

# Coping with Uncertainty

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*How might market forces create new ocean transport products  
for service-sensitive container shipments?*

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## Introduction

It is hard to overstate the importance of efficient container shipping to the health and growth of the world economy. Indeed, globalization as we know it would not be possible without standardized ocean containers. Yet container shipping risks being a victim of its own success in that sustained growth is overwhelming infrastructure at the ports and railroads—the “weak links” in the shipper-to-consignee intercontinental supply chain. Both ports and inland transport infrastructure are suffering from increasing congestion, rising costs and deteriorating reliability. The problems are particularly acute at major ports on the West Coast of North America, almost all of which are operating at or close to full capacity during peak season. Continued demand growth will lead to these ports operating at full capacity year-round as early as 2007.

While these ports have taken some steps to increase productivity, the hard reality is that major infrastructure expansion projects are required for endpoint-to-endpoint network capacity to keep pace with continued demand growth. Unfortunately, it takes years to expand port, road and rail capacity—indeed, it can take years to overcome environmental and political opposition to even approving such projects. It seems that congestion and delay problems will be with us for years to come, and that the problems will likely get worse before they get better.

Ocean shippers are thus in an increasingly difficult position. The growing variability in ocean transit time drives up shippers’ total supply-chain costs by forcing them either to retain higher safety stock levels, which increases their inventory carrying costs, or to resort to airfreight to recover from delays, which balloons transportation costs, or both. Most shippers have no viable alternative to using West Coast ports. Smaller West Coast ports do not have enough spare capacity to absorb forecast trans-Pacific traffic growth—and in any case, they face many of the same inland transport constraints as their larger counterparts. All-water routings to the U.S. Gulf and East Coasts are constrained by the limited capacity and rising tolls of the Panama Canal. Increasing the use of airfreight is an expensive proposition: by our estimate, the door-to-door cost of moving a shipment from Asia to North America by air is approximately eight-to-ten times that of standard ocean freight.

Based on the wide variety of commodities moving in ocean containers, there seems to be a clear opportunity to introduce new products aimed at the service-sensitive segment of container traffic that could justify a significant premium to move through the endpoint-to-endpoint network faster and more reliably than “standard” traffic—but at significantly lower cost than airfreight. Yet to date, the market has produced surprisingly few intermediate options for shippers unhappy with ocean service levels. In the following pages, we consider the economic case for such products.

### The growth of Asian imports

As markets force companies to improve profitability, the quest for ever cheaper manufacturing has stimulated sourcing from countries (especially China) where labor costs are relatively low. This strategic trend has caused imports from Asia to surge from 7.8 million TEU to 13.6 million TEU between 2000 and 2005, or at an annual average rate of 11.7 percent [Chart 1]. China's growth in particular exceeded the average by nearly 4 percentage points annually, increasing China's share of Asia's exports from 55 percent in 2000 to 65 percent in 2005. In total, China exported \$243.7 billion of goods to the U.S. in 2005, thus emerging as the U.S.'s second-largest trade partner in value terms (after Canada). Albeit at a slightly lower rate, North American imports from Asia are expected to continue growing at an annual rate of 9.2 percent between 2005 and 2010. Imports from China will continue to grow faster than the overall market (Chart 2).

The typical sourcing cycle sees developing countries begin by producing and exporting low value products, experiencing economic growth as a result, and later developing capabilities that allow them to manufacture and export progressively higher value products. Japan, Taiwan and South Korea are perfect examples of countries which have already gone through this cycle: initially exporters of inexpensive consumer products, they became manufacturers of high value products (electronics in particular) as they gained technological and manufacturing expertise. As their economies grew, labor costs in these countries rose and sourcing for more labor-intensive goods shifted to lower cost Asian countries, such as China, Vietnam and India.

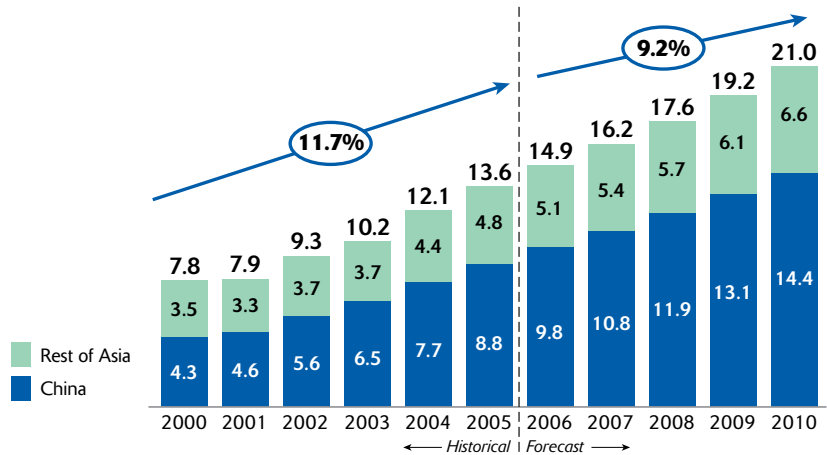
To a lesser extent, this evolution is already becoming visible in China. From the early days of cheap exports, the commodity mix has changed considerably as the country has moved up the value-added curve by developing technological expertise, reliable supplier bases and an infrastructure tailored for exports. This evolution is now encouraging industrial and capital equipment manufacturers to increase their sourcing from China. Indeed, today's fastest growing export categories to North America are capital and industrial equipment, which are expected to average

10.8 percent growth between 2005 and 2010. By comparison, forecasted growth of China-North America trade in consumer products, the leading imported commodity group from China, is expected to slow to 9.8 percent for the same period (as opposed to the 14.9 percent growth registered during the previous five-year cycle). There are two factors contributing to the below-average import growth trends of consumer products-related industries, such as toys and apparel:

1. Consumer products are undergoing lower levels of off-shoring growth, as most displacement of manufacturing activities in these sectors from North America has already taken place during previous waves of off-shoring to low-cost countries in Asia, Latin America and Africa.

### 1 North American Imports from Asia

millions of TEU per year

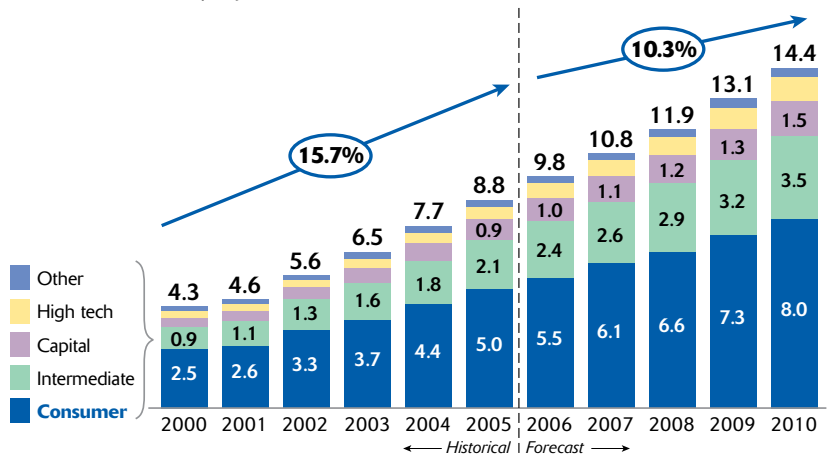


 Compound annual growth rate (CAGR) between the years indicated on each graph.

Source: MergeGlobal World Ocean Supply & Demand Model

### 2 North American Imports from China

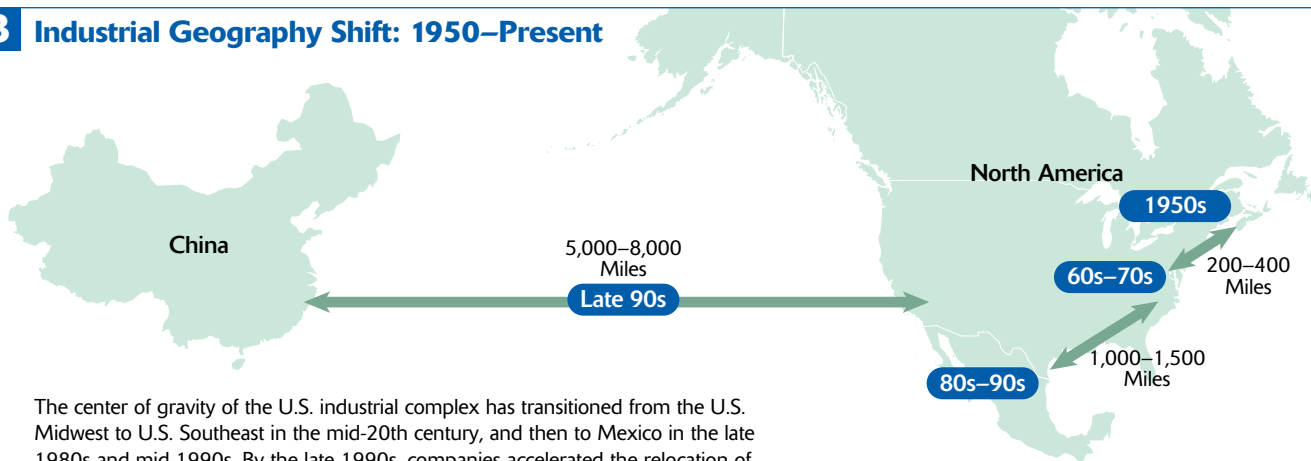
millions of TEU per year



 Compound annual growth rate (CAGR) between the years indicated on each graph.

Source: MergeGlobal World Ocean Supply & Demand Model

### 3 Industrial Geography Shift: 1950–Present



The center of gravity of the U.S. industrial complex has transitioned from the U.S. Midwest to U.S. Southeast in the mid-20th century, and then to Mexico in the late 1980s and mid 1990s. By the late 1990s, companies accelerated the relocation of their factories to Asia in order to lower manufacturing costs.

Source: MergeGlobal, Inc. estimates

2. After textile quotas were lifted at the beginning of 2005 under WTO agreements, China’s textile exports surged by 62.7 percent, while exports from smaller producers like Lesotho, Swaziland and Mauritius declined, indicating that a large portion of textile production rapidly shifted to China.

Any further growth in imports of consumer products from China will need to come from increased consumer demand and economic growth in North America. Conversely, one of the sectors with the highest growth prospects in offshore sourcing is auto parts, with massive investments in China-based assembly lines currently underway by both GM and Ford. These and other similar projects should account for the increasing weight that industrial and capital equipment goods will have in China’s total exports over the next five-year period.

With production lines being moved thousands of miles away from customers, sourcing strategies are not only reducing manufacturing costs; they are also creating logistic processes that usually become a vital link within the overall production process. As a result, more shippers are choosing to take ownership of the product upstream at the factory in the country of origin, so as to control the full supply chain and extract maximum cost benefits. With greater control, shippers also assume full economic risk for the inventory and transportation costs beginning in the country of origin. The increased risk will force supply chain managers to become more disciplined in managing intercontinental supply chains, in turn forcing service providers to develop more efficient and low cost solutions.

#### Intercontinental Supply Chains

The key aspect characterizing Intercontinental Supply Chains (ISCs) is length of haul, which can be 5 to 10 times longer than

Domestic Supply Chains (DSCs) and may average anywhere between 5,000-8,000 miles. Longer lengths-of-haul mean ISCs have higher unit transportation costs, larger in-transit inventory levels and associated inventory carrying costs, and slower order-to-cash payment cycles than those observed with DSCs. Longer lengths-of-haul also mean that ISCs have a longer response time, which makes it slower and relatively expensive to recover from service failures. For example, an unexpected spike in demand for a product sourced from China will need to be satisfied by expensive airfreight because less-than-containerload (LCL) and full-containerload (FCL) ocean services would take too long to deliver the product. With a DSC, on the other hand, it is usually possible to ship the product via truck or rail and get the orders to the required destination in time to meet the unexpected demand.

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**Many shippers are learning the hard way that “hidden costs” of Asia-originated supply chains are so large they can impact overall company performance**

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Generally speaking, for products with similar end-use demand patterns, an ISC has both higher unit transportation costs and higher inventory carrying costs than a DSC. There are two primary causes:

1. By definition, ISCs have longer lengths-of-haul causing longer transit times and—since trucks obviously can’t cross oceans—require a higher number of transportation modes than DSCs. Longer transit times force higher inventory carrying costs, and multiple transportation modes typically increase unit transportation costs.

2. ISCs usually involve multiple, independent transportation and logistics providers—in contrast to DSCs in which one

provider (whether an integrator or TL/LTL carrier) handles each shipment from origin to final destination. Costs, dwell times and service problems tend to increase in exponential proportion to the number of “cooks in the kitchen.”

Less evident, but nonetheless significant, are the cultural and operational challenges that add to the complexities of operating an ISC. Large differences in time zones impact coordination and make recovery from service failures more challenging. Differences in work culture, business etiquette and language also can meaningfully increase the time and cost of problem resolution.

**Total Distribution Cost Concept**

As companies increase their sourcing from Asia, logistics become more complex and supply chain costs account for a larger percentage of a company’s cost of goods sold (COGS). These costs can materially impact earnings, so understanding them has become a priority for CEOs as well as supply chain managers.

Total distribution cost (TDC) analysis is a useful way to analyze the costs of an ISC. TDC is defined as the transport-sensitive portion of the total landed cost for a product [Chart 4]. It comprises the sum of transport and inventory-related costs, and excludes product costs, as well as trade-related costs (duties, taxes, customs, etc.), which remain constant across different transportation modes.

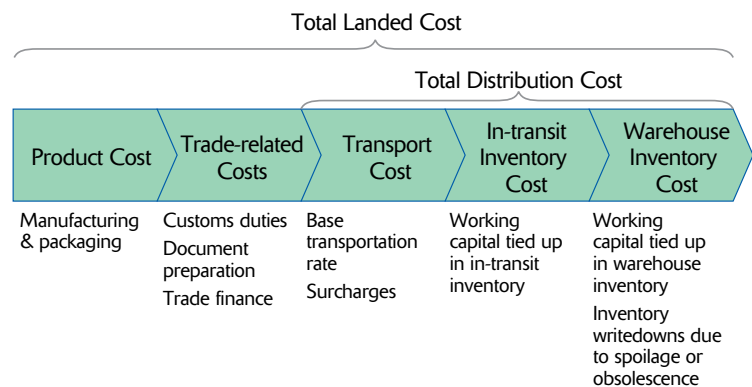
TDC is neither a new nor controversial concept. The basic idea is that shippers should not seek to minimize transport costs, but rather to minimize the sum of transport and inventory-related costs [Chart 5]. For example, the least expensive way to move goods is via standard ocean service—but if the goods are perishable, then inventory write-downs may more than offset transportation cost savings. Perishability is a broader concept than physical spoilage. For example, the value of toys and fashion apparel can fall significantly during a matter of weeks due to seasonality or fickle consumer tastes. The risk of lost inventory value often justifies the expense of moving highly perishable goods via airfreight.

Even in the same origin-destination markets, the TDC calculus can vary widely across different commodities due to differences in

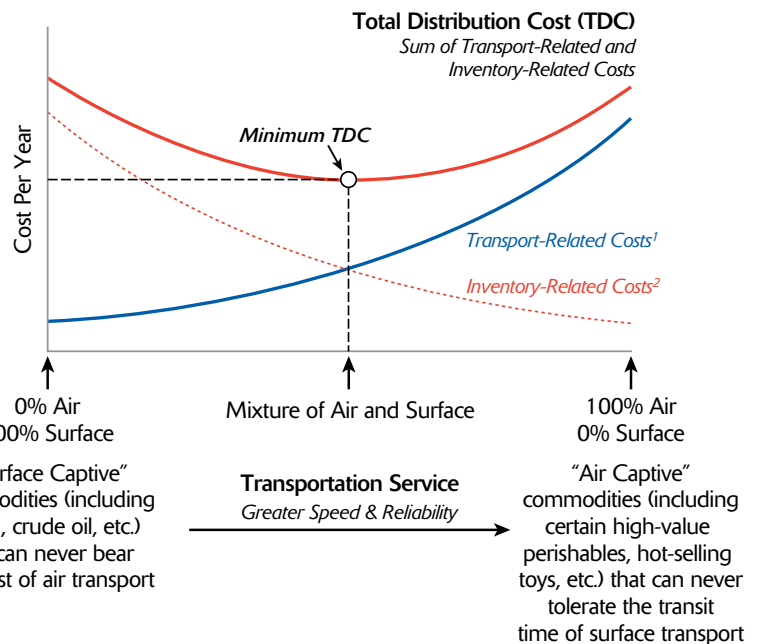
product value, product perishability (economic as well as physical), demand variability and/or the economic consequences of a stockout.

Historically, it has been hard for shippers to actually apply the TDC concept in day-to-day decision-making. It is difficult for managers to argue in favor of higher visible expense (transport cost) in order to achieve less visible, and often debatable, savings elsewhere in the supply chain. For example, consider how difficult it is to defensibly quantify the value

**4 TDC is the Transport-Sensitive Portion of a Product’s Total Landed Cost**



**5 Total Distribution Cost Concept**



**Notes**

<sup>1</sup> Transport-Related Costs reflect all costs associated with moving goods, including freight bills, documentation, customs brokerage, etc.

<sup>2</sup> Inventory-Related Costs include all other elements of logistics costs—from storing and handling product to writedowns of obsolete or spoiled goods.

Source: MergeGlobal, Inc.

of lost sales when a particular product is out of stock. How many customers actually will seek to purchase the sold-out item? Are these sales lost forever, or merely delayed? Is the customer relationship lost forever, or merely smaller than it would have been if the sale had been completed? Answers to these questions usually can't be proven right, yet have a large impact on perceived inventory-related costs.

The analytical challenges are significant but the situation is improving as firms capture and analyze more and better data on their respective businesses. The spread of progressively more sophisticated enterprise resource planning (ERP) systems means that more and more companies have a fuller understanding (and less debatable) understanding of their supply-chain costs. For this reason, perceived inventory-related costs are rising steadily (even if interest rates remain constant) and thus firms should become progressively more willing to spend more on transportation in order to minimize overall TDC.

**“Hidden costs” of intercontinental supply chains**

When making sourcing decisions, many firms consider only the direct and most visible supply chain costs, such as manufacturing and transportation, and often neglect the “hidden” costs that influence overall profitability. In addition to the widely-acknowledged complexities of coordinating across oceans and multiple time zones, business cultures and lan-

guages, a major hidden cost of an ISC is transit time variability. Transit time variability—for example, not knowing whether an ocean shipment will arrive 25, 30 or 35-plus days

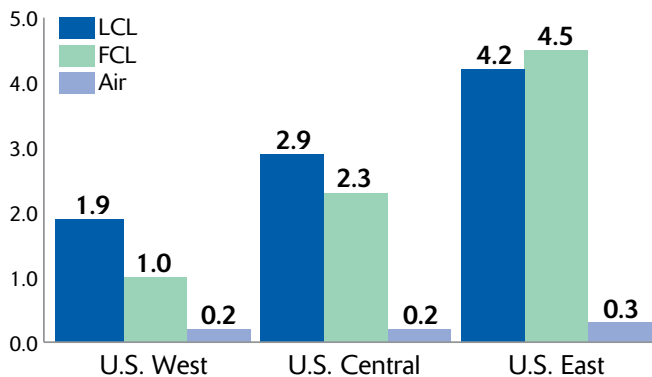
**The market has produced surprisingly few intermediate options for shippers unhappy with existing ocean service levels**

after dispatch from China—often forces shippers to maintain high safety stock inventories and thus results in higher inventory carrying costs. Virtually every firm can provide a set of accounts with an accurate tally of transport expenses—but far fewer can quantify inventory carrying costs in a way that reasonable and informed people would not debate. Even fewer firms can defensibly quantify the impact of transit time variability on supply-chain costs (both higher safety-stock costs and higher transport expense when airfreight is used to recover from delayed ocean shipments).

Transit time variability and the associated unreliability impose the highest penalty during peak season when short selling windows mean that stockouts or service failures result in lost sales and potentially huge inventory writedowns. It is therefore critical to understand the total inventory carrying costs for an ISC, including the carrying cost portion directly attributable to transit time variability.

**6 Transit Time Variability: A China–U.S. Example**

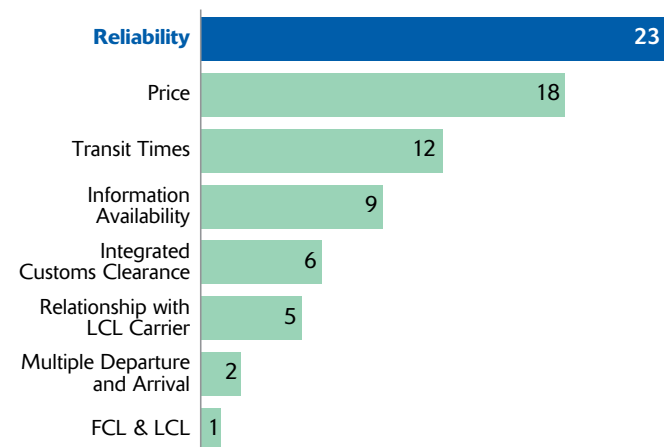
Days variability in scheduled transit time



Source: MergeGlobal, Inc. analysis of survey results from shipper focus groups conducted in Fall 2005.

**7 Customers Want Reliable Ocean Transport**

Weighted\* number of responses from focus groups.



\*Responses weighted by importance assigned (via allocation of points) by each survey participant.

Source: MergeGlobal, Inc. analysis of survey results from shipper focus groups conducted in Fall 2005.















