	0	0.00	0	0.00	5	2.25	9	4.05	
	4	0.80	5	1.00	8	1.60	10	2.00	10	2.00	10	2.00	5	1.00	4	0.80	
		4.60		5.25	9.15		2.00		5.70	9.15		5.70		7.30		7.30	
		0.92		1.05	1.83		0.40		0.40	1.83		1.14		1.46		1.46	
Reliability	3	0.45	4	0.60	7	1.05	0	0.00	0	0.00	0	0.00	5	0.75	10	1.50	
	1	0.25	6	1.50	7	1.75	6	1.50	8	2.00	7	1.75	2	0.50	2	0.50	
	8.5	2.13	8.5	2.13	7	1.75	6	1.50	5	1.25	8.5	2.13	6.5	1.63	6.5	1.63	
	9	3.15	7.3	2.56	5.7	2.00	5	1.75	4	1.40	3.7	1.30	7.7	2.70	7.7	2.70	
		5.98	6.78	6.55	6.55		4.75		4.65	6.32		5.92		6.32		6.32	
		1.49	1.70	1.64	1.64		1.19		1.16	1.58		1.48		1.58		1.58	
Business Factors/Infrastructure	10	1.50	10	1.50	10	1.50	10	1.50	10	1.50	10	1.50	0	0.00	0	0.00	
	5	0.75	5	0.75	0	0.00	0	0.00	0	0.00	10	1.50	0	0.00	5	0.75	
	2	0.20	6	0.60	4	0.40	8	0.80	10	1.00	0	0.00	4	0.40	4	0.40	
	10	0.50	8	0.40	0	0.00	4	0.20	6	0.30	0	0.00	10	1.50	10	1.50	
	10	1.50	10	1.50	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	10	1.50	
	0	0.00	0	0.00	0	0.00	0	0.00	10	0.50	0	0.00	0	0.00	0	0.00	
	0	0.00	0	0.00	10	0.50	10	0.50	10	0.50	10	0.50	0	0.00	0	0.00	
	4	0.60	6	0.90	2	0.30	10	1.50	2	0.30	2	0.30	0	0.00	0	0.00	
	3	0.45	1	0.15	5	0.75	10	1.50	10	1.50	10	1.50	3	0.45	1	0.15	
		5.50		5.80	3.45		6.00		7.10	2.75		2.75		3.30		3.30	
	2.20		2.32	1.38		2.40		2.84	1.10		1.10		1.32		1.32		
		6.02	6.54	6.35	4.74	5.18	5.22	5.18	5.22		5.76		5.76		5.76		
	YVR	3	SEA	1	LAX	2	SDF	7	MEM	6	SFO	5	ANC	4			

GLDPartners Competitiveness Assessment

Sector Fast Fashion

Date Updated: 6 25 14

Scenario Description

Activity: Final product labelling, tagging, destination packaging/sorting
 Facility Description: 40,000 sq ft building, 2,000 sq ft office, 5 loading docks, 30 foot ceiling height, low climate control requirements, level floor, redundant power (automated picking systems), no special water, gas requirements
 Supply Chain Proposition: 3PL/expressor managed facility here multiple-source goods can be efficiently assembled, tagged and labelled making moving time demand requirements

ANC Facility Location: O'Hare-reservation

Sourcing Locations: Shanghai, Hong Kong

Destination Locations: Los Angeles, Memphis

Land Requirement: 4+ acres

Modelled Origin - Stop - Final Destination HKG - XXX - JFK

Factor	Group Weight		Ind. Weight	YVR		SEA		LAX		SDF		MEM		SFO		ANC	
	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating
Cost	10	9	10	9	10	9	10	9	10	9	10	9	10	9	10	9	10
	5	0.5	9	0.9	10	1	10	1	10	6	0.6	8	0.8	10	1	3	0.3
		9.50		9.90		10.00		10.00			9.60		5.30		10.00		9.3
Total		1.43		1.49		1.50		1.50			1.44		0.80		1.50		1.395
Group Wtd Total																	
Time in Transit	8	2.8	7	2.45	2	0.7	6	2.1	4	1.4	4	1.4	4	1.4	4	1.4	8
	4	1.8	1	0.45	5	2.25	0	0	0	0	0	0	0	5	2.25	10	4.5
	4	0.8	5	1	8	1.6	10	2	10	2	10	2	10	5	1	4	0.8
Total		5.40		3.90		4.55		4.55			4.10		3.40		4.65		8.1
Total		1.08		0.78		0.91		0.91			0.82		0.68		0.93		1.62
Group Wtd Total																	
Reliability	3	0.75	4	1.00	7	1.75	0	0.00	0	0.00	0	0.00	5	1.25	10.0	2.50	
	1	0.20	6	1.20	7	1.40	6	1.20	8	1.60	7	1.40	7	1.40	2.0	0.40	
	8.5	0.85	8.5	0.85	7	0.70	6	0.60	5	0.50	5	0.50	8.5	0.85	6.5	0.65	
% Airport Arrivals/Departures Cancellations	9	2.25	7.3	1.83	5.7	1.43	5	1.25	4	1.00	3.7	0.93	7.7	1.93	7.7	1.93	
Road Congestion	3	0.60	4.3	0.86	2.3	0.46	5.7	1.43	6.7	1.67	3.7	0.93	7.7	1.93	7.7	1.93	
Total		4.65		3.74		5.74		5.74			4.19		4.44		5.17		7.14
Total		1.16		1.43		1.43		1.43			1.05		1.11		1.29		1.78
Group Wtd Total																	
Business Factors/Infrastructure	1	0.25	3	0.75	1	0.25	7	1.75	10	2.5	5	1.25	1	0.25			
	3	0.6	5	1	1	0.2	10	2	10	2	10	2	10	2	10	2	10
	10	1	8	0.8	0	0	4	0.4	6	0.6	0	0	0	0	0	0	0
Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deal Closing Fund	5	1	3	0.6	7	1.4	7	1.4	7	1.4	7	1.4	5	1	5	1	1
Workforce Availability (Unemployment Rate)	3	0.45	5	0.75	10	1.5	7	1.05	3	0.45	3	0.45	3	0.45	1	0.15	
Cost of Sector Workforce (Helpers/Production Workers)		3.3		3.9		3.35		3.35			6.6		7.95		3.7		2.6
Total		1.32		1.56		1.34		1.34			2.64		3.18		1.48		1.04
Group Wtd Total																	
Fully Weighted Score				4.99	5.26	5.18	5.95	5.77	5.20	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84
YVR	7																
SEA		4															
LAX			6														
SDF				1													
MEM					3												
SFO						5											
ANC																2	

GLDPartners Competitiveness Assessment

Sector Pharma

Date Updated: 6/24/14

Scenario Description

Activity: Pharma reverse logistics center
 Facility Description: 15,000 SF building, 1,000 SF office, 3 loading docks, 15 foot ceilings, very high climate control requirements, level floor, redundant power, no special water or gas requirements
 Supply Chain Proposition: Eastbound movement/reverse logistics for pharmaceuticals handling a combination of product returns, of expiring or overstocked product recalls initiated by manufacturers or by FDA for product defects. Shipment: 250kg
 combination of product returns of expiring or overstocked product recalls
 ANC Facility Location: On-reservation
 Sourcing Locations: Shanghai, Beijing, Tokyo
 Destination Locations: Chicago, Newark
 Land Requirement: 1.5-2 acres
 Modelled Origin - Step - Final Destination PVG - XXX - EWR

Factor	Group Weight		Ind. Weight		SEA		LAX		SDF		MEM		SFO		ANC	
	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor
Cost																
	10	9.00	10	9.00	10	9.00	10	9.00	10	9.00	5	4.50	10	9.00	10	9.00
	5	0.50	9	0.90	10	1.00	10	1.00	6	0.60	8	0.80	10	1.00	3	0.30
Time in Transit																
	7	2.45	8	2.80	2	0.70	7	2.45	7	2.45	6	2.10	6	2.10	10	3.50
	3	1.35	1	0.45	9	4.05	9	4.05	0	0.00	0	0.00	3	1.35	9	4.05
Reliability																
	8.5	1.70	8.5	1.70	7	1.40	7	1.40	6	1.20	5	1.00	8.5	1.70	6.5	1.30
	9	3.60	7.3	2.92	5.7	2.28	5.7	2.28	5	2.00	4	1.60	4	1.48	7.7	3.08
Business Factors/Infrastructure																
	3	0.00	4.3	0.00	2.3	0.00	2.3	0.00	5.7	0.00	6.7	0.00	4	0.00	8.3	0.00
	3	6.30	6.42	6.42	1.61	1.62	6.48	6.48	3.80	3.80	0.95	3.40	3.40	5.38	7.58	1.90
Business Factors/Infrastructure																
	5	1.50	5	1.50	0	0.00	0	0.00	0	0.00	10	3.00	0	0.00	5	1.50
	2	0.30	6	0.90	4	0.60	4	0.60	8	1.20	10	1.50	0	0.00	4	0.60
Business Factors/Infrastructure																
	10	0.50	8	0.40	0	0.00	0	0.00	4	0.20	6	0.30	0	0.00	10	0.50
	10	1.00	10	1.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	10	1.00
Business Factors/Infrastructure																
	4	0.20	10	0.50	2	0.10	2	0.10	10	1.00	10	1.00	10	1.00	0	0.00
	4	0.60	2	0.30	10	1.50	10	1.50	8	1.20	8	1.20	6	0.90	6	0.90
Business Factors/Infrastructure																
	0	0.00	8	0.80	10	1.00	10	1.00	10	1.00	10	1.00	10	1.00	2	0.20
	0	4.10	8	5.40	10	4.20	10	4.20	10	4.20	10	4.20	10	4.20	2	0.20
Business Factors/Infrastructure																
	0	4.10	8	5.40	10	4.20	10	4.20	10	4.20	10	4.20	10	4.20	2	0.20
	0	4.10	8	5.40	10	4.20	10	4.20	10	4.20	10	4.20	10	4.20	2	0.20
Fully Weighted Score					5.56	6.10	6.07	5.16	5.83	4.82	6.92	5.83	4.82	6.92	5.83	4.82
YVR	5		SEA	2		LAX	3		SDF	6		MEM	4		SFO	7
																ANC
																1

GLDPartners Competitiveness Assessment

Sector Toys

Date Updated: 6 25 14

Scenario Description

Activity:	Sub-assembly consolidation point
Capacity:	50,000 sq ft building, 2,500 sq ft office, 5 loading docks, 30 foot ceiling height, level floor, redundant power
Supply Chain Proposition:	Multiple electronic component sources converging in ANC for final assembly and distribution, delivery to Lower 48 distribution hubs
ANC Facility Location:	Off-reservation
Sourcing Location:	Shanghai, Manila, Ho Chi Minh City
Destination Locations:	Los Angeles, Memphis, Louisville
Area and Requirement:	7+ acres
Modelled Origin - Stop - Final Destination	MNL - NRT - XXX - MEM

Factor	Group Weight		Ind. Weight													
	SEA	LAX	SDF	MEM	SFO	ANC										
Cost	YVR	SEA	LAX	SDF	MEM	SFO	ANC									
	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating									
	10	9.00	10	9.00	10	9.00	10									
	5	0.50	9	0.90	10	1.00	3									
	100%	9.50	9.90	10.00	9.60	5.30	9.30									
Group Wtd Total		1.90	1.98	2.00	1.92	1.06	2.00	1.86								
Time in Transit	YVR	SEA	LAX	SDF	MEM	SFO	ANC									
	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating									
	9	5.40	10	6.00	8	4.80	9									
	7	1.40	7	1.40	2	0.40	6									
	100%	7.60	8.40	7.80	7.20	8.00	7.40									
Group Wtd Total		1.52	1.68	1.56	1.44	1.56	1.60	1.48								
Reliability	YVR	SEA	LAX	SDF	MEM	SFO	ANC									
	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating									
	3	0.45	4	0.60	7	1.05	0									
	1	0.15	6	0.90	7	1.05	8									
	100%	2.25	7.3	1.83	5.7	1.43	5									
Group Wtd Total		1.01	1.18	1.05	0.95	0.99	1.02	1.44								
Business Factors/Infrastructure	YVR	SEA	LAX	SDF	MEM	SFO	ANC									
	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating									
	1	0.15	3	0.45	1	0.15	10									
	3	0.60	5	1.00	1	0.20	5									
	100%	2.25	7.3	1.83	5.7	1.43	5									
Group Wtd Total		1.01	1.18	1.05	0.95	0.99	1.02	1.44								
Fully Weighted Score	YVR	SEA	LAX	SDF	MEM	SFO	ANC									
	Rating	Wt Factor	Rating	Wt Factor	Rating	Wt Factor	Rating									
	1	0.15	3	0.45	1	0.15	10									
	3	0.60	5	1.00	1	0.20	5									
	100%	2.25	7.3	1.83	5.7	1.43	5									
Group Wtd Total		1.01	1.18	1.05	0.95	0.99	1.02	1.44								

APPENDIX C

Sector Trend Updates

Trend Updates

Since this project began, two overarching issues have impacted Asia-North America trade over the past 6-12 months. These issues have mutual dependency to a large degree and they have begun to effect investment market outlook quite substantially. Both the slowdown in growth rate in the Chinese economy and the precipitous drop in oil prices have become major concerns for global investment and have begun to impact Asian-North American supply chains.

Many experts believe that Chinese growth is settling at a somewhat more sustainable growth rate, something less than 7% per year but time will tell. The drop in oil prices is undoubtedly related to the Chinese economy but there are wider causes for this as well, including new sources for domestic production, ongoing economic stagnation in Europe and unabated supply levels by major oil producers. And many expect that with this week's release of Iran to again sell oil on the global market, prices will decline further in the short-term.

This is generally good news for transport providers and beneficial cargo owners in terms of direct costs, but given the commodity price decline is correlated with overall economic activity, this is cause for concern. Transport cost management dynamics that were facing supply chain managers have altered a bit and reduced some pressure, providing advantage to offshore manufacturing. At the same time, a strong US currency has impacted both exports and imports in different ways. Imports are more competitive while outbound manufactured products have suffered.

Update: Trends in Clinical Trial Supply Management

Clinical trial supply management provides clinical trial supply and logistics services to support local, regional and global trial requirements. Capabilities include coordination of clinical trial supplies, ancillary supplies and central lab services.

- Globalization of industry-sponsored trials has continued to increase as the cost and competition when conducting trials in the US and the EU has continued to rise. New trial destinations are being sought that will offer the opportunity of reducing time to market, shortening study timelines and reducing R&D costs.

- Emerging markets are attractive because they offer the opportunity to collect data from patients with diverse backgrounds. Asia especially China, Korea and Taiwan, South America, and Eastern Europe are becoming very active locations.
- There is tremendous pressure to better control the supply chain because effective clinical trials depend heavily on providing study supplies to various sites so that prescribed drugs are administered at the correct times throughout the study. If supplies run out (known as a "supply stock-out"), patients using the drug may be disqualified and the entire clinical study could be jeopardized.
- 85% of the pharmaceutical companies are currently outsourcing their clinical trials to CROs (clinical research organizations) and CSMOs (clinical supply chain management organizations)
- Shipment of trial drugs to many sites, which are often scattered in different countries, is difficult to achieve because of the need to comply with Good Clinical Practices (GCP) and cGMP regulations
- An innovative approach being tested is the Direct-to-Patient (DtP) platform in which the supplies are prepared, packaged, labeled, and then shipped directly to the patient's or caregiver's home. This method enables sponsors to avoid shipping to and storing supplies at clinical sites, allowing them to reduce costs, decrease timelines, and improve quality. The DtP platform will enable sponsors to conduct trials that would be all but impossible with traditional supply chains such as trials involving a rare diseases.

Update: Trends in Electronics

Much of our work has been concentrated on two prime elements of the overall electronics sector, the consumer electronics area and the automotive area, this update will include brief comments for both.

Automotive

Technology

- The role and presence in the non-traditional OEM space has exploded particularly over the past 12 months. This phenomenon is roughly in three areas: 1) whole car autonomy, 2) propulsion systems and 3) more development in the data management/infotainment area.
- This has included exploratory and testing work from the consumer electronics space (Apple), data investigation and management space (Google), and the upstart livery service (Uber).

- Every major automotive firm in the world has announced large investments in R&D related to autonomy, and many have literally opened innovation studios in Silicon Valley in the past year.
- 'Internet of Automotive Things' has become more deeply embedded within both vehicle and production environments and this intersects with autonomy.
- With dropping fuel prices, large vehicle sales have increased but reflecting long product development life-cycles, automotive OEMs have continued the development of alternative fuel/propulsion system vehicles.
 - Wholly new electric vehicle brands have entered the space, some with Chinese funding and established western brands will see manufacturers introduce dedicated platforms and sub brands for their electric vehicles.
- New generation of strategic partnership announced between high tech and automotive OEMs.

Supply Chain Management

- Even during a period of Chinese economic growth slowing, China is still accelerating acquisition of key suppliers and struggling western OEMs.
- Chinese automotive exports are becoming a reality, now a trickle of finished product flows coming to US, this will increase substantially even over the next few years (e.g. Volvo and Buick).
- Use of alternative materials and 3D printing technology has continued to mature and has begun to move from conceptual design to mainstream use in production environments.
- Recent surveys have shown that
 - Over 90% of execs see increasing value to have a manufacturing partner that could help improve idea to distribution.
 - The same study showed that 80% of companies will launch more products faster than last year and 58% saw long-lead times as persistent problems that need solving.
- To reduce lead times, enhance customer service and bring products quickly to market, companies have begun to accelerate the search for new sourcing patterns.
- In an effort to eliminate long lead times, some companies have begun new country- or regional-sourcing strategies for some products.
- Long-term forward supply chain management is in a state of flux as producers seek to refine their tech strategies and sourcing plans.
- Shorter-term supply chains are otherwise operating within a more normal band, albeit with some quite significant shifting in tech sourcing as some newer technologies are emerging quite quickly.

Product Electronics

- Especially with the overall slowdown impacting China and the European economic malaise, consumer product electronics companies are continuing to evolve their emerging market strategies.
 - Over the next two decades, globally over three billion new consumers will enter the middle class, the majority of which will come from emerging markets.
 - As a result, demand patterns are changing as rapidly as the electronic products themselves. Over the next five years the demand pattern will increase in Brazil, India, the Middle East/Africa and South America by approximately 20% each. Major investments in the past year have signaled that some attention is being actively shifted from North America and Europe.
- Long lead times continue to be a top pain point for high-tech/electronics companies, causing more companies to consider relocating sourcing operations to address this issue.
 - A recent survey shows that 22% of supply chain managers are building increased flexibility, or excess capacity, into their supply chains, and 20% are attempting to be more responsive to changes in the market. 48% said that end-to-end visibility is a top pain point in their import/export process.
- The effects of "big data" has enabled investments in and the creation of technologies that enable visibility and virtualization of the supply chain and the electronics industry has become an early adopter.
- Manufacturers have begun to focusing on building more resiliency into their supply chain and logistics plans.

Update: Trends in Third-Party Logistics

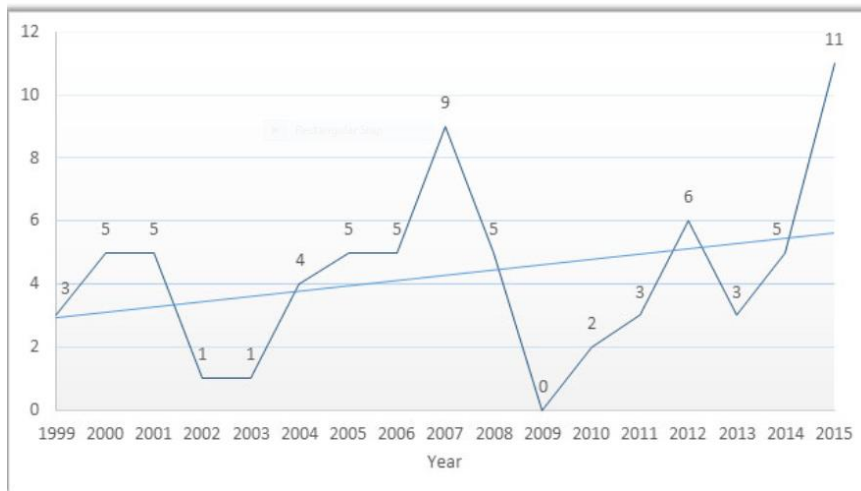
The main issue in the outsourced third-party sector is consolidation. While there has been an overall slowdown in the demand for virtually all transportation services, 3PL sector growth has continued but slowed. This has pressured some companies into achieving growth through acquisition instead of through organic measures

Growth has been centered on two main issues

- Mergers to create expanded and complimentary geographic footprints
- Merged companies that yield a more powerful aggregated service offer, including value-add warehouse and distribution (VAWD).

The rate of 3PL acquisition reached a record pace in 2015, and the recent round of transactions were much larger than in previous years. The chart below depicts 3PL transaction history over the past fifteen years.

3PL Acquisitions Over \$100 Million (1999 – November 3, 2015)



Below are the more significant transactions over the past 18 months:

<u>Acquirer</u>	<u>Acquisition Target</u>	<u>Transaction</u>
Japan Post (Japan)	Toll Holdings (Australia)	\$5.0 billion
FedEx	TNT Express (Netherlands)	\$4.8 billion
XPO	Norbert-Dentressangle (France)	\$3.5 billion
XPO	Con-way Logistics/Menlo Logistics	\$3.0 billion
FedEx	GENCO Supply Chain Solutions	\$2.0 billion
UPS	Coyote Logistics	\$1.8 billion
DSV (Denmark)	UTi	\$1.3 billion
Kintetsu World Express (Japan)	APL Logistics	\$ 1.2 billion
Geodis (France)	OHL	\$ 0.8 billion
XPO	New Breed Logistics	\$ 0.6 billion

Some important observations:

- XPO's massive set of acquisitions is intended to alter the balance of things, creating a super-presence in the outsourced logistics/extended manufacturing space unlike anything else. Some are betting that this is too much too quickly.
- The Con-way/Menlo acquisition provides big help to XPO with its China and SE Asia and Europe footprints.
- XPO's acquisition of New Breed was an investment focused on VAWD

- Menlo has large concentrations of activity in Eastern European and targeting of high-value industries and customers (GM, H-P and Dow as examples)
- FedEx's purchase of GENCO gives it a major expansion into VAWD making it more competitive on a combined service basis. Combined, they provide a strong competitor to UPS SCS and DHL Supply Chain.
- The expanded DSV has now built strong presence in automotive and high-tech; H-P, Hitachi, Philips, Pirelli, Porsche and Volvo. DSV's air freight has increased by 11% in the past six months.