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THE NEW PANAMA CANAL IN A GLOBAL CONTEXT

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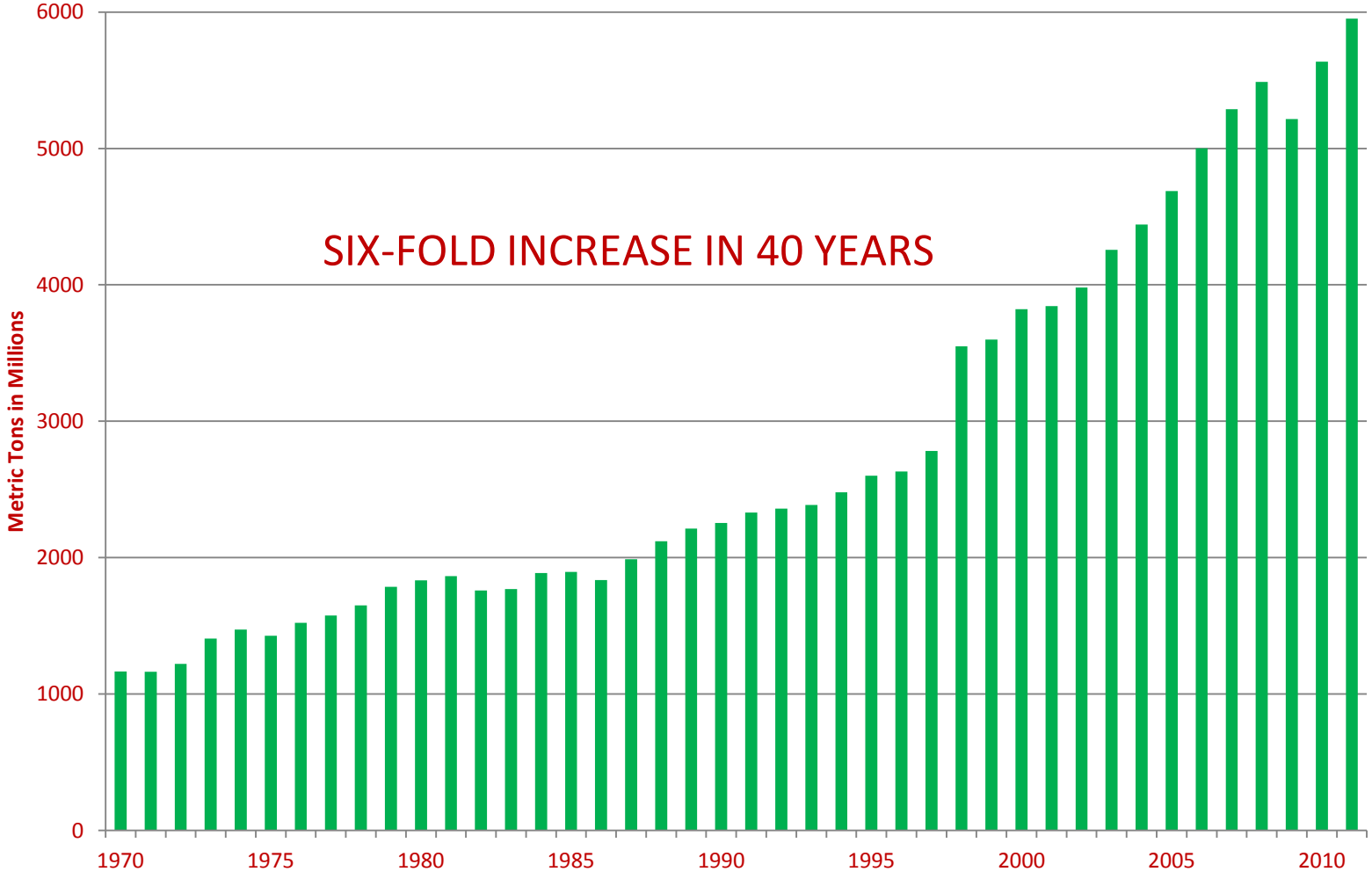
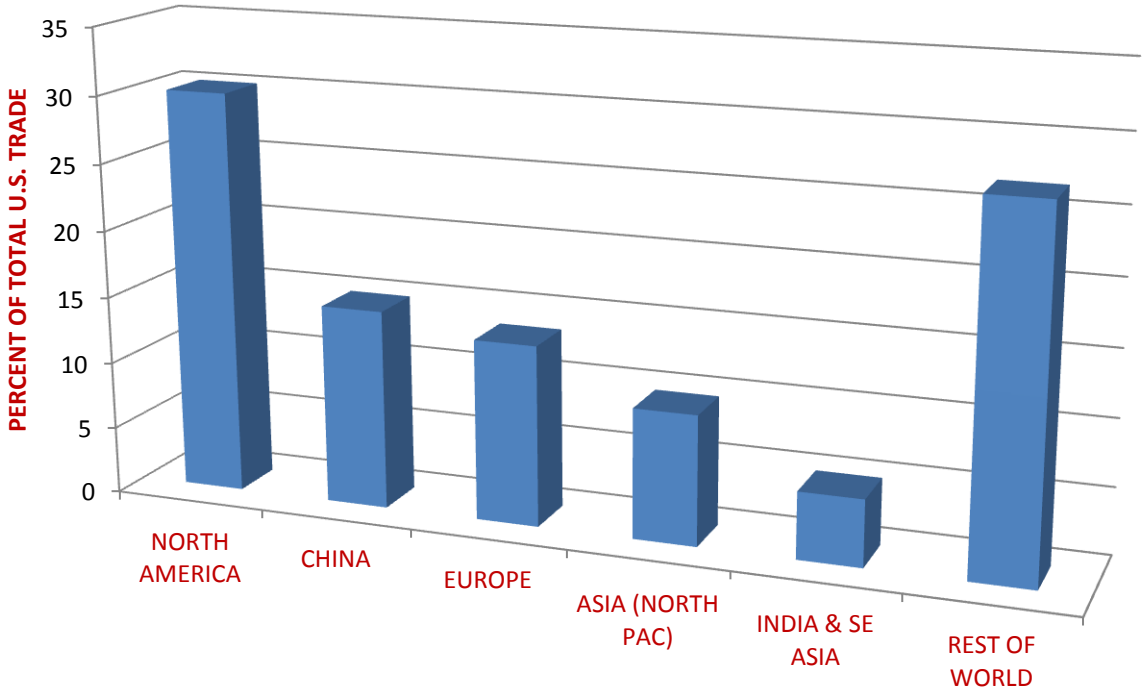
SAN FRANCISCO, JUNE 11, 2015

WORLD CONTAINERIZED WATERBORNE COMMERCE



GLOBALIZATION REMAINS REGIONALIZED: EXAMPLE OF U. S. TRADING PARTNERS BASED ON DOLLARS IN 2014



FIVE DETERMINANTS OF CONTAINERIZED GLOBAL SHIPPING ROUTES

1. **ROUTE DESTINATIONS**: WORLD CONSUMPTION GROWTH IS SHIFTING FROM MOSTLY U.S. AND EUROPE PHENOMENON TO GLOBAL-WIDE SCENE:

   - PRIOR TO 1980: APPROXIMATYELY 80 PERCENT OF WORLD CONSUMPTION OCCURRED WITHIN THE NORTH ATLANTIC COMMUNITY (ABOUT 20 PERCENT OF WORLD'S POPULATION AT THE TIME)

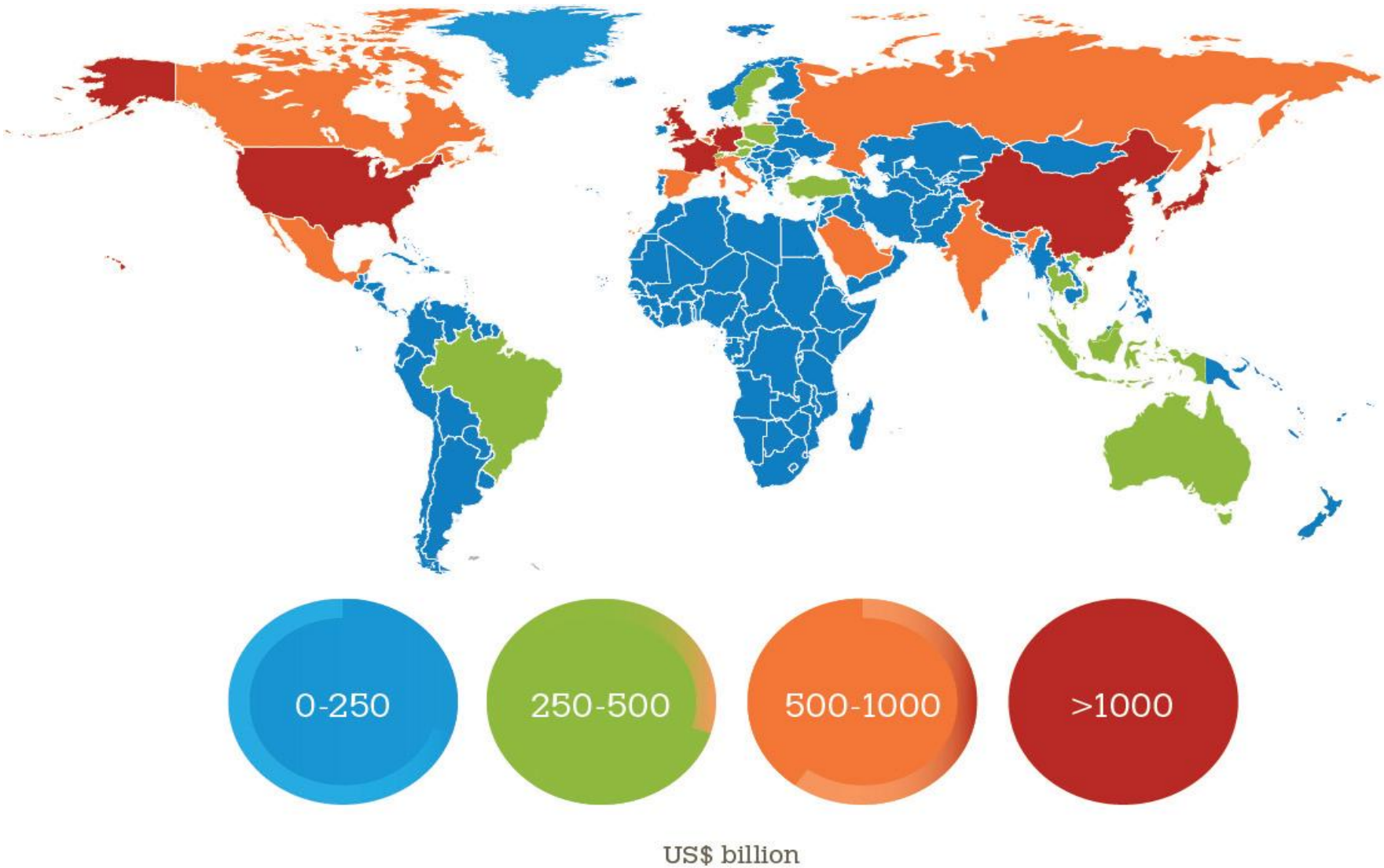
   - SINCE 1980: WORLD CONSUMPTION DISTRIBUTED MORE WIDELY AROUND THE GLOBE

   - SINCE 2000, CHINA BECOMES MAJOR CUSTOMER OF ITS PRODUCTS, BUT REQUIRES REGIONAL & GLOBAL SOURCING OF RAW/SEMI-FINISHED MATERIALS

   - SINCE 2010, SOUTHERN HEMISPHERE ENTERS THE AGE OF CONSUMPTION (ESP. BRAZIL AND AUSTRALIA)

   RESULT? EXPANDING GLOBAL TRADE; DIVERSIFYING ROUTE DESTINATIONS

ECONOMIES BY SIZE OF MERCHANDISE TRADE IN 2013



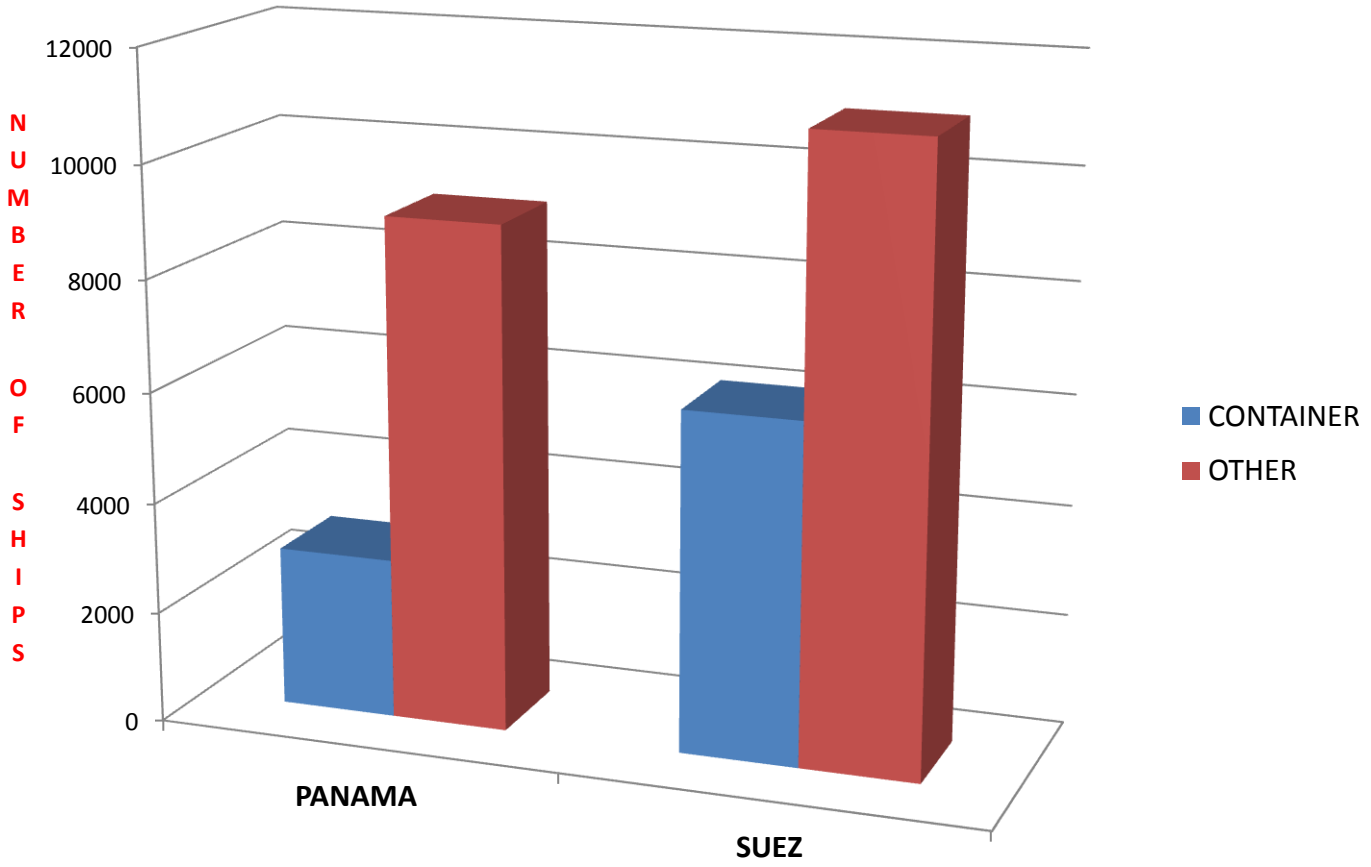
SOURCE: World Trade Organization

FIVE DETERMINANTS OF CONTAINERIZED GLOBAL SHIPPING ROUTES

2. **ROUTE ORIGINS**: DYNAMIC SHIFTS IN ASIAN LOCATIONS OF WORLD PRODUCTION CAPACITY:
   - 1950-1980: PRODUCTION CAPACITY HEAVILY CONCENTRATED ABOVE TROPIC OF CANCER IN NORTH PACIFIC (E.G., JAPAN, KOREA, TAIWAN)
   - 1980-2000: LOCUS SHIFTS TO SOUTH CHINA SEA (E.G., SINGAPORE, THIALAND, PHILIPPINES, MALASIAN PENINSULA, VIETNAM)
   - SINCE 2000: EMERGENT PRODUCTION CAPACITY DISTRIBUTED BETWEEN SOUTH ASIA (INDIA) AND MAINLAND CHINA
   - FUTURE: GLOBAL SOURCING LIKELY TO INCLUDE SIGNIFICANT PRODUCTION CAPACITY IN SOUTHERN HEMISPHERE (ESP, SOUTH AMERICA, AFRICA)

SHIFTING LOCATIONS IN THE CONCENTRATION OF WORLD PRODUCTION CAPACITY

PANAMA & SUEZ COMPARISON: ANNUAL SHIP TRAFFIC (2014)



FIVE DETERMINANTS OF CONTAINERIZED GLOBAL SHIPPING ROUTES

3. SHIPPING FIRMS' CRTITERIA FOR SELECTING OPTIMAL ROUTES:

A. OLIGOPOLISTIC INDUSTRY MARKET STRUCTURE: TWO SHIPPING CONSORTIUMS DOMINATE INTER-CONTINENTAL GLOBAL TRADE MOVEMENT

B. COST PER UNIT OF GOODS SHIPPED: TRANSPORTATION COMPONENT

C. TIME-IN-TRANSIT THROUGH MULTIMODAL SYSTEM: ORIGIN TO DESTINATION

D. "ONE-STOP" TRANSSHIPMENT (THE "LOAD CENTER" CONCEPT) FOR:

- MINIMIZING TIME IN PORT
- ACCESS TO LARGE-SCALE PORT TECHNOLOGIES
- ACCESS TO TRANSCONTINENTAL RAIL ROUTES
- ACCESS TO ADVANCED PRODUCER SERVICES (GLOBAL CITIES)

E. JUST-IN-TIME MANAGEMENT (JIT) OF "INVENTORY ON WHEELS" (FIXED-BASE WAREHOUSING IS OBSOLETE TECHNOLGY)

FIVE DETERMINANTS OF CONTAINERIZED GLOBAL SHIPPING ROUTES

4. POST-PANAMAX ERA: ROUTE ALTERNATIVES PROLIFERATE:

- SINCE 1970s, TRANS-PACIFIC TRADE THROUGH THE "NORTH AMERICAN LAND BRIDGE" (WEST COAST SEAPORTS DOMINATE EAST/WEST CONTAINER TRAFFIC ROUTES)

- SINCE 1980, SUEZ CANAL ROUTE EMERGES AS PRODUCTION MOVES TO SOUTH CHINA SEA AND WESTWARD (SINGAPORE DOMINATES ROUTE)

- SINCE 2010, EXPERIMENTS WITH A "TRANS-SIBERIAN LAND BRIDGE" (A NEW SILK ROAD)

- SINCE 2015, GLOBAL WARMING OPENS YEAR-ROUND ARCTIC ROUTE (NORTHWEST PASSAGE)

- IN 2016, THE NEW PANAMA CANAL OPENS

RESULTING IN A COMBINED WORLD MULTIMODAL SYSTEM!

THE NORTH AMERICAN "LAND BRIDGE" COMPARED WITH PANAMA

SOURCE: Jean-Paul Rodrigue, THE GEOGRAPHY OF TRANSPORTATION SYSTEMS

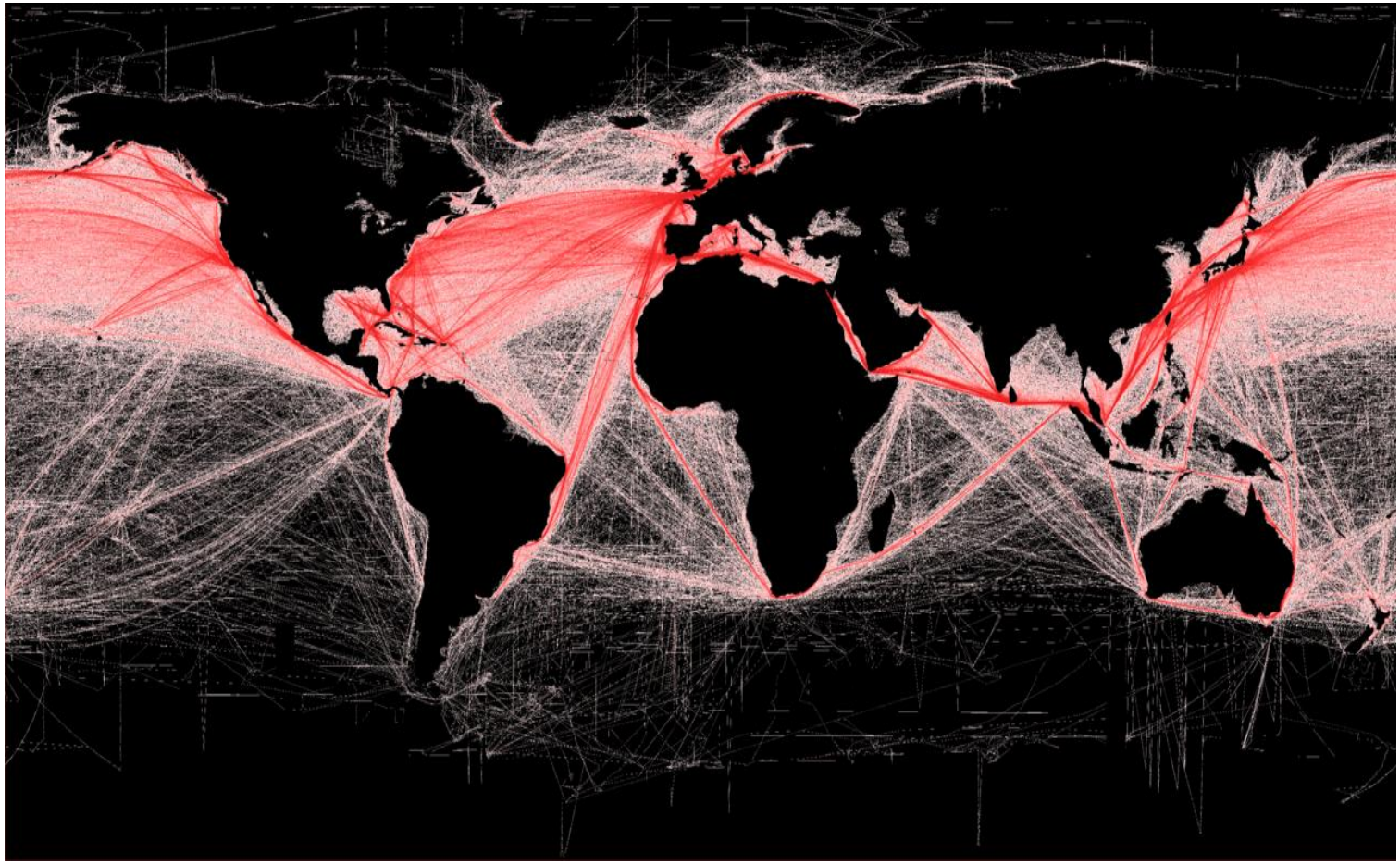
SUEZ ROUTE AND TRANS-SIBERIAN "LAND BRIDGE"

SOURCE: Jean-Paul Rodrrigue, THE GEOGRAPHY OF TRANSPORTATION SYSTEMS

POTENTIAL ARCTIC SEA ROUTE VS. PANAMA AND SUEZ CANALS

SOURCE: WWW.discoveringtheartic.org.uk

A WORLDWIDE TRADE SYSTEM: MARITIME ROUTE INTENSITY



SOURCE: Halpern, et al (2008), SCIENCE, vol. 319:948-952

FIVE DETERMINANTS OF CONTAINERIZED GLOBAL SHIPPING ROUTES

5. INFRASTRUCTURE TECHNOLOGY: ADDRESSING SCALE AND INTERMODAL SYSTEM CONTROL

- CONTAINERS (SINCE 1960s): GROW IN LENGTH (TWENTY-FOOT-EQUIVALENT-UNITS [TEUs] REPLACED IN SUCCESSION BY 40s, 48s, 53s)

- SHIPS (SINCE 1970S): CONTAINER SHIPS GROW IN SIZE (FIRST GENERATION CAPACITY </= 1000 TEUs ; CURRENT TRIPLE-E CLASS >/= 18,000 TEUs)

- CONTAINER SEAPORTS (SINCE 1965): MULTIPLE TRANSSHIPMENT INNOVATIONS

  + STRADLE CRANE DESIGNS EVOLVE WITH SHIP SIZE AND VOLUME

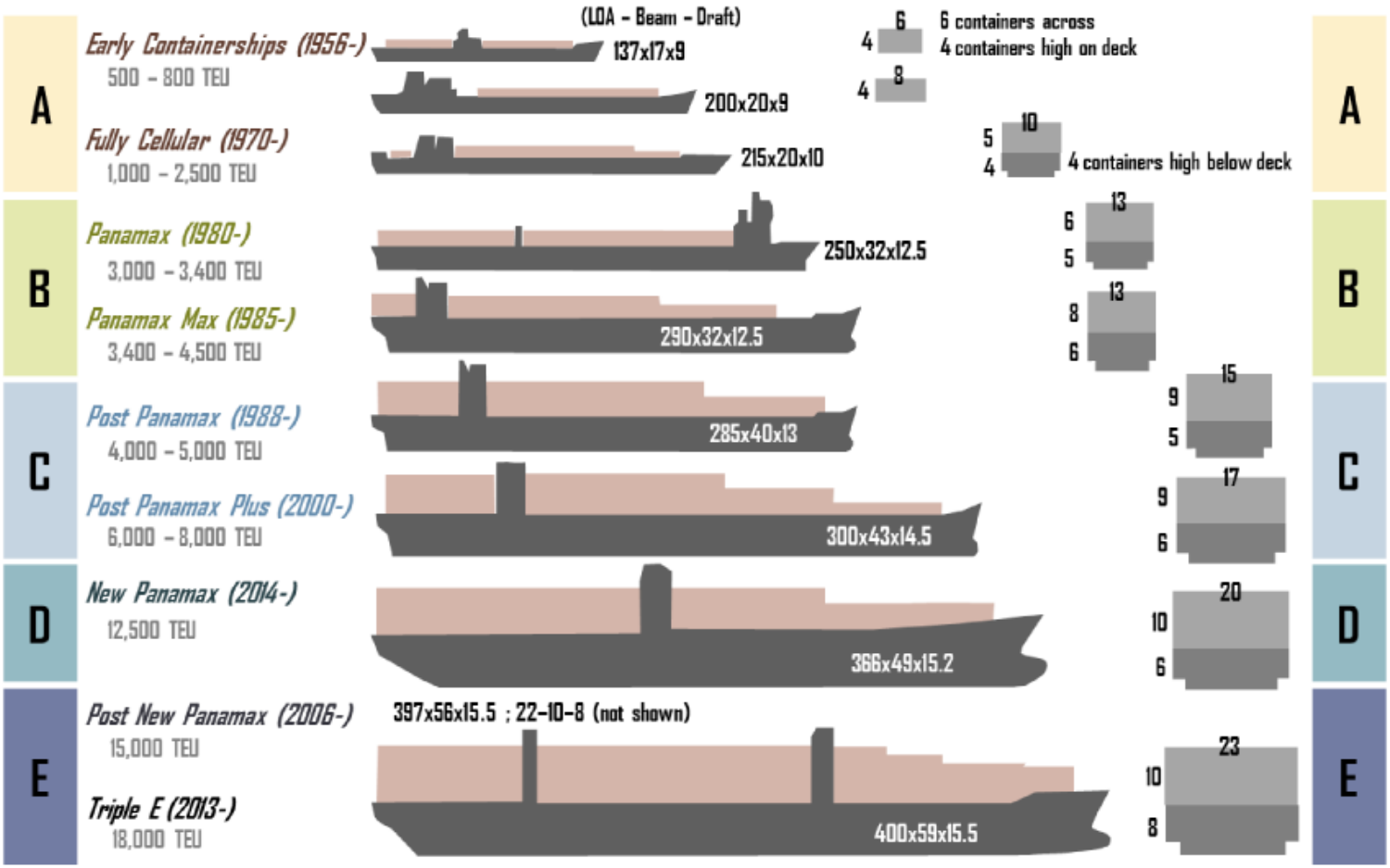
  + COMPUTERIZED TRANSSHIPMENT SYSTEMS: CONSOLIDATION AND ROUTING

  + DOCKSIDE ROBOTICS AND AUTOMATION SYSTEMS REPLACE MANPOWER (INNOVATIONS SINCE 2010 LED BY ASIAN COUNTRIES)

- CONTAINER TRAINS (SINCE 1980s): "DOUBLE-STACK" FOR TRANSCONTINENTAL AND LAND-BRIDGE ROUTES

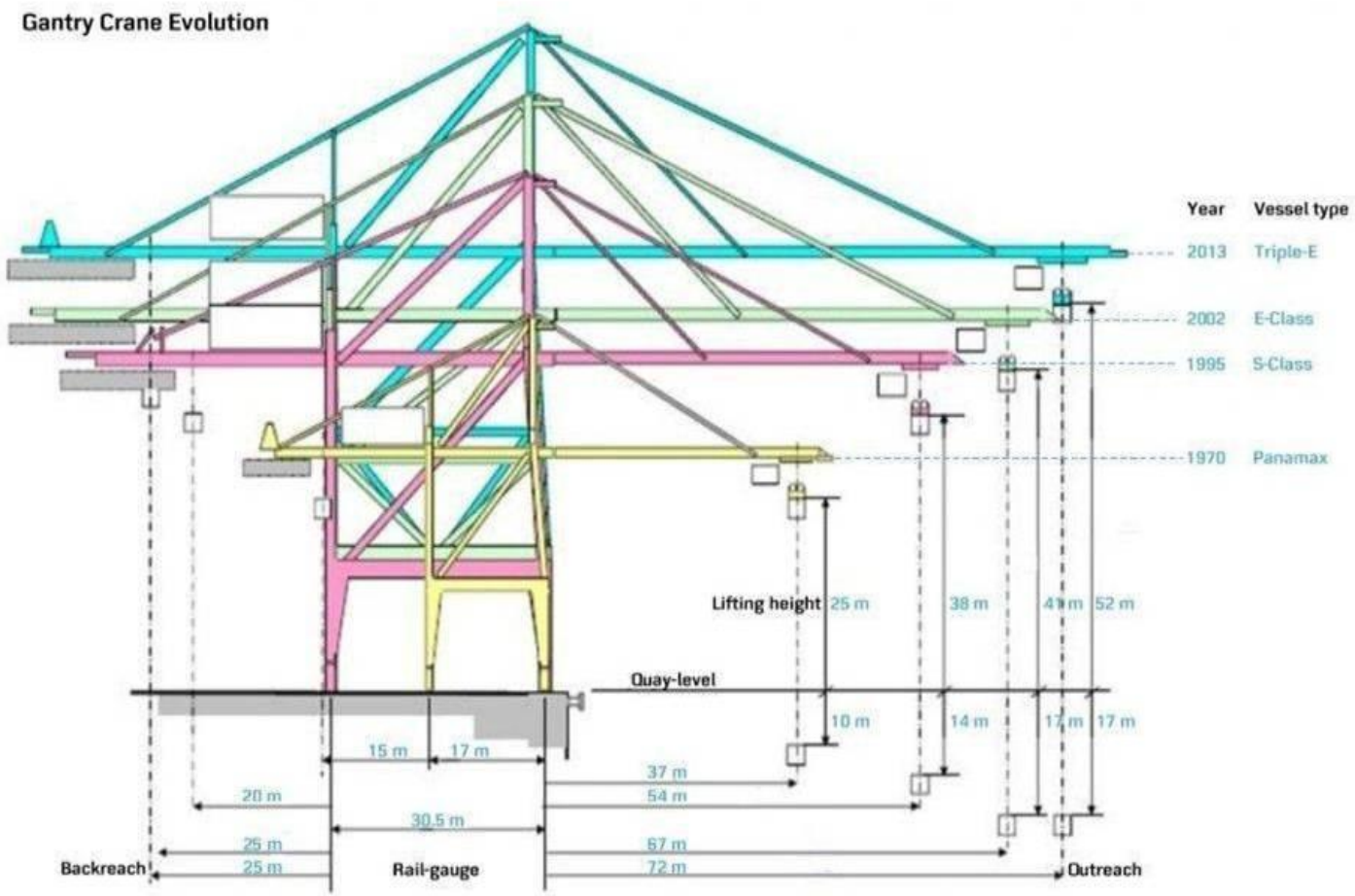
- THE NEW PANAMA CANAL (2016): PROVIDES ACCESS TO ALL POST-PANAMAX SHIPS

EVOLUTION IN CONTAINERSHIP SCALE



SOURCE: Jean-Paul Rodrigue, THE GEOGRAPHY OF TRANSPORTATION SYSTEMS

SEAPORT AND SHIP: SYMBIOTIC TECHNOLOGIES



SOURCE: APM Terminals (2013)

CONTAINER PORT TRANSSHIPMENT: THE "GENERAL METHOD" BEING REPLACED WITH CONTROL AUTOMATION AND ROBOTICS

Boat Loads

The general method in which cargo ships in the U.S. are unloaded varies by port, but can be slow and arduous. The system relies heavily on human labor and older equipment—a stark contrast to automated ports in other countries that use advanced technologies such as robotic cranes and computer-controlled vehicles.

1. After a ship arrives at berth, cranes lift off containers and place them on the dock.

2. Large vehicles called straddle carriers pick up containers and place them in stacks in the storage area, where they may sit for days.

3. Containers destined for rail transportation are hauled by trucks to the port's rail yard, which has direct links to rail lines.

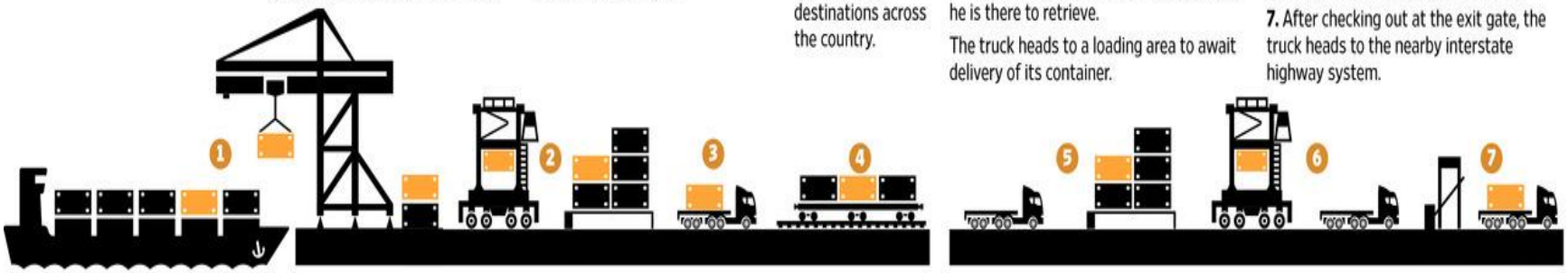
4. Those containers are put on rail cars and eventually transported to destinations across the country.

5. Most containers are transported by truck. When a truck first arrives at the terminal entrance gate, the driver scans an ID that alerts port workers what container he is there to retrieve.

The truck heads to a loading area to await delivery of its container.

6. A straddle carrier retrieves the container from the stack, brings it to the truck and deposits it on a chassis, the undercarriage used to transport containers by truck.

7. After checking out at the exit gate, the truck heads to the nearby interstate highway system.



Note: The illustration above is based on the logistical model at one the Port of Virginia terminals. Source: Port of Virginia

THE WALL STREET JOURNAL.

DYNAMICS OF A MULTIMODAL SYSTEM OUT OF BALANCE

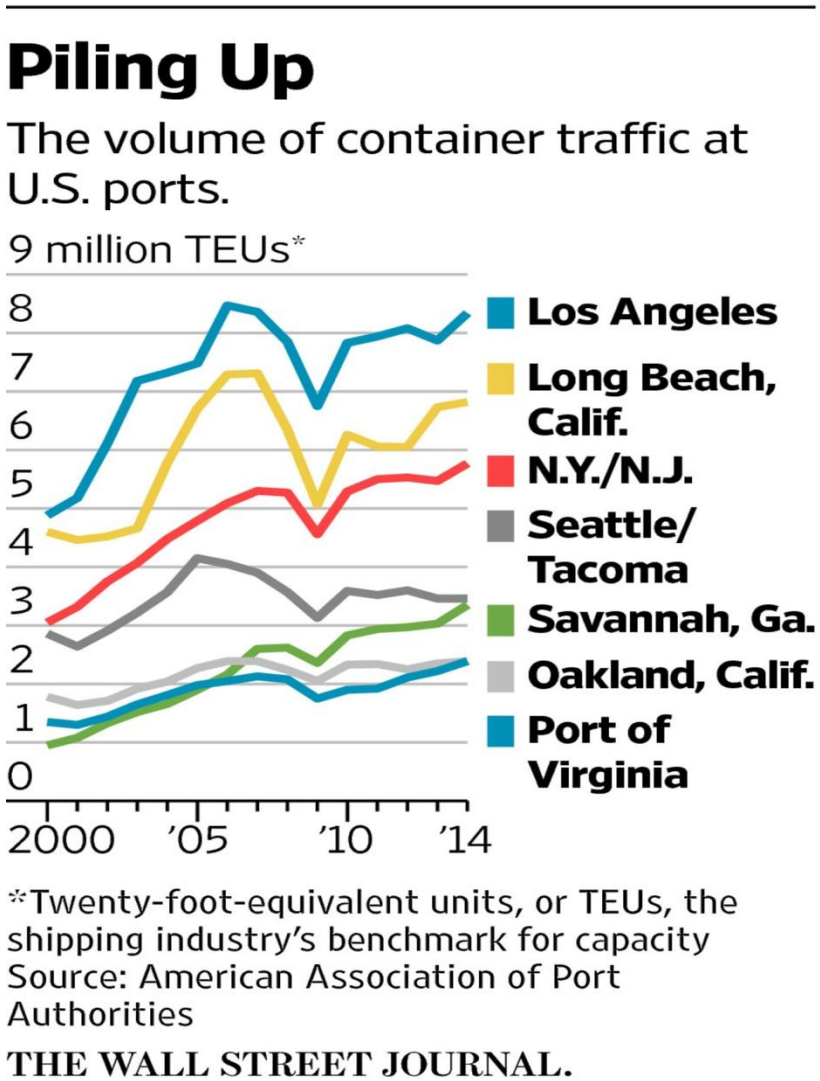
A. **"LOAD CENTER" DEMAND**: SHIPPERS INVESTMENT IN LARGE-SCALE TECHNOLOGIES AND PREFERENCE FOR "ONE-STOP" TRANSSHIPMENT DRIVES COMPETITION TOWARD **FEWER BUT LARGER SEAPORTS**

B. **"LOAD-CENTER" CAPACITY**: MISMATCH BETWEEN U.S. PORTS' TRANSSHIPMENT CAPACITY AND GROWTH IN CONTAINER VOLUME AND SHIP SIZE; **CAUSES CONGESTION , DELAY, AND HIGHER SHIPPING COSTS**

C. **ROUTE COMPETITION**: SHORTFALL IN U.S. LAND-BRIDGE INFRASTRUCTURE INVESTMENT THREATENS WEST COAST PORTS; **FAVORS PANAMA CANAL**

D. **ROUTE COMPETITON**: PANAMA LIMIT ON SHIP SIZE RESTRICTS ROUTE CHOICES; **NEW PANAMA PROMISES TO REDUCE DISADVANTAGE**

COMPETITION: "LOAD-CENTER" DEMAND & CAPACITY



CONGESTION & DELAY ISSUES AT WEST COAST PORTS

PANAMA'S PROSPECTS IN A GLOBAL CONTEXT….
LIKELY TO HINGE ON:

1. HOW ROUTE ORIGIN (PRODUCTION) AND DESTINATION (CONSUMPTION) SITES FURTHER EVOLVE WORLDWIDE

2. HOW SHIPPING FIRMS ALTER THEIR CORPORATE INTEREST CALCULATIONS

3. HOW THE IMPLEMENTATION OF ALTERNATIVE TRADE ROUTES UNFOLDS

4. HOW NEW TECHNOLOGIES DRIVE COMPETITION WITHIN THE MULTIMODAL ROUTE SYSTEM

SOURCE: Smithsonian