

How Supply Chain & Logistics Performance Impacts Trade

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GEORGIA TECH
Supply Chain & Logistics Institute
EDUCATION • INNOVATION • LEADERSHIP

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Education

Research

Industry Collaboration

Global Outreach

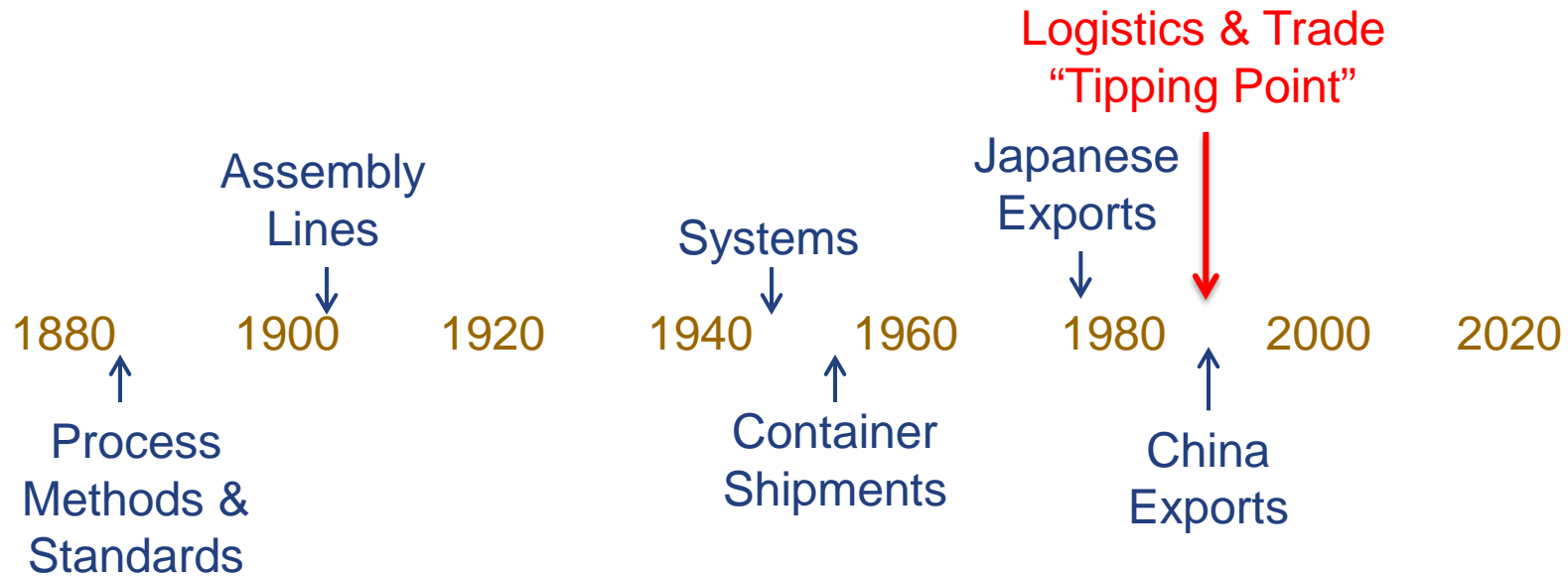
- A unit of the School of Industrial & Systems Engineering
- Ranked #1 Industrial Engineering Program for 20 consecutive years
- World's largest supply chain & logistics research and education unit



Georgia Tech Supply Chain & Logistics Research and Innovation Centers



Evolution of Logistics & Trade

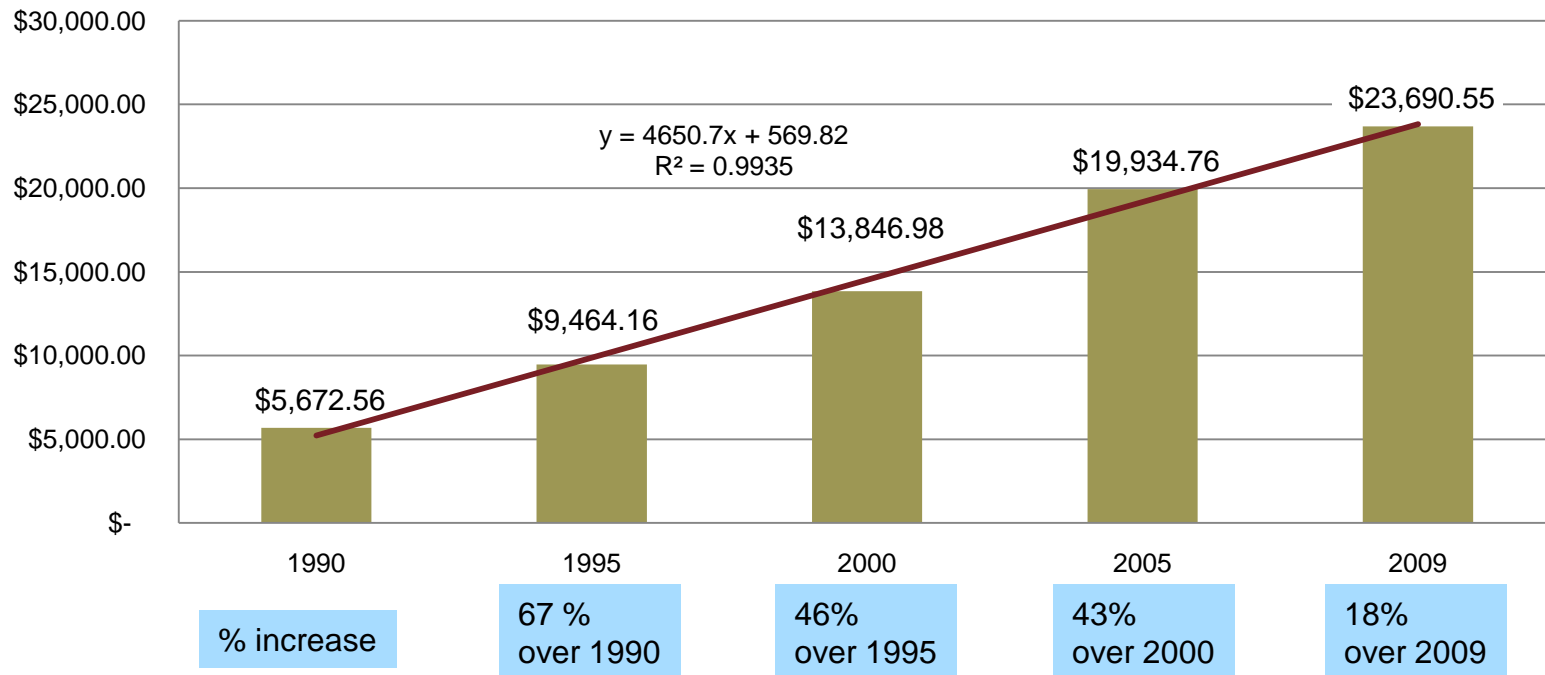


Supply Chains



Expansion of Trade – A Supply Chain Revolution

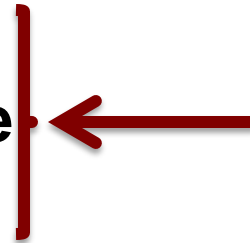
Total World Export 1990 - 2009 in Billion \$



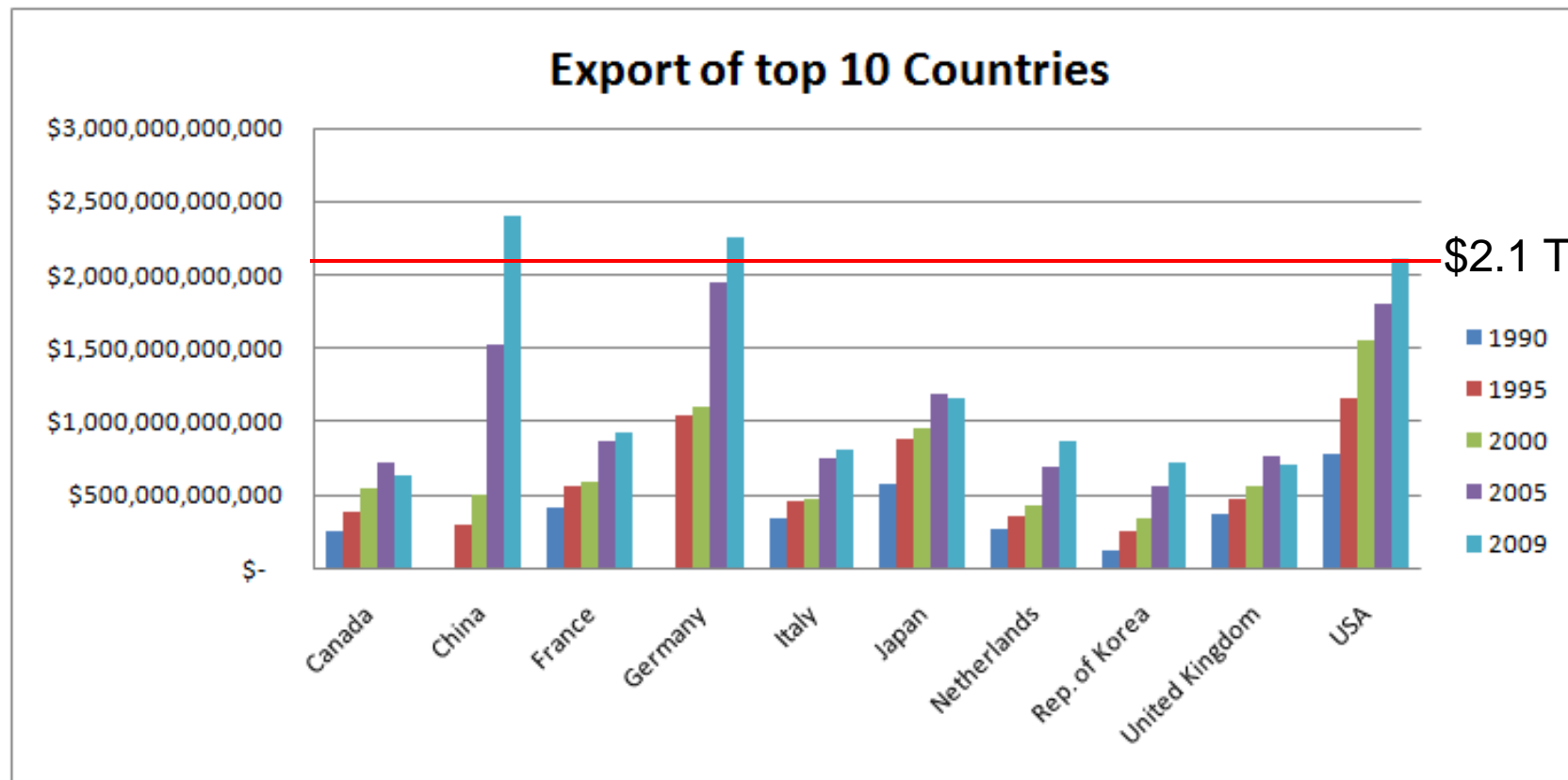
Requirements for Export

1. Produce products at competitive quality and prices
2. Find markets for the products and sell generate sales
3. Deliver the products to the markets at competitive quality and prices

**Logistics
Performance**



Expansion of Trade



- **Note growth of China trade!**

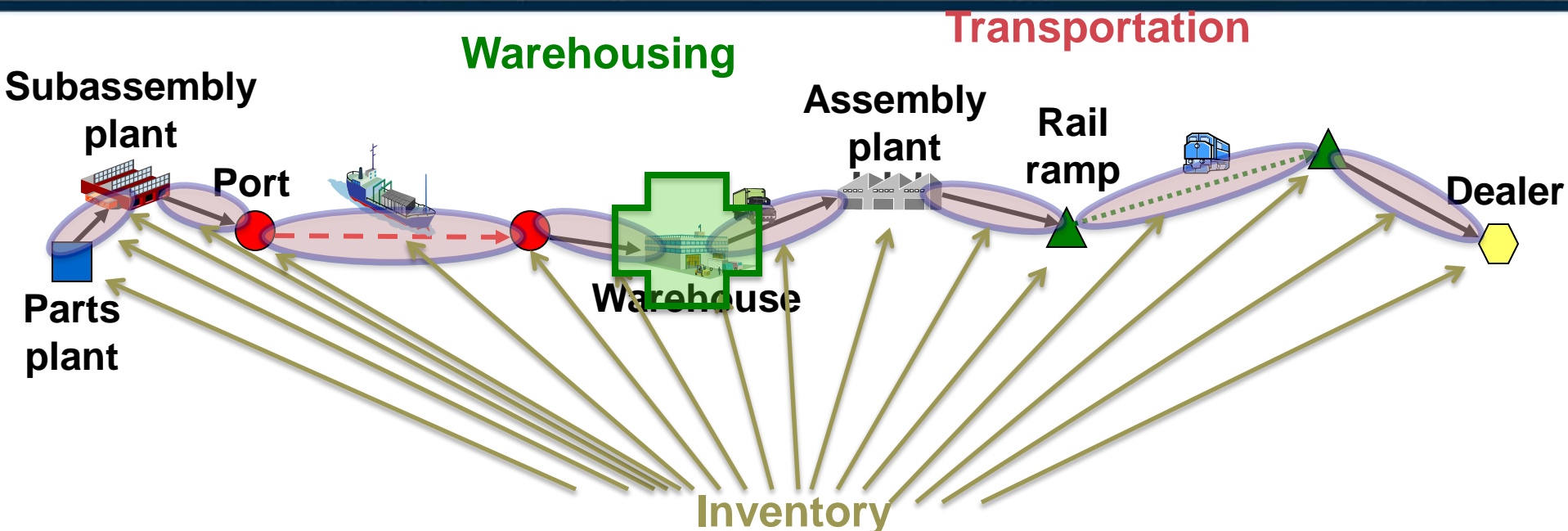
World's Largest Container Ports (million TEUs)

| 1989 | | 2009 | |
|-------------------------------------|-----|------------------------------|------|
| Hong Kong | 4.5 | Singapore | 25.8 |
| Singapore | 4.4 | Shanghai (China) | 25.0 |
| Rotterdam (Netherlands) | 3.9 | Hong Kong | 20.9 |
| Kaohsiung (Taiwan) | 3.4 | Shenzhen (China) | 18.2 |
| Kobe (Japan) | 2.5 | Busan (South Korea) | 11.9 |
| Busan (South Korea) | 2.2 | Guangzhou (China) | 11.2 |
| Los Angeles (United States) | 2.1 | Dubai (United Arab Emirates) | 11.1 |
| New York/New Jersey (United States) | 2.0 | Ningbo (China) | 10.5 |
| Keelung (Taiwan) | 1.8 | Qingdao (China) | 10.2 |
| Hamburg (Germany) | 1.7 | Rotterdam (Netherlands) | 9.7 |
| Long Beach (United States) | 1.5 | Tianjin (China) | 8.7 |
| Yokohama (Japan) | 1.5 | Kaohsiung (Taiwan) | 8.5 |
| Antwerp (Belgium) | 1.5 | Antwerp (Belgium) | 7.3 |
| Tokyo (Japan) | 1.4 | Port Klang (Malaysia) | 7.3 |
| Felixstowe (Britain) | 1.4 | Hamburg (Germany) | 7.0 |

- China has made huge investments in logistics infrastructure
- Very “export” focused



How has "globalization" changed logistics?



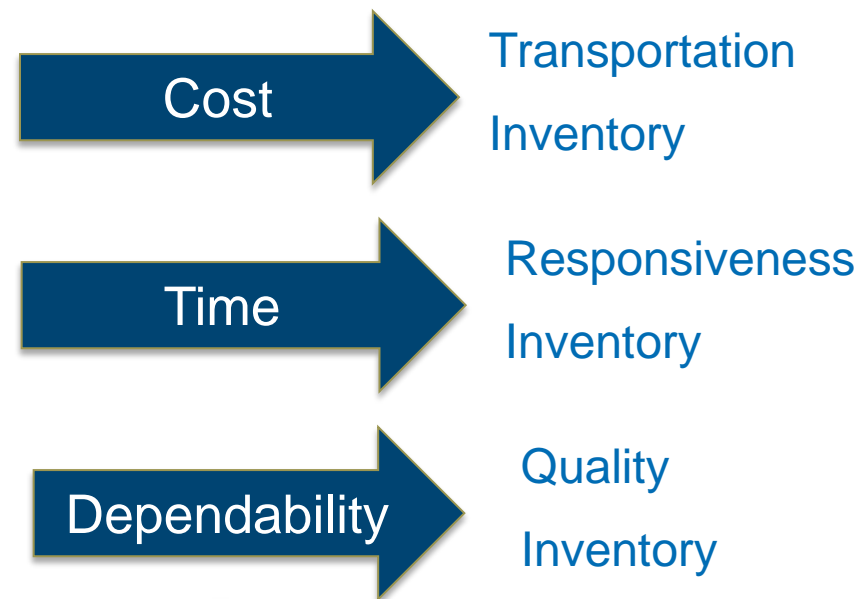
- Transportation – increased
- Inventory – increase and moved
- Warehousing – limited change
- Time to customer – increased
- Variability – increased
- Complexity – increased
- Technology – increased

Logistics performance – more critical to competitiveness!

Supply Chain and Logistics Performance

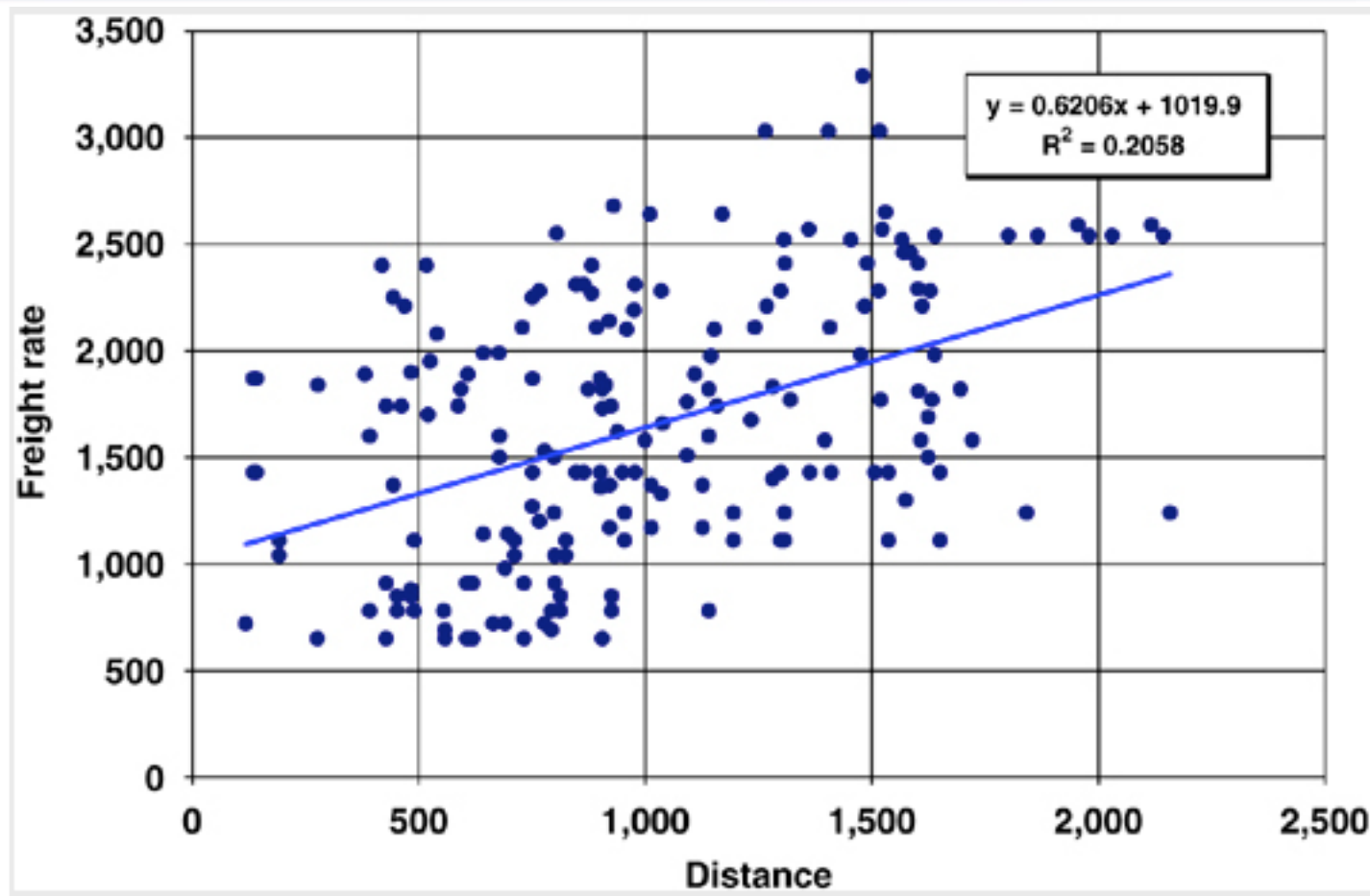
- **Individual enterprise “logistics” performance**
 - Usually the focus of each enterprise

- **Supply chain “network” performance**
 - Major concern of the shippers
 - **Key to export competitiveness**



Cost – Freight Rates

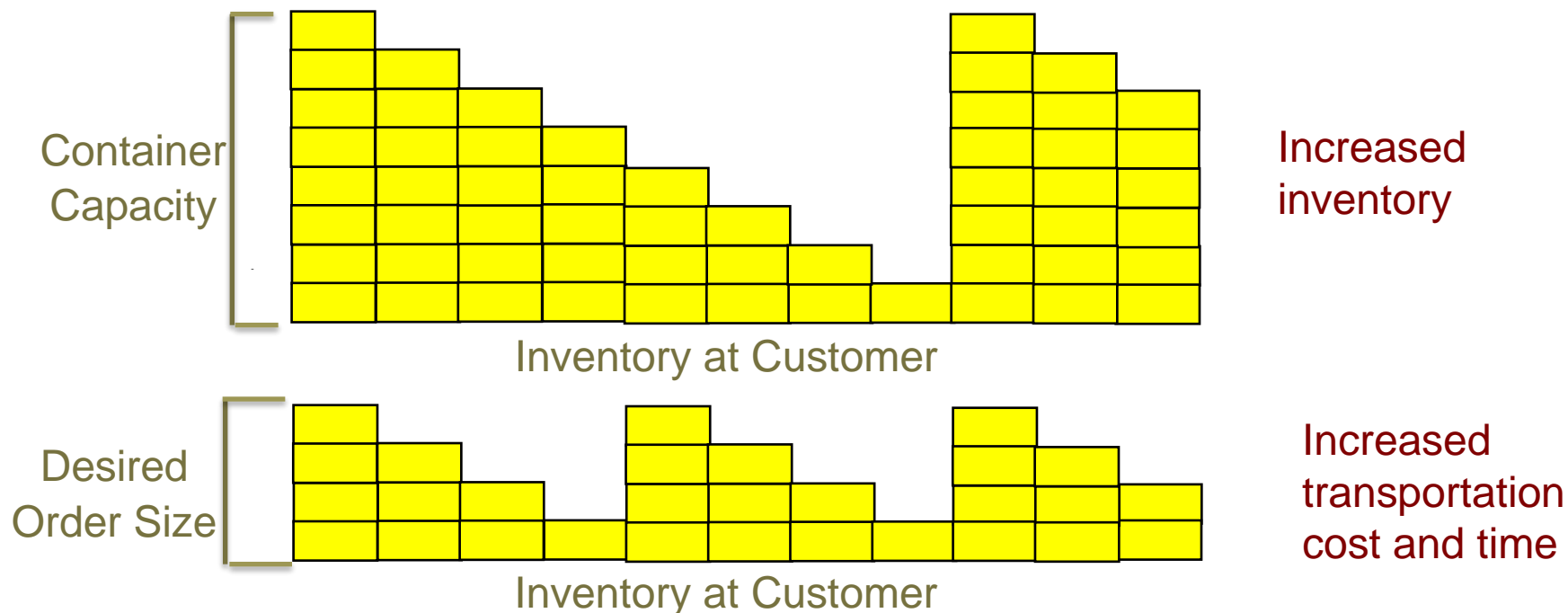
- Distance
- Time
- Flow balance
- Competition



Ref: "Liner Shipping Connectivity and Port Infrastructure as Determinants of Freight Rates in the Caribbean," Gordon Wilmsmeier and Jan Hoffmann

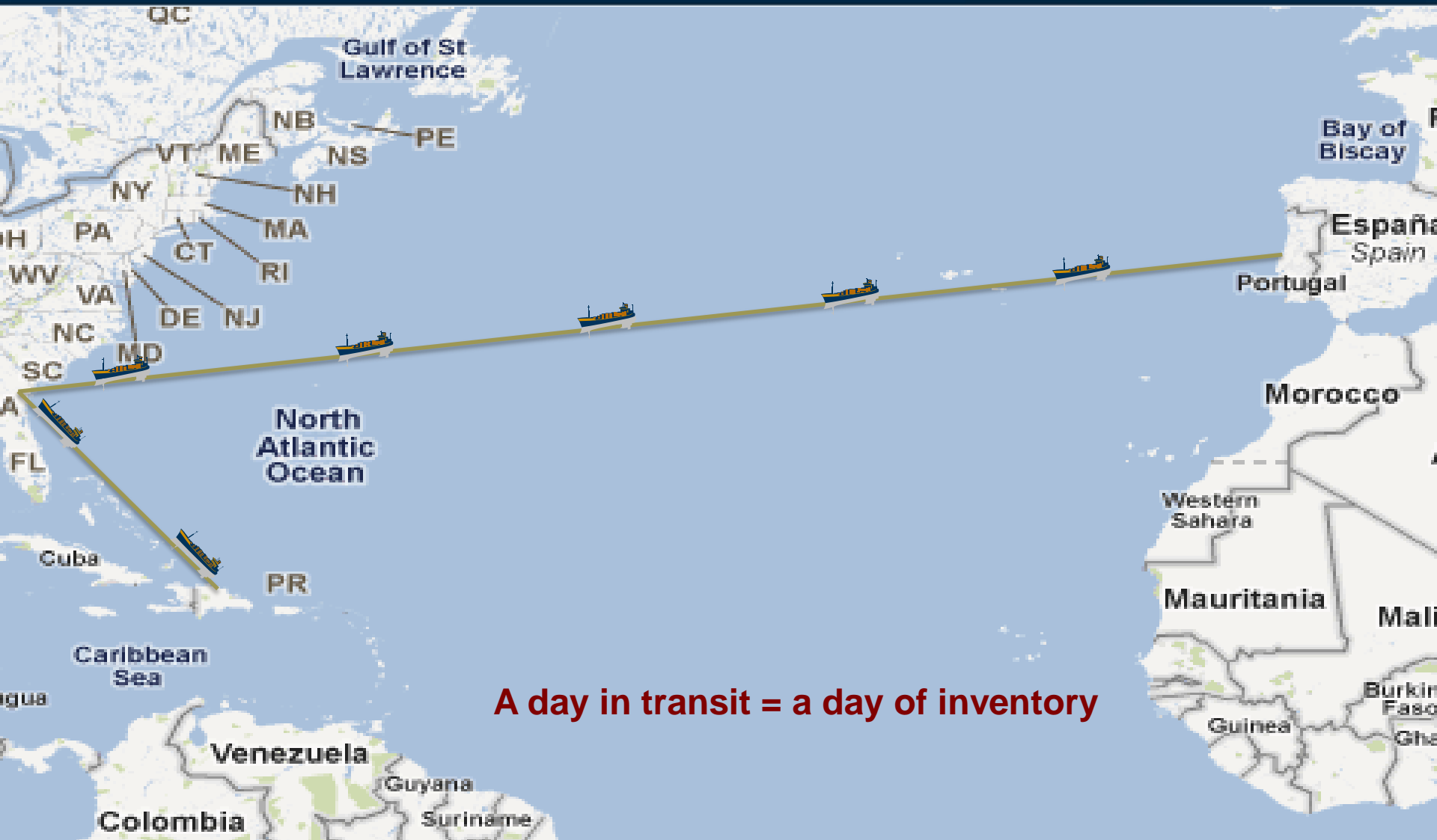


Cost - "Full Container" Shipments



- **Full containers not a problem for large volume exporters**
- **Decreases competitiveness for start up exporters**
- **Particularly important for refrigerated products**

Time – In-transit Inventory



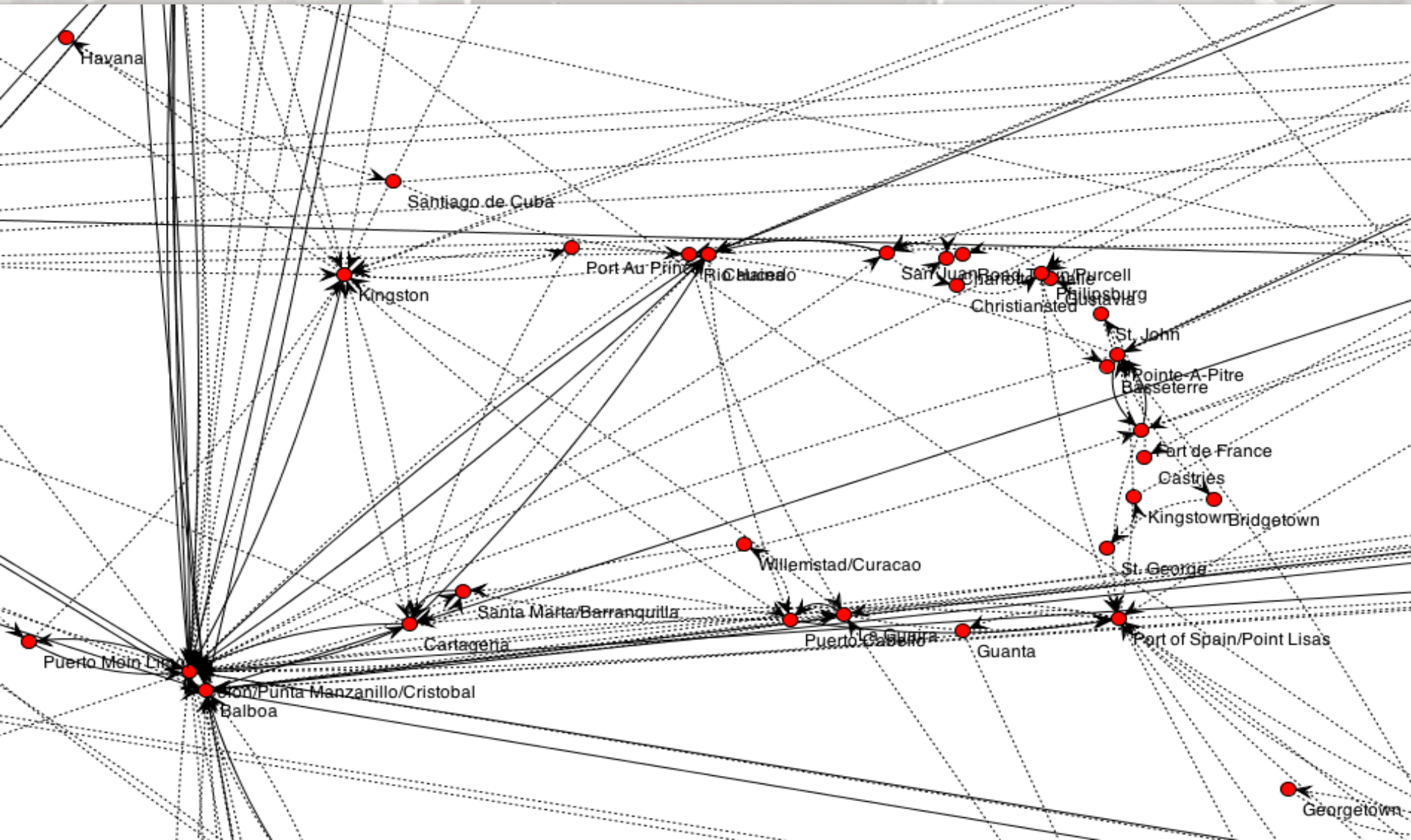
A day in transit = a day of inventory

Time – Direct Versus Multi-stop Route

- **Direct ship lanes**
 - Minimize transit time
 - May not utilize ship capacity
- **Multi-stop routes**
 - Longer distance
 - Stops take time
 - Stops increase potential delays
 - May increase utilization
- **“Connectivity” is important to competitiveness**
 - Direct ship is best
 - Fewer stops is better



Caribbean Ports Connectivity



Time - Frequency of Port Calls

| Port | Arrive | Depart |
|------------|--------|--------|
| Manzanillo | | Sat |
| San Juan | Wed | Wed |
| Rio Haina | Thur | Fri |
| Manzanillo | Sun | |



If a shipment is ready on Monday at Rio Haina for Manzanillo, transit time is increased by 3 days

More in-transit inventory

More safety stock at customer

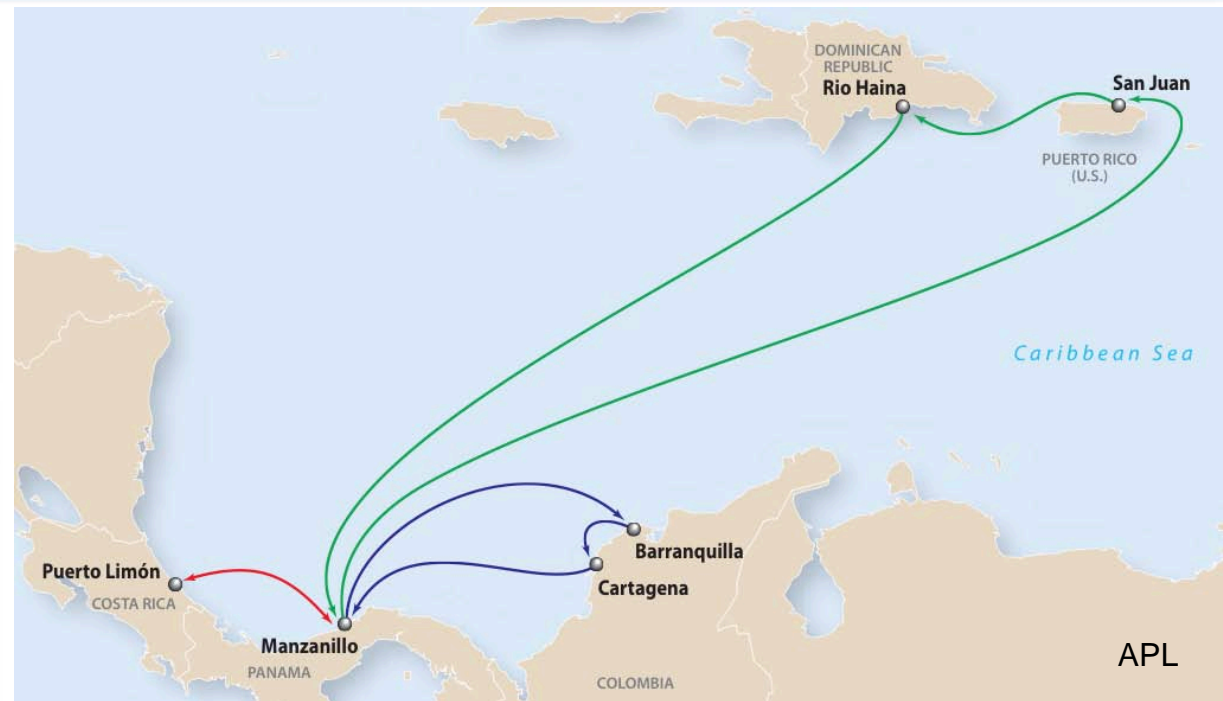
More frequent port calls increase competitiveness!



Time - Transshipping

| Port | Arrive | Depart |
|------------|--------|--------|
| Manzanillo | | Sat |
| San Juan | Wed | Wed |
| Rio Haina | Thur | Fri |
| Manzanillo | Sun | |

| Port | Arrive | Depart |
|--------------|--------|--------|
| Manzanillo | | Sun |
| Barranquilla | Mon | Tues |
| Cartagena | Tues | Wed |
| Manzanillo | Thur | |

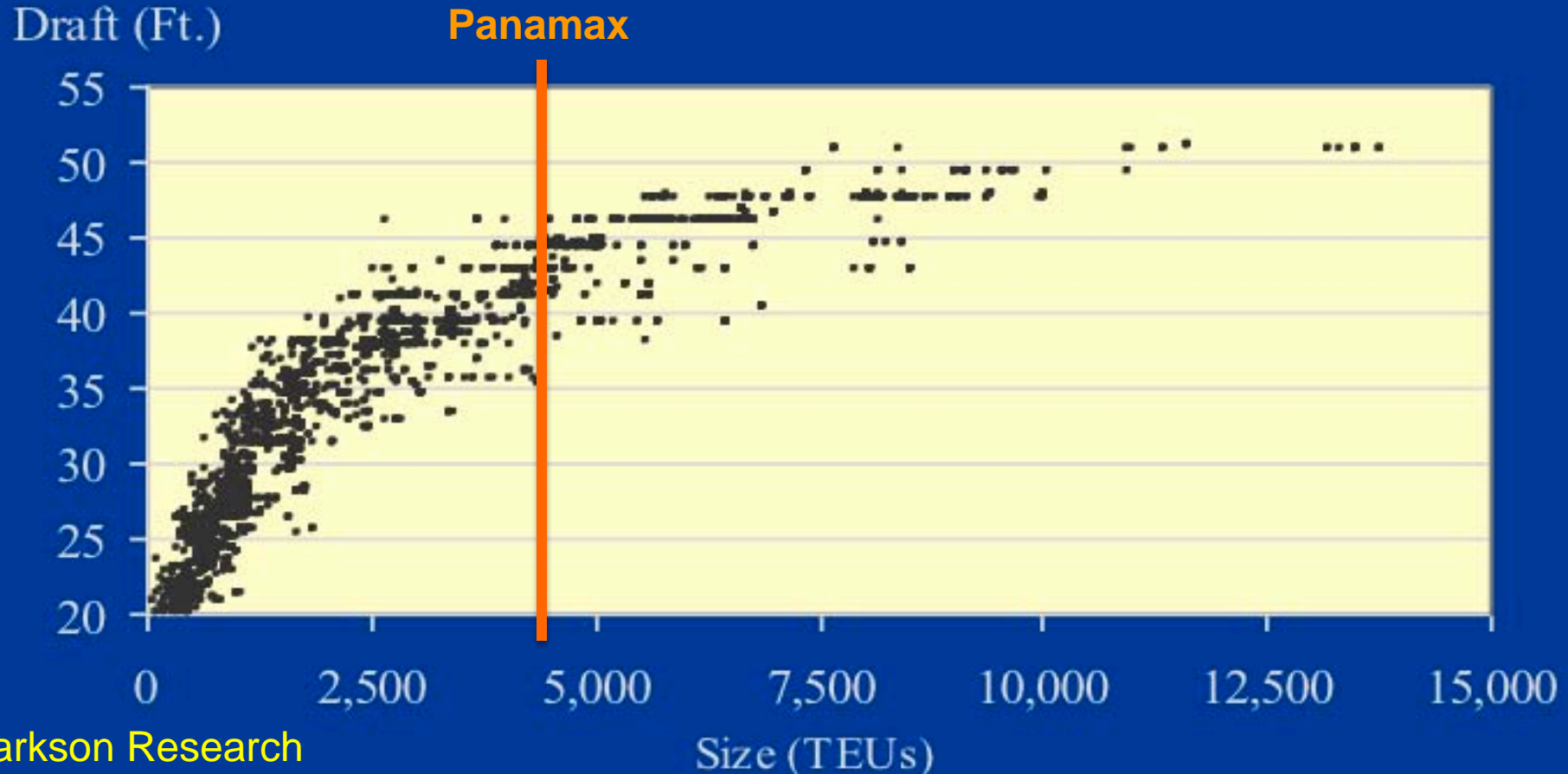


- **If a shipment is from Rio Haina to Cartagena**
 - Probably waits for a week in Manzanillo
 - Requires an extra day for a port call in Barranquilla
- **“Good” transshipments can increase competitiveness!**



Current Containership Fleet

Global Containership Fleet, Size (TEUs) V. Draft,
Year-End 2009



Expansion of Panama Canal 2014

***CSAV orders two post-panamax containerships
at Samsung - December 2010***

***Technomar Shipping to order four post-
panamax ships - May 2011***

***Evergreen Orders 10 Post-Panamax
Ships - July, 2010***

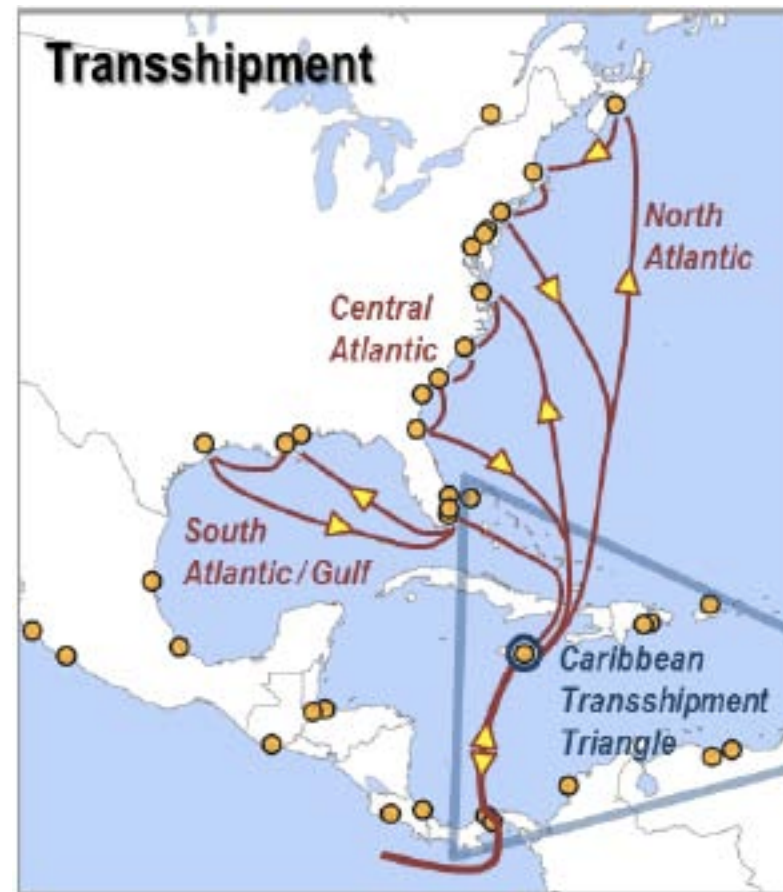
***Neptune Orient Orders 10 14,000 teu
container ships – June, 2011***

***Maersk orders as many as 30 18,000 teu
container ships – February 2011***



Impact of Post Panamax Ships

- Not likely to reduce freight rates
 - 12,000 TEU ships are about 10% per slot cheaper to operate
- Not enough freight for direct lanes
- Biggest ships can only access one east coast US port
- There is likely to be a transshipment hub in the triangle
- **Connectivity to the transshipment hub will be critical for competitiveness**



Ref: Hofstra University, Dr. Jean-Paul Rodrigue Factors Impacting North American Freight Distribution in View of the Panama Canal Expansion 2010



Different Stakeholder Perspectives

- **Carrier perspective**

- Transportation assets move in cycles or routes so flow balance matters
- Larger transportation assets are generally more efficient per unit transported than smaller assets
- Ship utilization is improved by multiple stop routes
- Carriers control ship routes

- **Shipper perspective**

- Total landed cost includes both transportation and inventory
- Increasing transit time increases inventory
- Increasing transit time variability increases inventory
- Trend toward shippers controlling container routing



Logistics and Trade Mega Trends

- **Globalization of manufacturing**
 - Dramatic increase in transportation
- **Mass customization**
 - Dramatic increase in number and diversity of products
- **Increasing customer focus on “lean”**
 - Decrease in inventory but increase in transportation cost
- **Computing advances**
 - Dramatic increase in data
- **Increasingly complex supply chains**
 - Dramatic increase in difficulty
- **Requirements for competitiveness**
 - Technology
 - Education
 - **Country level attention!**



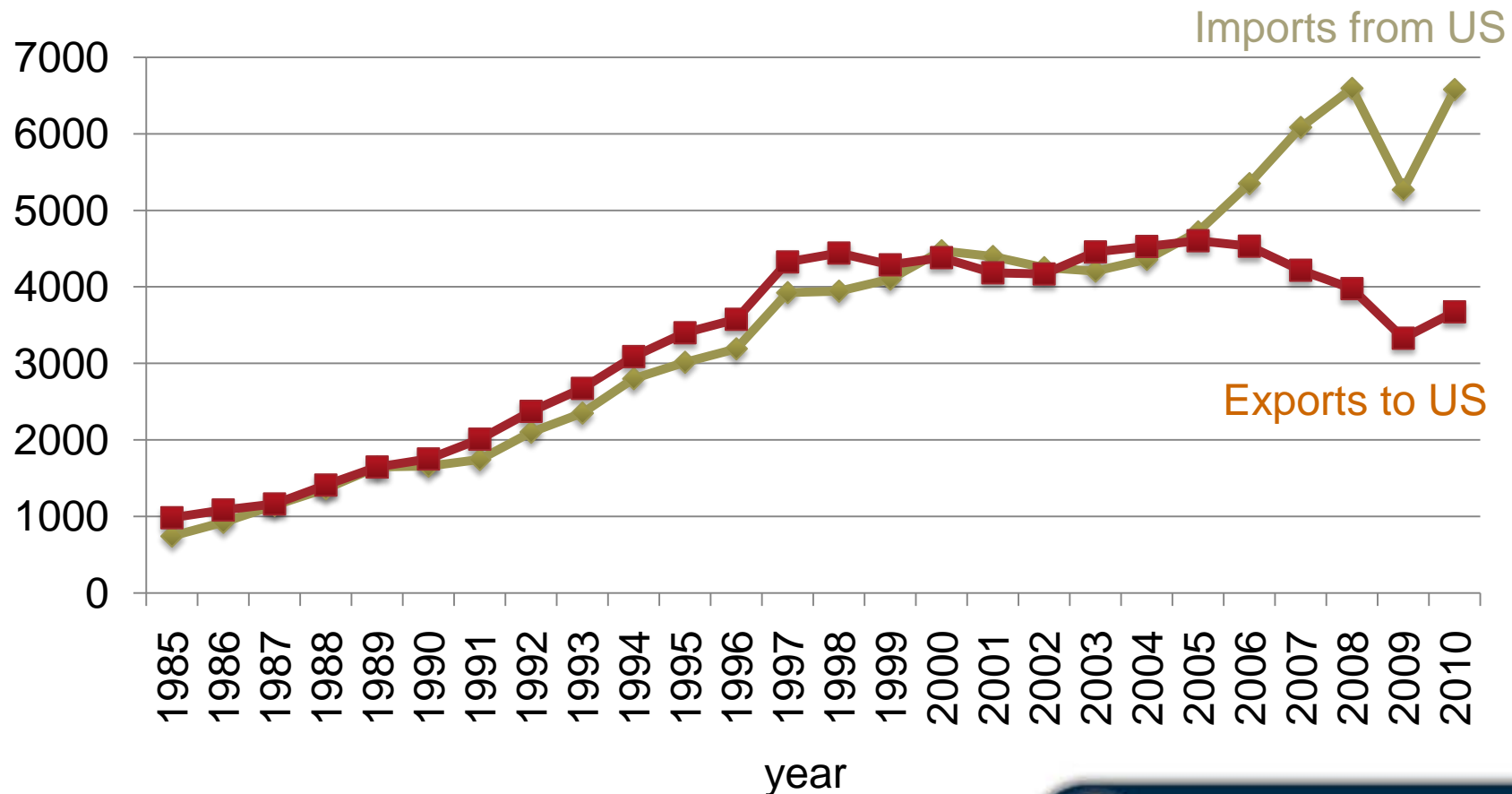
Dominican Republic Export Potential

- **Biggest economy in CAFTA (GDP \$87.25 billion)**
 - agriculture: 7.1%, industry: 28.3%, services: 64.6%
- **Exports**
 - ferronickel, sugar, gold, silver, coffee, cocoa, tobacco, meats, consumer goods
- **Imports**
 - foodstuffs, petroleum, cotton and fabrics, chemicals and pharmaceuticals
 - US 44.3%, Venezuela 6%, China 5%, Mexico 4.3%, Columbia 4.1%
- **US is the biggest trade partner**



Dominican Republic Trade with US

\$ million



Container Ports



Container Lines

Port of Caucedo

CSAV

Evergreen

Hapag-Lloyd

Libra

Maersk

MOL

Tropical Shipping

Port of Puerto Plata

Antillean Marine Shipping

Seaboard Marine

Tropical Shipping

Port of Rio Haina

Antillean Marine Shipping

APL

Caribbean Feeder Services

Crowley Liner Services

CSAV

Libra

MOL

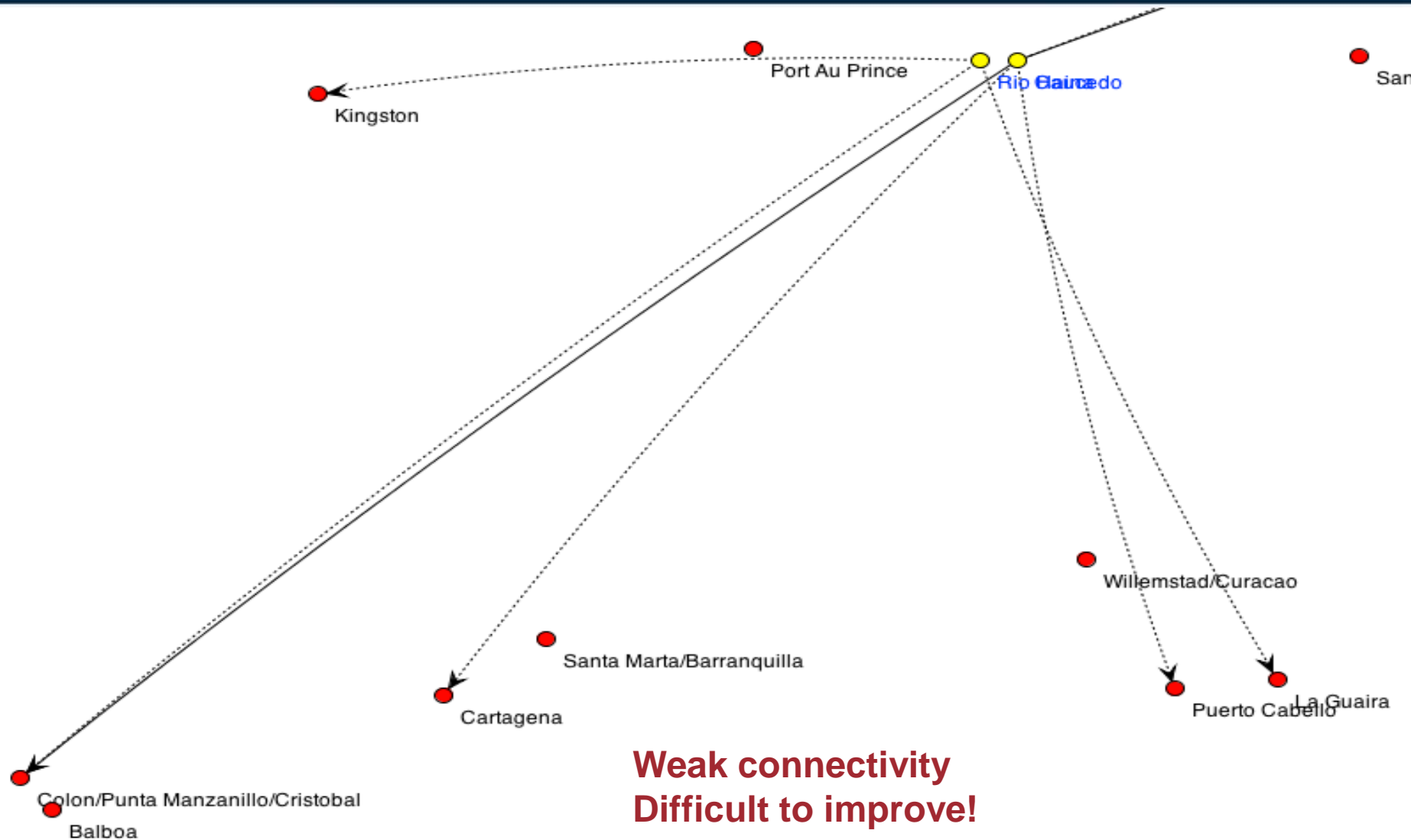
Seaboard Marine

Port of Santo Domingo

Libra



DR Ports "Direct Connectivity"



World Bank Logistics Performance Index

| | Rank |
|-------------------------|------|
| Overall LPI | 65 |
| Customs | 63 |
| Infrastructure | 90 |
| International Shipments | 107 |
| Logistics Competence | 100 |
| Traching & Tracing | 48 |
| Timeliness | 38 |

Logistics performance appears to be a major barrier to DR competitiveness!



Emerging Markets Drive Global Growth

- **It is forecast that around two-thirds of the world's economic growth will be generated by emerging markets in the next five years**
- **By 2015 emerging markets are projected to account for 41% of global GDP, compared to an estimated 1% in 2011**
- **Dominican Republic has very good proximity to emerging markets**
- **There appears to be a big opportunity for Dominican Republic if logistics performance can be significantly improved!**

Ref: The Economist Intelligence Unit Limited 2011





Questions?

Comments?

