Improving Supply Chain Competitiveness: the Port Authority's Role

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Strategic Drivers Shaping Port Opportunities

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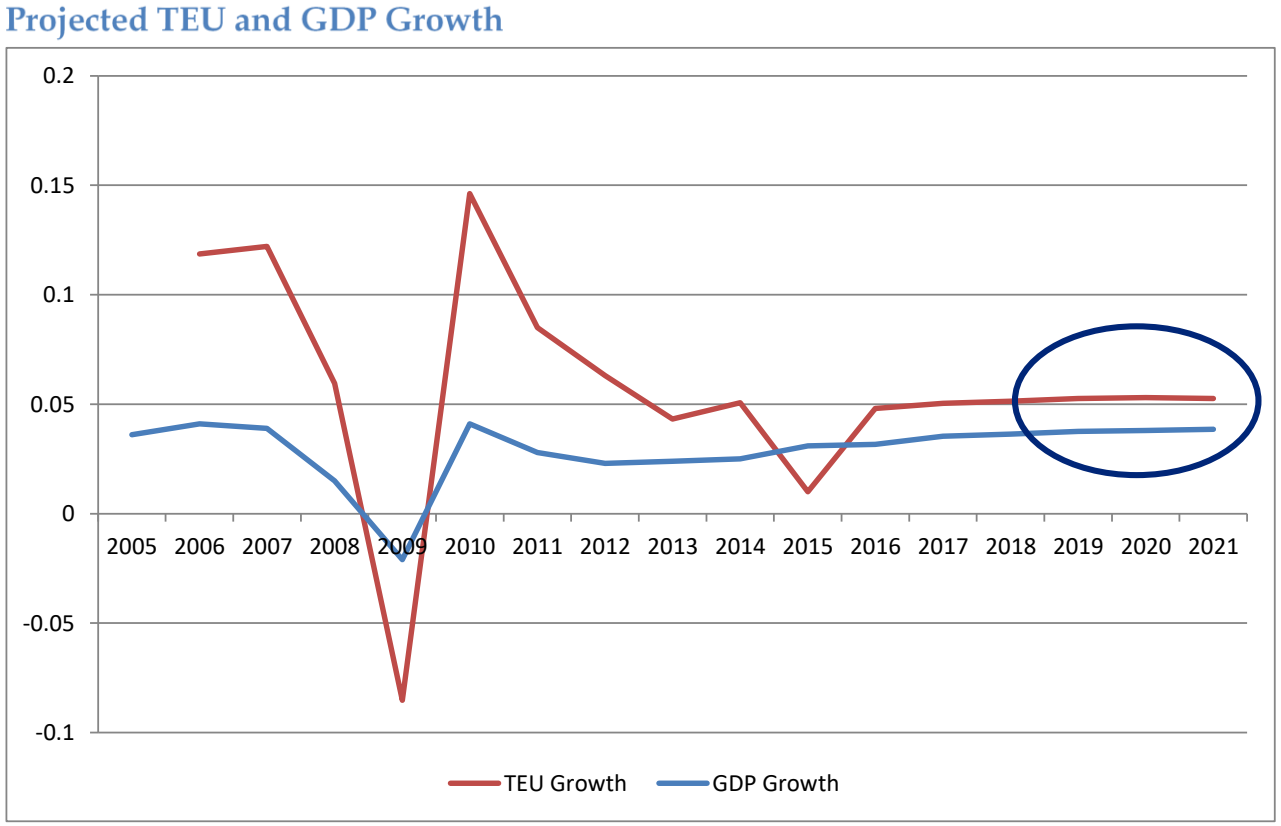
Global Economy and Trade Growth

- Global economy and country debt
  - 48 of 65 non-OECD countries rated by Moody's hold junk bond status
  - Of 33 OECD countries, 11 have debt/GDP ratios of about 80% or more
  - Global infrastructure gap = $57 trillion by 2030
- Trade growth
  - Gap between GDP growth and trade growth narrowing



Source: Author's TEU forecast based on OECD Data, GDP Long-Term Forecasts, https://data.oecd.org/gdp/gdp-long-term-forecast.htm#indicator-chart and UNCTADSTAT historic container statistics, available at http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=13321 (note: Container volume represents throughput of 126 countries/territories)

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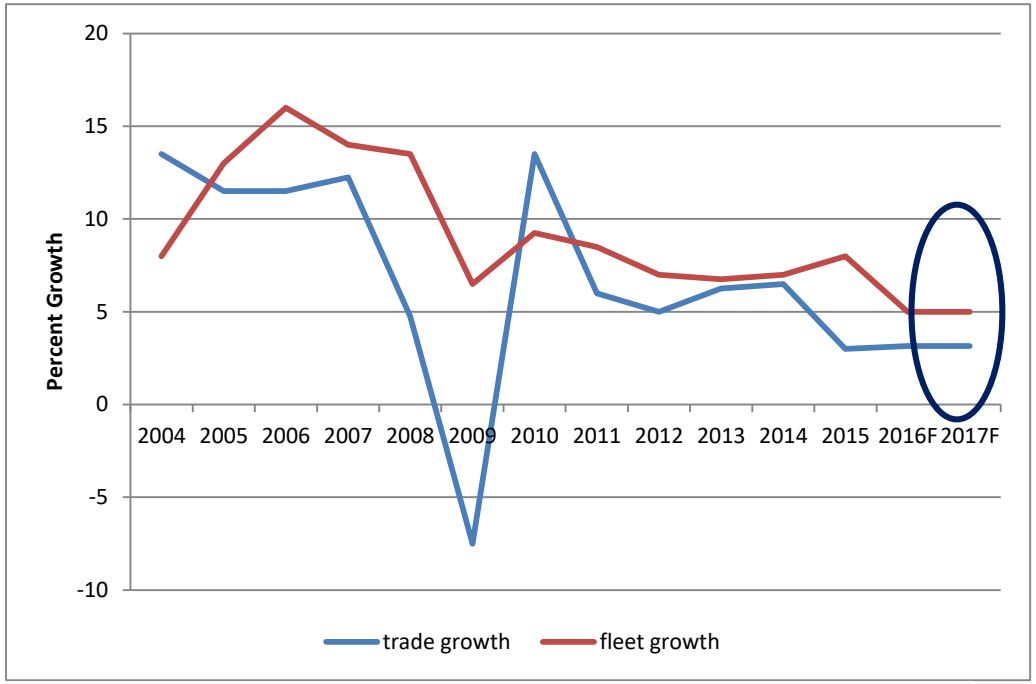
Carrier Strategy

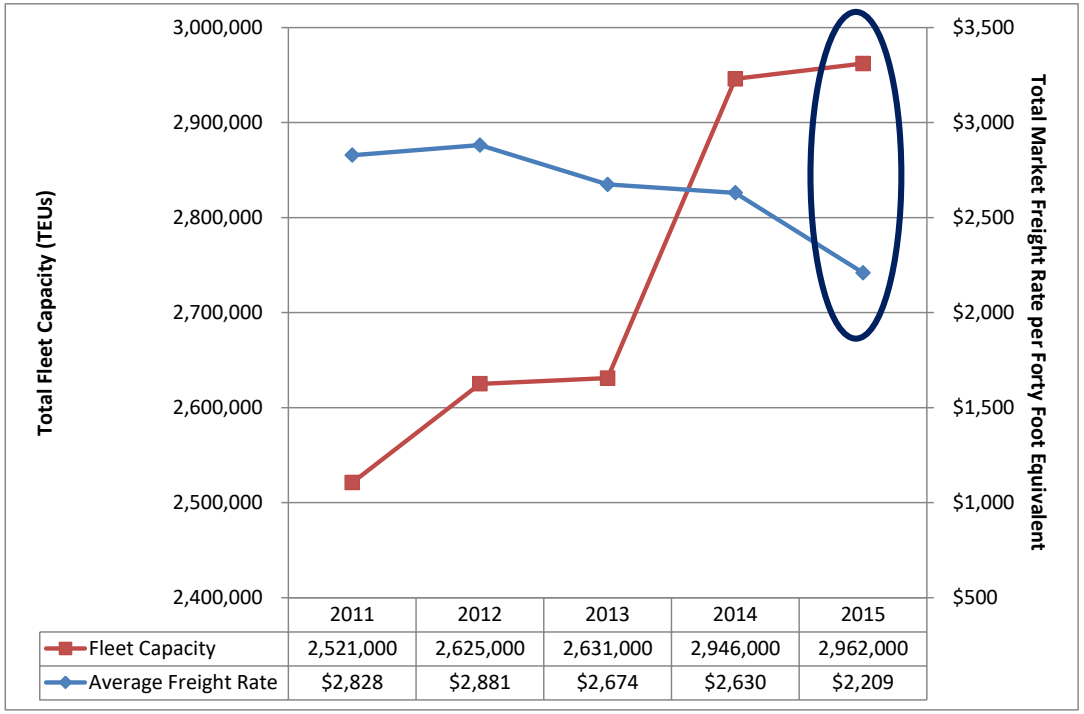
- Demolitions not keeping pace with new-buildings
  - In 2016, scrapping capacity = 400K TEUs, but new capacity of 1.2 million TEUs entered market the same year
  - Maersk did not anticipate other carriers would follow its lead with ultra large container carriers

Trade and Fleet Capacity Gap



Source: Author drawing from data from Clarkson Research Services Limited, *Shipping Review & Outlook*, London 2015. Note: 2016 and 2017 are forecasted.

Maersk Fleet Capacity and Freight Rates, 2011-2015



	2011	2012	2013	2014	2015
Fleet Capacity	2,521,000	2,625,000	2,631,000	2,946,000	2,962,000
Average Freight Rate	$2,828	$2,881	$2,674	$2,630	$2,209

Source: A. P. Moeller Maersk A/S, *Annual Report, 2015*, Five-Year Summary Table, p. 9,

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Carrier Strategies (*cont.*)

- New and larger alliances emerging, largely driven by excess capacity
- Of top 20 carriers, only 3 have not joined an alliance, with Maersk recently acquiring Hamburg Sud

Year of Formation			
Q4 2009	Q1 2012	Q2 2015	Q2 2017
NWA	G6 Alliance	G6 Alliance	THE Alliance
APL/NOL	APL/NOL	APL/NOL	MOL
MOL	MOL	MOL	K-Line
HMM	HMM	HMM	NYK Line
Grand Alliance IV	Hapaq-Lloyd	Hapaq-Lloyd	Yang Ming
Hapag-Lloyd	NYK Line	NYK Line	Hapag-Lloyd
NYK	OOCL	OOCL	Ocean Alliance
OOCL	CKYH	CKYHE	CMA CGM
CKYH	Hanjin	Hanjin	COSCO CS
Hanjin	K-Line	K-Line	OOCL
K-Line	Yang Ming	Yang Ming	Evergreen
Yang Ming	COSCO	COSCO	2M
COSCO	MSC/CMA CGM	Evergreen	MSC
	MSC	2M	Maersk Line
	CMA CGM	MSC	HMM
		Maersk Line	
		Ocean Three	
		CMA CGM	
		China Shipping	
		UASC	
Top 20 Carriers Not Part of Alliance	Top 20 Carriers Not Part of Alliance	Top 20 Carriers Not Part of Alliance	Top 20 Carriers Not Part of Alliance
Maersk Line	Maersk Line	PIL, Zim Line	PIL, Zim Line
MSC		Hamburg Sud	Hamburg Sud
CMA CGM		Wan Hai	Wan Hai
Evergreen	Evergreen		

Source: Notteboom, Theo, PortEconomics, Rounds of alliance formation in container shipping, May 2016, revised by Nathan Associates Inc. in accord with recent media reporting.

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Disruptive Technologies Most Impactful on Supply Chain

- Supply chain managers challenged to increase freight velocity
- Obvious place to start – reduce idle time of assets
- Encouraged emergence of disruptive technologies for improving supply chain efficiency
  - Internet of Things
  - 3D Printing

Disruptive Technology 1: Internet of Things

- Reduces idle time of assets and freight
- Sensing and sense making
  - Enables supply chain managers to re-route trucks to avoid congestion points or avoid creating them, direct trucks to alternative routes or other pick-ups or deliveries until congestion dissipates;
  - Through predictive analytics, traffic managers weigh congestion likelihood and revise logarithms to stage freight movements and available assets

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Disruptive Technology 2: 3D Printing

- Most attention given to benefits to manufacturing
  - Reduces raw material input waste associated with subtractive manufacturing
  - Reduces lead time for developing prototypes
  - Customizable
- Shortens supply chains – renewed emphasis on local manufacturing and distribution
- Assuming available 3D printing technologies today, estimated 15% of trade flows can be substituted with 3D printing

Source: *The Economist*, "Adidas's high-tech factory brings production back to Germany", January 14, 2017. Available at: http://www.economist.com/news/business/21714394-making-trainers-robots-and-3d-printers-adidass-high-tech-factory-brings-production-back .

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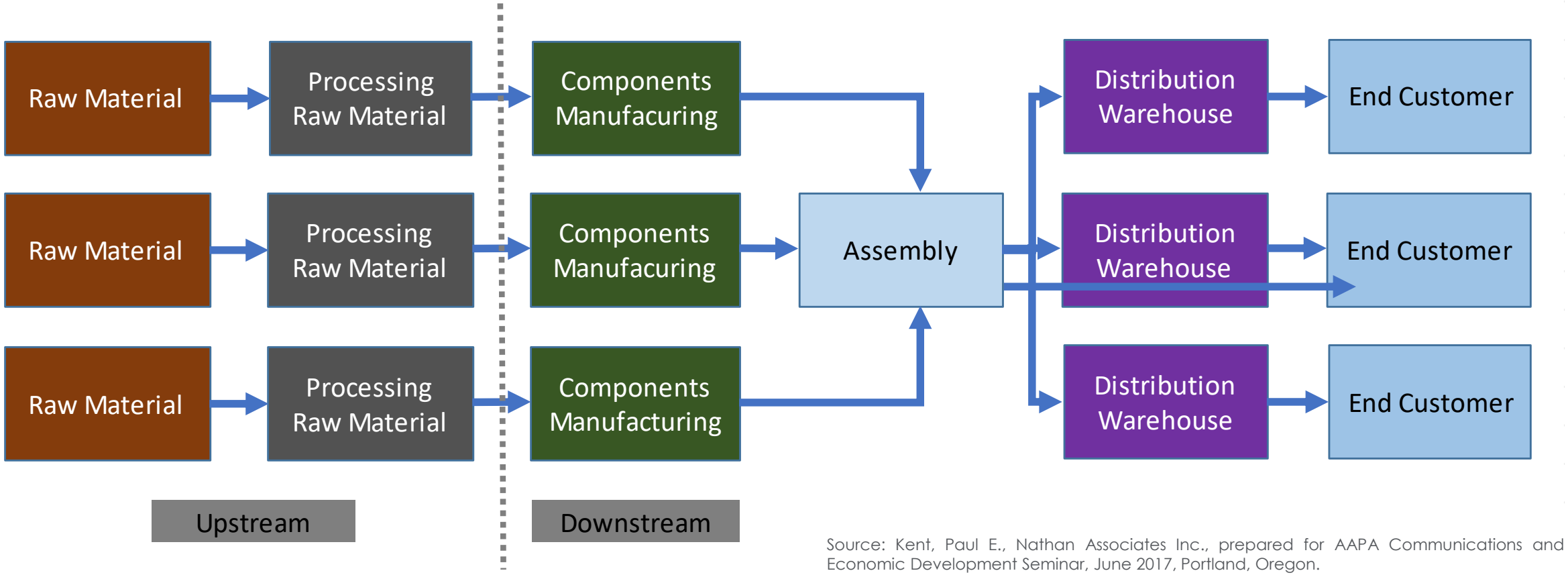
3D Printing Effect on Supply Chains

Traditional supply chain



Source: Kent, Paul E., Nathan Associates Inc., prepared for AAPA Communications and Economic Development Seminar, June 2017, Portland, Oregon.

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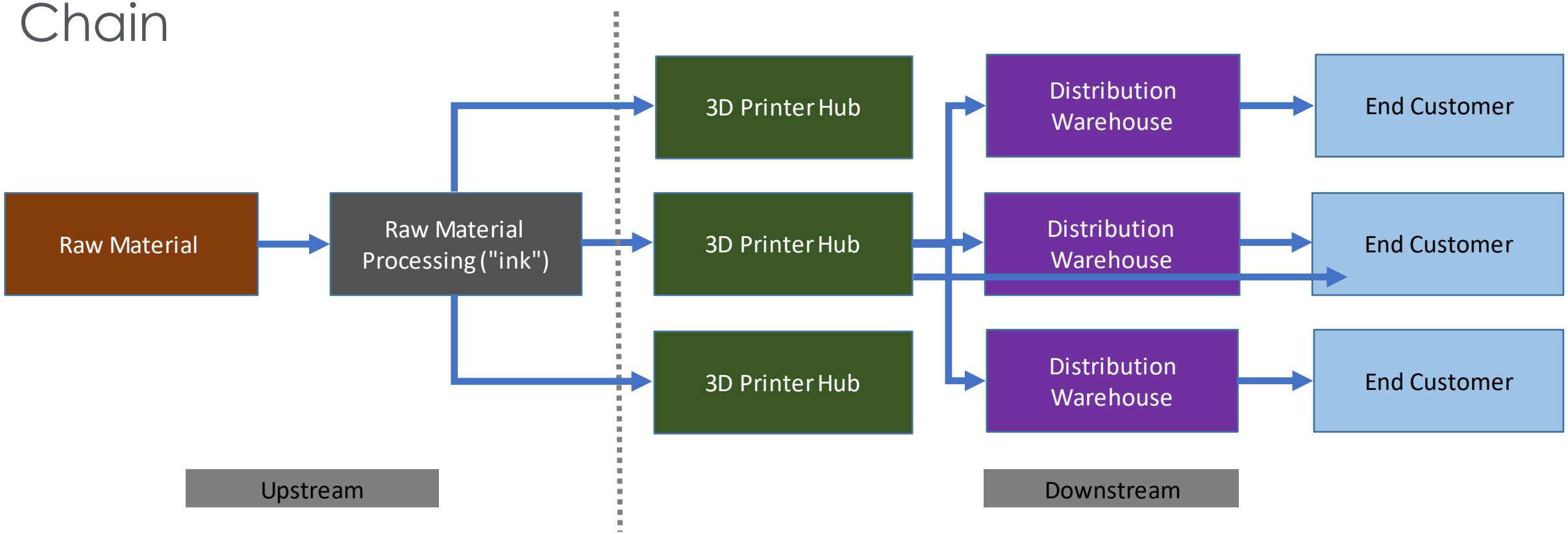
3D Printing Effect on Supply Chains (*cont.*)

3D Printing Enabled Supply Chain



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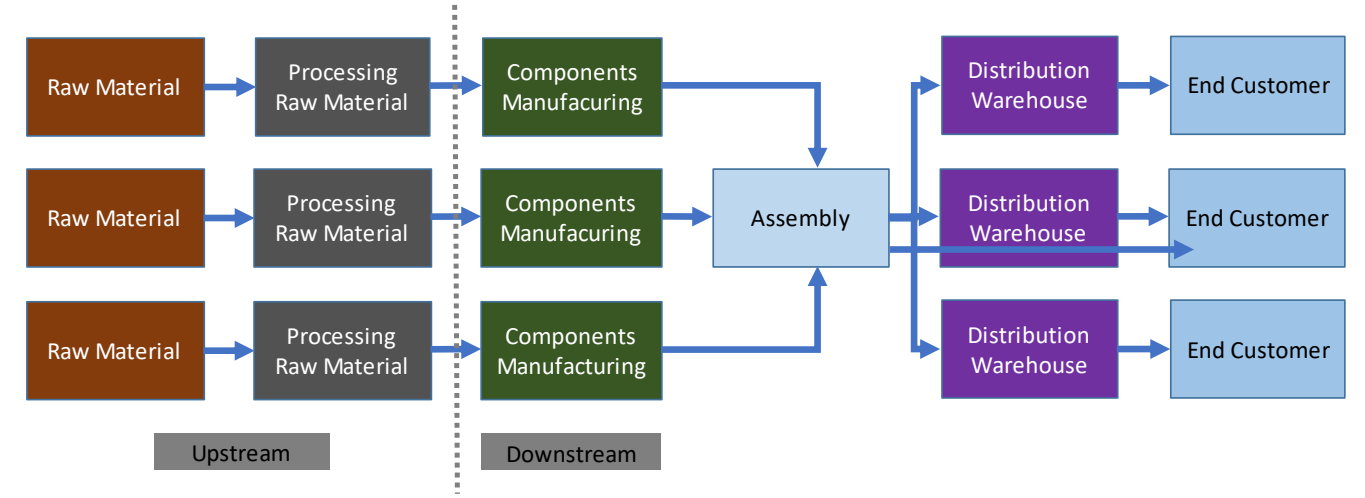
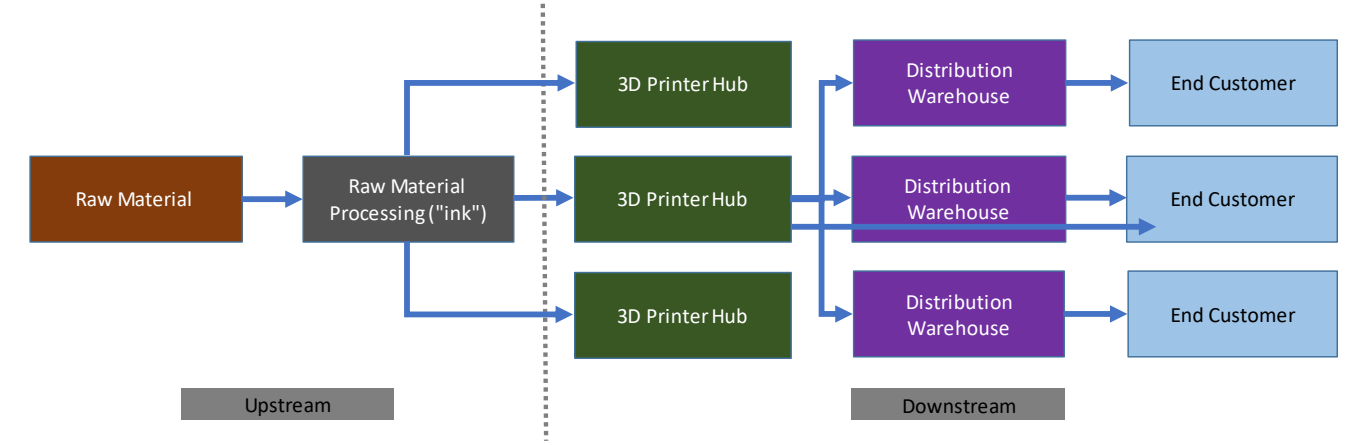
3D Printing – Shortening the Supply Chain

- Traditional Manufacturing Supply Chain



- Additive Manufacturing Supply Chain



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Source: Kent, Paul E., Nathan Associates Inc., prepared for AAPA Communications and Economic Development Seminar, June 2017, Portland, Oregon.

Strategic Driver Implications

- Global GDP growth slowing
  - Countries enjoying GDP growth shift to purchases of services
  - Peak impact of trade agreements realized
  - Substitution of labor with capital
  - Population growth generally slowing, with strongest growth in urban areas
- Alliance rationalization efforts likely to result in fewer vessel calls/higher peak load volumes
- P3 likely to become more commonplace, out of necessity
  - Global infrastructure gap will generate investor competition
  - Ports must be able to develop bankable projects to secure 3P deals
- Competitiveness extends beyond port gates to market hinterlands
  - Sensitivity to time, cost, and reliability imperative for attracting customers/tenants
- Supply chains likely to be impacted by emerging disruptive technologies

Strategic Enablers and Actions for Business Growth

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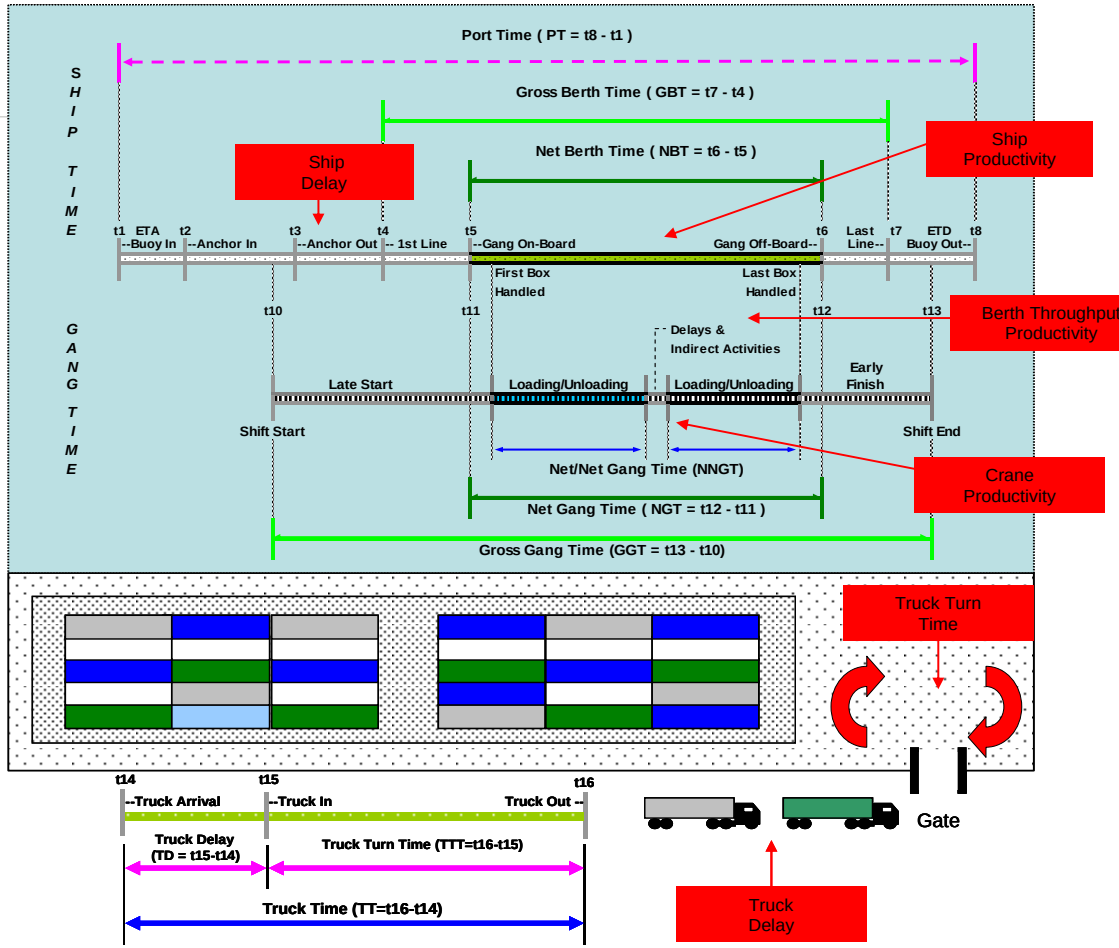
Strategic Enablers for Business Growth

1. Improved Supply Chain Performance
2. Enhanced Business Capture Effort
3. Intensified Customer Focus and Advocacy
4. Sustainable Financial Performance
5. Organizational Agility and Responsiveness

Enabler 1. Improved Supply Chain Performance Actions

1. Resident port authority knowledge of supply chain management
2. Engage in competitive intelligence gathering
   - Identify transport logistics chains (TLC) associated with relevant current and prospective markets
   - Measure TLC performance: time, cost, reliab., and variability
   - Mitigate chokepoints
3. Continuously monitor competitiveness
   - Reach out to customers, service providers, and govt. plng. bodies
   - Develop internal procedures for collecting, monitoring, and reporting freight system performance
   - Distribute freight system performance results
4. Establish stakeholder collaboration
   - Conduct regular forums for exchanging views on freight system issues
   - Lead cooperative efforts to communicate and advocate for needed logistics chain improvements



Source: Kent, Paul E., Anatoly Hochstein, and Asaf Ashar, *Port Reform Toolkit*, Regulatory Module, World Bank; graphic updated in Kent, Paul E., Asaf Ashar, and Gerardo Ayzanoa, "How Fit are Central America's Ports? An Exercise in Measuring Port Performance", paper presented to the annual conference of the International Association of Maritime Economists, Norfolk, Virginia, July 2014.

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Enabler 2. Actions for Intensifying Customer and Stakeholder Focus and Advocacy

1. Organize/advocate joint efforts to pursue policy changes and infrastructure improvements that enhance port and relevant supply chain performance
2. Organize strategic capture sessions with relevant partners to pursue leads
3. Play leadership role in leveraging government assistance and collaboration for improving hinterland transport systems – congestion mitigation
4. Institute “at your service” hotline to enable immediate response to customer and stakeholder concerns

Top 10 States with Highest Congestion Costs to Trucking Industry		
Rank	**State**	**2013 Cost (millions $US)**
1	California	$1,706
2	New York/New Jersey	$1,088
3	Texas	$1,053
4	Illinois	$498
5	Pennsylvania	$422
6	Virginia	$330
7	Maryland	$316
8	Georgia	$304
9	Massachusetts	$303
10	Florida	$256
11	Washington	$250
12	New Jersey	$242

Source: Congestion ranks and costs from Dave Pierce and Dan Murray, *Cost of Congestion to the Trucking Industry*, American Transportation Research Institute (ATRI), April 2014, Appendix B, pp. 28-29.

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Enabler 3. Enhanced Business Capture Effort

1. Develop internal process for conducting due diligence on prospective opportunities
2. Gather competitive intelligence on identified opportunities
   - Collect relevant market data
   - Identify potential customers/operators/investors
   - Devise call plan with strict adherence to follow-up
3. Assess internally terms and conditions that can be offered relative to rents, facilities, and services that support specific business capture opportunity
4. Prepare model term sheet setting forth material terms and conditions for investment to serve as a template for parties to provide details for final agreement

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Enabler 4. Actions for Strong and Sustainable Financial Performance

1. Seek balanced risk in leases/operating agreements
   - Volume incentives
   - Minimum throughput guarantees
2. Seek to renegotiate contracts having archaic or non-market based terms/conditions
3. Advocate for public funding availability for transport logistics chain improvements
4. Engage in P3 contracts
5. Expand diversity of tenants/customers to mitigate market segment ebbs and flows

Enabler 5. Organizational Agility and Responsiveness

1. Reduce management span of control
2. Align business plans with strategic goals/growth strategy
3. Use ERP system to facilitate collection and performance analysis relative to business plan goals and targets
4. Build culture of collaboration -- make use of tiger teams
5. Enhance workforce motivation
   - Provide for continuing education and development and incorporate as part of career promotion criteria
   - Monitor compensation competitiveness to retain/attract high performers

Thank You!

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