The Potential Impacts of the Panama Canal Expansion and Evolving Post-Panamax/Super Post-Panamax Container Ship Routes on Michigan Freight and Hub Logistics

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Cover Photo credit: JAXPORT, Meredith Fordham Hughes
1. Introduction

As a part of the MSU Center for Community and Economic Development’s (CCED) U.S. Economic Development Administration-funded Regional Exporting Strategies Project to assist small and medium size businesses in developing foreign markets and identifying logistics opportunities, the project’s newest partner, the St. Clair County Economic Development Alliance (EDA), requested information in March, 2013 on the potential impact of the Panama Canal expansion on Atlantic coast ports and Michigan freight volumes.

In addition to the St Clai County EDA (which along with Lapeer, Genesee and Shiawassee county economic development organizations have formed the I-69 International Trade Corridor Next Michigan Development Corporation¹), MSU CCED’s project partners include two regional planning organizations, the East Michigan Council of Governments (14 counties in the Thumb and around Saginaw Bay) and Eastern Upper Peninsula Regional Planning and Development Commission (Chippewa, Luce and Mackinac counties).² In the collaboration with EMCOG and EUPRPDC, the project team developed regional exporting strategies and logistics/supply chain hub strategies in 2012 and January 2013.

The MSU CCED project team is collaborating with the St. Clair County EDA in 2013 to develop regional exporting and logistics/supply chain strategies for the I-69 Corridor. With the Blue Water Bridge and St. Clair River Rail Tunnel connecting St. Clair County to Sarnia/Lambton in Ontario, logistics and trade opportunities form a key part of the county’s overall approach to economic development in this bi-national transportation corridor.

It is clear that Michigan’s geographic position provides an outstanding opportunity to become a major North American logistics hub with its strategic location between historical hubs in Toronto and Chicago and direct rail access via Canadian National (CN) with the Port of Halifax in Nova Scotia, Canada on the Atlantic coast (as well as rail connections with the Canadian Pacific ports of Vancouver and Prince Rupert). The Great Lakes International Trade and Transport Hub (GLITTH) and the Great Lakes Global Freight Gateway (GLGFG) have advanced this value proposition, and the state of Michigan has

¹ Next Michigan Development Corporations (NMDCs) are designated by the Michigan Strategic Fund under Public Act 275 of 2010 to promote economic growth focused on multi-modal transportation. In addition to the I-69 International Trade Corridor NMDC, there are four other NMDCs: the Port Lansing Next Michigan Development Corporation, West Michigan Economic Partnership, Traverse City Next Michigan Development Corporation, and the Detroit Region Aerotropolis Development Corp.

² These two regional planning organizations are also federally-designated economic development districts (EDDs). The St. Clair County EDA is a member of the Southeast Michigan Council of Governments (SEMCOG) which is not a federally-designated EDD. Genesee, Lapeer, and Shiawassee counties are neither members of a regional planning agency or an economic development district.
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responded with the Michigan Logistics and Supply Chain Strategic Plan released in April 2013. The state strategy closely parallels the two regional Supply Chain Logistics Strategies developed by the MSU CCED project team earlier this year. The state strategy and regional strategies emphasize collaboration between industry, regional partners, and universities to promote Michigan’s supply chain and logistics hub capabilities as a vehicle for job growth in the state. The U.S. News and World Report’s top-ranked MSU Supply Chain Management program 3 in particular provides critical knowledge assets that can help create and facilitate collaboration with the private sector (cargo owners, carriers, freight forwarders) and local and regional economic developers to implement the broad outlines of the state strategy and specific regional strategies.

This report is organized in five sections. Following this section, section 2 describes the research methodology. Section 3 provides an overview of global trade trends, subsequent changes to global freight infrastructure and how these changes might impact logistics in the states and Canadian provinces in the Great Lakes region. Section 4 provides an analysis of the shift in Asian trade routes, the decision of the Panama Canal Authority to expand the canal and establish a major logistics hub, and the potential impacts of the Panama Canal expansion on Michigan freight and hub logistics. Section 5 presents our conclusions based on our analysis. Our major finding is that changes in Asian freight patterns are expected to significantly increase the volume of trade in North American Atlantic Coast ports, but the impact of the Panama Canal expansion on these ports will be considerably more modest. A secondary finding is that the prospect for Arctic Ocean global trade routes accessing ice-diminished waters resulting from global climate change is highly limited at this time.

2. Research Methodology

To determine the potential impacts of the Panama Canal expansion and post-Panamax ships on Michigan logistics and freight movement, the project team conducted research in a 45-day time frame that included: 1) an online review of literature on the current and future cargo activities at North American ports and associated logistics in connection with the Panama Canal expansion, changing global trade routes, and the potential impact of Arctic Ocean ice diminishment on global trade routes; 2) designing an interview questionnaire for interviews with representatives of North American Atlantic Coast Port Authorities; 3) conducting interviews with those representatives; 4) designing an interview questionnaire for Michigan Department of Transportation (MDOT) staff; 5) conducting an interview

3 Dr. David Closs, chair of the MSU Supply Chain Management Dept., serves on the state Logistics and Supply Chain Steering Committee and the GLITTH Steering Committee. He also participates in the project’s Export Resource Export Network (EREN) and briefed EREN members on August 29, 2012.
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with MDOT staff; and 6) review of U.S. Senate Commerce Committee testimony on the impacts of the Panama Canal expansion delivered on April 10, 2013.

The research team designed an 11-question survey instrument for Atlantic Coast port authorities (Appendix A) and conducted semi-structured telephone interviews (with specific questions being asked by the project team as follow-ups to answers elicited by the formal interview questions) with representatives of two port authorities. The two telephone interviews were conducted with Paul DuVoisin, Vice-President Commercial for the Halifax Port Authority, on April 5, 2013, and Alberto Cabrera, Marketing Director for the Jacksonville Port Authority, on April 17, 2013. A written response was also obtained from Joe Harris, Media Relations Manager for Hampton Roads, on April 10, 2013. A second follow-up interview was conducted with Paul DuVoisin on May 7, 2013.

Requests for interviews with representatives of the Port Authority of New York and New Jersey, PortMiami, Georgia Ports Authority (Savannah), and Maryland Port Administration (Baltimore) failed to elicit responses in our project time frame.

A second questionnaire was designed to elicit information from MDOT staff about the impact of the Panama Canal expansion on state freight logistics. Larry Karnes, Freight Policy Specialist, responded to the questionnaire (Appendix B) and also met with the project team April 19, 2013 to review MDOT infrastructure initiatives and state freight data.

The project team also reviewed the testimony delivered to a U.S. Senate Commerce Committee hearing April 10, 2013 on “Expanding the Panama Canal: What Does it Mean for American Freight and Infrastructure?” Expert witnesses appearing before the committee included:

- Edward Hamberger, President and Chief Executive Officer, Association of American Railroads.
- Philip Byrd, President and CEO, Bulldog Highway Express, on behalf of the American Trucking Association (ATA).
- John Vickerman, President, Vickerman & Associates.
- J. J. Keever, Senior Deputy Executive Director, Virginia Port Authority.
3. Context and Overview of Global Trade

The phenomenal expansion of global trade since the 1990s has resulted in large part from the:

- Pervasive use of standardized shipping containers reducing shipping costs,
- Escalating sizes of container ships further decreasing shipping costs,
- Rapid rise of China as a manufacturing and exporting powerhouse,
- Rising middle classes in Brazil, India, Russia, China, South Africa, and other emerging markets like Indonesia, Vietnam, Thailand, and Taiwan, creating significant new demand for products from foreign markets,
- Extensive development of global supply chains.

This revolution in global trade has fundamental implications as well as significant opportunities for strategic economic development in Michigan and the upper Great Lakes Region. This section provides a brief overview of first, global trade trends; second, global trade infrastructure; and third, the alignment of the Michigan trade infrastructure in the global trade infrastructure and the role of the bi-national trade corridor with Ontario and Canada in accessing global markets via North American Pacific and Atlantic Ports.

a. Global Trade Trends

International trade has become the turbocharged engine of global economic growth driven by containerization that facilitates intermodal freight movements and decreases shipping costs, increasing economies of scale from ever-larger container ships, and supply chain diversification that intensifies the need for timely and reliable freight movement. International trade has increased as a share of world GDP from over 20% in 1970 to nearly 60% in 2008, as shown in Figure 1.
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Figure 1: International Trade as a Percent Share of World GDP, 1971-2007

The upward trend of international trade as a share of world GDP has remained consistent, except for the significant interruption in 2009 at the nadir of the global-wide Great Recession, as shown in Figure 2. International trade recovered but had not returned to pre-recession levels as of 2010.

Figure 2: International Trade as a Percent Share of World GDP, 2002-2010

Goods exports make up about 80 percent of international trade with the remaining 20 percent being services exports. In 2011, world goods exports totaled $17.8 trillion and world services exports totaled

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$4.17 trillion. Of the $17.8 trillion in total goods exports, $11.5 trillion was manufactured goods, $1.6 trillion was agricultural products, and $4.0 trillion was fuel or mining products. Of the $4.17 trillion in total services exports, $1.1 trillion was in travel service exports and $2.24 trillion was in other commercial services.\(^6\)

Global trade of merchandise has grown exponentially over the past two decades (see Figure 3). From 1980 to 2002, global trade grew 219%. In the five-year period of 2003 to 2008 following China’s accession to the World Trade Organization in late 2002, global trade grew 149%. From 2009 to 2012, global trade grew just 46% in the wake of the Great Recession in 2008-09. Growth has remained sluggish since 2010. The current sluggishness is attributable in large part to the indolent recovery of European economies as well as a slowdown in China’s economy. World trade increased by 2.0 percent in 2012 compared to 5.2 percent growth in 2011. The projected trade growth of 3.3 percent in 2013 is below the 20-year average of 5.3 percent and well below the pre-2009 trend of 6.0 percent annual growth from 1990 to 2008.\(^7\)

![Figure 3: Value of World Trade, 1980-2012\(^8\)](image)

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b. Global Trade Infrastructure

The overall growth of international trade has brought about significant changes in the global freight infrastructure, including the increased carrying capacity of container ships to achieve greater economies of scale, a greater emphasis on logistics hubs to facilitate intermodal transfer and rationalize freight movement, and a corresponding emphasis on transportation corridors to facilitate road and rail freight movement.

This contemporary reconfiguration of the global freight infrastructure has a direct impact on the types of regional (sub-state) freight infrastructures that are needed. The greater carrying capacity of individual ships underscores the importance of a transportation corridor’s corresponding capacity to manage and efficiently transport large freight volumes. Transportation corridors are fundamental structures that shape regional economic development and are characterized by:

- Greater capacity in supporting trade volumes based upon transportation economies of scale,
- Integration between production and distribution with the corridor becoming an intermodal supply chain composed of gateways and inland ports, and
- Reliability of distribution resulting from transport performance, coordinated governance, and more efficient cross-border flows.  

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C. The Impact of Global Trade Trends on Great Lakes Regional Logistics

The Toronto-Windsor/Detroit-Sarnia/Port Huron-Chicago Corridor is one of the densest, most integrated transportation corridors in North America. With the Great Lakes acting as a barrier to land transportation, freight from Canada entering the U.S. is, in effect, channeled through the Windsor/Detroit-Sarnia/Port Huron corridors (where two bridges, two rail tunnels, and one vehicular tunnel are located)10 and the Niagara Peninsula (where four bridges and one rail bridge are located),11 providing hugely-significant cross-border trade and transportation gateways (see Figure 4 below). Trade value with Canada through Port Huron and Detroit totaled $212.1 billion in 2012, and trade value with

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10 Ambassador Bridge, Blue Water Bridge, St. Clair River Tunnel, Michigan Central Railway Tunnel, and Detroit-Windsor Tunnel.
11 Whirlpool Bridge, Rainbow Bridge, Peace Bridge, Queenston-Lewiston Bridge, and International Railway Bridge (operated by CN Rail).
Canada through Buffalo-Niagara Falls totaled $83 billion in the same year. Trade through Port Huron, Detroit, and Buffalo-Niagara Falls constituted 48% of total U.S.-Canada trade value in 2012.

Further development and integration of the Southwest Ontario-Southeast Michigan corridor will not necessarily revolve about trade, but about functionally-integrated supply chains, according to at least one expert. The capacity of this bi-national corridor to transport, manage, and distribute freight efficiently will determine the volume of shipments passing into Michigan from Atlantic and Pacific ports.

**Figure 4: Southwest Ontario-Southeast Michigan Bi-National Trade Corridor**

It was anticipated, as recently as three or four years ago, that with the expansion of Panama Canal capacity to accommodate post-Panamax ships, significant volumes of Asian freight would be diverted from West Coast ports, principally Long Beach/Los Angeles (but also others), and freight would instead transit the canal and be transloaded at Gulf and Atlantic ports. Up to 25 percent of the Pacific Coast share of freight traffic was expected to be lost to Atlantic ports as a result of the Panama Canal expansion, according to one expert three years ago. However, at a U.S. Senate Commerce Committee hearing held April 10, 2013 on the impact of the Panama Canal expansion, it was noted that while earlier predictions had routinely estimated double-digit growth in shipping volumes, growth predictions have

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13 Ibid.
moderated over time with projections now in the single digits.\textsuperscript{18}

4. Research Analysis and Findings

Current trends in global maritime logistics may generate opportunities for supply chain and logistics hub development in Michigan. This section describes maritime logistics trends with an emphasis on Asian trade routes in the evolving global market; the Panama Canal Authority’s rationale and decision to expand canal capacity to accommodate post-Panamax container ships; the potential impacts of the canal expansion and shifting trade routes on Atlantic ports and ensuing effects on Michigan logistics; and the potential impact of opening Arctic trade routes as a result of diminished ice cover from global climate change.

a. The Evolving Global Market: Understanding Shifts in Asian Trade Routes and Related Changes

Asia-U.S. shipping patterns are currently experiencing a shift in trade routes (see Figure 5 for a map of global trade routes) resulting from significant changes in vessel design, capacity, and size.\textsuperscript{19} Approximately 90 percent of cargo currently travels from Asia to the Atlantic Coast through the Panama Canal while the remaining 10 percent passes through the Suez Canal.\textsuperscript{20} But that is changing. Paul DuVoisin of the Port of Halifax projects that 40 percent of the traffic from Asia will use the Suez Canal in 2013 with a corresponding drop in Panama Canal Asian traffic from 90 to 60 percent. Shippers will use the Suez Canal because it is a sea-level canal and a more economical route.\textsuperscript{21}

James White, the executive director of the Maryland Port Administration, confirms DuVoisin’s assessment of global trade patterns, citing the shift in the manufacturing base from Asia to South Asia as another reason for evolving trade routes. If the shift in manufacturing continues, White predicts that most of the transits from Asia in the next decade will use the Suez Canal with the Panama Canal getting the overflow.\textsuperscript{22}

\textsuperscript{19} Class EEE ships with a capacity of over 18,000 TEUs are being manufactured by the Daewoo Shipbuilding and Marine Engineering Co. for Maersk. The first ship of a 20-vessel order commenced its maiden voyage July 2, 2013 from Busan, South Korea. EEE refers to economy-of-scale, energy-efficiency, and environmentally-improved performance. Once the fleet is constructed, the 20 vessels will operate in a loop between eight ports in Asia and six ports in Europe, according to Maersk.
\textsuperscript{20} Paul DuVoisin, Vice-President Commercial, Port of Halifax. Telephone interview. April 5, 2013.
\textsuperscript{21} Joe Harris, Media Relations Manager, Hampton Roads. Email interview. April 10, 2013.
The primary reason for the change in global trade routes is the trend towards constructing and using larger container ships to move cargo. And the constraints of current Panama Canal capacity preclude transit by post-Panamax ships. But even after the expansion, canal capacity will not accommodate super post-Panamax ships or ultra-large container ships that are coming into use. Larger vessels allow for a greater volume of goods to be shipped in fewer trips and achieve greater economies of scale.

Paul DuVoisin points out that:

> The structure ability, the design ability, the engine capacity became available to build bigger ships. They’re now up to Ultras.\(^{23}\) They’re the mainstay. The order book is just full of Ultras between deliveries this year and 2016. That becomes that long haul, the work vessel and Ultras are 13,000 TEU capacity or higher...The ports consume fewer but bigger vessels, there (are) more moves at one time.\(^{24}\)

From 2010 to 2011, the number of vessels larger than 6,601 TEUs increased while the smaller vessel size classes either declined or held steady.\(^{25}\) Vessels greater than 6,601 TEUs now account for a global carrying capacity of 1.5 million TEUs, which is up 28 percent from 2010.\(^{26}\) These large vessels include Post-Panamax, Super Post-Panamax, and Ultra-Large Container Vessels (see Table 1 for container vessel TEU capacities).

**Figure 5: Major Marine Shipping Routes\(^{27}\)**
With the advent of post-Panamax (PPX) and super post-Panamax (SPPX) ships, port capacity factors based on PPX readiness has become the new current standard. Port depth must be at least 50 feet to accommodate post-Panamax ships with sufficient channel width and turning basin size, cranes capable of loading and unloading PPX ships, and docks engineered to handle the new larger cranes. Four east coast ports are joining the four west coast ports of L.A./Long Beach, Seattle, and Oakland in being PPX ready. Norfolk is currently ready. The Port of Baltimore will be post-Panamax ready this year. The Port of New York will be post-Panamax ready in 2015. However, the Port of New York/New Jersey must raise the 82-year old Bayonne Bridge some 64 feet to reach an air draft of 215 feet and even then the channel may be too shallow to accommodate the larger container ships except at high tide. The Port of Halifax (http://www.portofhalifax.ca/index.html) provides one of the deepest natural harbors on the North American Atlantic Coast at a minimum depth of 55 feet.

The Jacksonville Port Authority is also preparing its docks for post-Panamax cranes and dredging to accommodate post-Panamax vessels. However, the Jacksonville port expansion will not be fully completed in time for the 2015 opening of the Panama Canal expansion.

Table 1: Ocean Container Vessels and TEU Capacities

<table>
<thead>
<tr>
<th>Vessel Type</th>
<th>TEU Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeder</td>
<td>1,000 to 2,8000</td>
</tr>
<tr>
<td>Panamax</td>
<td>2,800 to 5,100</td>
</tr>
<tr>
<td>Post-Panamax</td>
<td>5,100 to 10,000</td>
</tr>
<tr>
<td>Super Post-Panamax</td>
<td>10,000 to 14,500</td>
</tr>
<tr>
<td>Ultra-Large Container Vessel (ULCV)</td>
<td>14,000+</td>
</tr>
</tbody>
</table>

The ranking of U.S. container ports as reflected by TEU volume shows that the Pacific ports of Los Angeles and Long Beach are the top two U.S. ports by far with a combined total of 14,001,602 TEUs that is nearly triple the volume of New York/New Jersey with 5,503,485 TEUs (see Table 2).

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29 Alberto Cabrera, Marketing Director, JaxPort. Telephone interview. April 17, 2013.
This shift to PPX ships is on the verge of being overtaken by the advent of super post-Panamax container ships that will increasingly shift East Asian trade routes away from the Panama Canal and to the Suez Canal. Trade shipments from the Pearl River Delta in south China (that includes major global ports at Hong Kong, Guangzhou, and Shenzhen) go west around Southeast Asia past the Indian subcontinent through the Suez Canal and the Mediterranean that make Atlantic coast ports the competitive logistics gateways for this trade. Halifax as the nearest North American port and a natural deep-water port with year-round access for ships traversing the Atlantic Ocean from Europe and the Mediterranean is particularly well-positioned to increase trade activity (see Table 3 for port travel times).

China trade originating north of the Pearl River Delta (as well as Korea and Japan) is expected to continue using the trans-Pacific route to North American Pacific Coast ports. These established Asian trade routes will unlikely be altered on account of distance, time, and cost constraints associated with alternative trade patterns. The result may also be a complex tradeoff between regional hubs and large ships between East Asia, Southeast Asia, and Europe, possibly extending to North America.

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33 Michael Belzer, Professor, Wayne State University. Telephone interview. April 25, 2013.
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Table 3: Times between Selected Ports and Halifax, New York, and Virginia

<table>
<thead>
<tr>
<th>Container Port</th>
<th>Halifax</th>
<th>New York</th>
<th>Virginia</th>
<th>2012 Port Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotterdam, Netherlands</td>
<td>5:06</td>
<td>6:06</td>
<td>6:15</td>
<td>10</td>
</tr>
<tr>
<td>Dubai, United Arab Emirates</td>
<td>14:06</td>
<td>15:06</td>
<td>15:13</td>
<td>9</td>
</tr>
<tr>
<td>Jawaharlal Nehru (Mumbai), India</td>
<td>14:12</td>
<td>15:11</td>
<td>15:19</td>
<td>30</td>
</tr>
<tr>
<td>Hong Kong, China</td>
<td>20:23</td>
<td>21:01</td>
<td>20:16</td>
<td>3</td>
</tr>
<tr>
<td>Singapore, Singapore</td>
<td>18:05</td>
<td>19:14</td>
<td>19:12</td>
<td>2</td>
</tr>
<tr>
<td>Shanghai, China</td>
<td>20:12</td>
<td>19:22</td>
<td>19:13</td>
<td>1</td>
</tr>
</tbody>
</table>

Current shipments from East Asia to Halifax via the Panama Canal follow a “pendulum” shipping route. The path of this pendulum traverses a string of ports to and fro (see Figure 6 for a conventional pendulum route). Along this pendulum route, goods are delivered to a string of ports (not routed to just a single port). Containers are transloaded from the ship (imports) at their destinations and other containers are transloaded for the vessel’s return trip (exports), wherever appropriate. The capacity of these ships on their return routes carrying North American exports is generally underutilized.

As a result, export shippers have opportunities to pay lower shipping charges compared to import shipment charges. This current trend towards pendulum operations are more restricted in their

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35 Rodrigue. 2010.
distances, but not more restrictive in their impact.\textsuperscript{36} Increased freight volumes that Halifax might receive as a result of the Panama Canal expansion will be caused by increased ship size along pendulum shipping routes.\textsuperscript{37}

What is clear here is that the trend towards super post-Panamax ships is shifting Asian trade routes away from the Panama Canal and to the Suez Canal. While the specific impacts of the Panama Canal expansion on North American Atlantic ports remain unclear in either the short or long term, the global trend of using larger container ships by global carriers has precipitated expansion by Atlantic Ports to accommodate these larger container ships.

It is also worth noting that the continued ordering of these new larger container ships even in the teeth of the 2008-09 Great Recession and stagnating demand of late in both Europe and China has resulted in a serious glut of ocean container ships. The oversupply of container ships has further depressed shipping rates already plagued by lagging demand. Global shipping markets have been extremely volatile. Paradoxically, these conditions drive shippers to continue buying ships to stay competitive because newer, larger ships achieve greater economies of scale. It is quite likely that the industry will be compelled to restructure itself in the near term, as evidenced by the formation of loose alliances by major shipping carriers like Maersk, CMA CGM, and Mediterranean. The ramifications of any future restructuring in the shipping industry are anything but clear.\textsuperscript{38}

b. Panama Canal Authority’s (Autoridad del Canal de Panamá) Decision to Expand the Canal

The Panama Canal originally opened in 1914 as a result of direct U.S. investment, U.S. control of Panama, and U.S. management of its construction that was started under the presidential administration of Theodore Roosevelt in 1904. The geostrategic value of the canal became immediately evident during World War I with the new capacity to rapidly deploy U.S. naval ships and personnel from the Pacific to the Atlantic. The waterway has provided transit service to more than 815,000 vessels in its past 99 years of service. In 2012, 333.7 million PC/UMS\textsuperscript{39} tons of cargo transited the Canal, a 3.6 percent increase over 2011. Toll revenues reached a record $1.8 billion in 2012.\textsuperscript{40}

\textsuperscript{36} Belzer. Telephone interview. April 25, 2013.
\textsuperscript{37} Ibid.
\textsuperscript{38} Stratfor Global Intelligence. Global Shipping Contends with Oversupply Problems. July 8, 2013.
\textsuperscript{39} Panama Canal Universal Measurement System (PC/UMS) is based on the international standard of vessel admeasurement established by the International Convention of Measurement of Ships of 1969. This system applies a mathematical formula for the measurement of total ship volume. A net Panama Canal ton is equivalent to 100 cubic feet of volumetric capacity.
\textsuperscript{40} Panama Canal Authority. Annual Report. 2012.
In July 2009, the Panama Canal Authority (la Autoridad del Canal de Panamá, or ACP) made the decision to expand Canal capacity to accommodate post-Panamax ships and establish Panama as a major multimodal port.\textsuperscript{41} Since then, the Authority has signed several Memoranda of Understanding (MOUs) with ports on the North American Atlantic and Gulf coasts addressing areas like joint marketing, data exchange, market studies, modernization/improvements, training, and technology exchange. The Port of Halifax was the first Canadian port to sign an MOU with the Panama Canal on September 19, 2012.\textsuperscript{42}

The rationale for the $5.2 billion canal expansion was based in large part on the immediate prospect of losing business to larger (post-Panamax) container ships from the constraints of canal capacity and the growth of transpacific trade. It was also believed that concerns about the reliability of the U.S. land route and west coast ports could be taken advantage of by offering an all-water route to post-Panamax container ships.\textsuperscript{43}

The opening of the expanded Panama Canal now scheduled for 2015 was expected, until recently, to increase the volume of Asian freight transiting the Canal with the prospect of increasing freight volumes at Atlantic coast ports and inland ports in eastern North America. The expanded canal will accommodate post-Panamax ships that can carry up to 12,000 TEUs\textsuperscript{44} compared to Panamax ships carrying 4,800 TEUs. The capacity of the expanded canal will not, however, accommodate super post-Panamax or ultra-large container vessels that are coming on line and are on order by major carriers. The impact of these even larger container ships with TEU capacities exceeding 18,000 TEUs on global trade routes clearly favors the Suez Canal with its larger capacity compared to the Panama Canal with even its expanded locks capacity. And this geographic shift can be expected to increase freight volumes at North American Atlantic ports.

The expansion of the Panama Canal is the first element in Panama’s strategy to transform the small Central American country into a regional logistics hub similar to the Singapore hub in Southeast Asia and the Dubai hub in the Middle East. The second element is the Panama Pacífico Project, a 3,500 acre development on the site of the former U.S. Howard Air Force Base.

The goal is to develop an international and logistics hub outside Panama City with the construction of more than one million square meters of commercial space as well as an urban center with 20,000

\textsuperscript{41} Cabrera. April 17, 2013.
\textsuperscript{42} Journal of Commerce. Halifax first Port in Canada to sign a Memorandum of Understanding with the Panama Canal Authority. September 18, 2012.
\textsuperscript{43} Rodrigue, 2010.
\textsuperscript{44} TEU, or twenty-foot equivalent unit, is a unit of measurement of the capacity of container ships, based on 20-foot-long intermodal shipping containers.
houses and apartments, hotels, and shopping centers surrounded by green belts, parks, and water resources. The former military airstrip is being used as an alternate airport to Tocumen International Airport. The Panama Pacífico master plan is divided into an international business park, a logistics park, a town center, an airport, a green area, Forest Business Park, and Kobbe Hills.\footnote{Panama Q Magazine Online, Retrieved July 15, 2013 from http://www.panamaqmagazine.com/JUNE_10/Panama_Pacifico_VisionaryProject.html}

Panama’s strategic location, government stability, and efficient administrative processes for conducting business provide powerful support for its development as a regional logistics hub. However, Panama lags behind Singapore and Dubai in the quality of its labor, infrastructure (ports and intermodal services), and ability to attract foreign investments.\footnote{Munoz and Rivera. Development of Panama as a Logistics Hub and the Impact on Latin America. 2010.} The expansion of the Panama Canal will undoubtedly improve the country’s logistics infrastructure, making Panama far more competitive with other logistics hubs in North and South America. This may be the overall key to Panama’s future development rather than as a circumnavigational transit link, as originally envisioned a few years ago.

c. The Potential Impact of the Panama Canal Expansion on Michigan Freight and Hub Logistics

For North America and Michigan, freight carried from Asia currently takes three routes: 1) via west coast ports and then transloaded onto rail across the U.S. (that is, the so-called land route); 2) via the Panama Canal and then transloaded at either Gulf Coast or Atlantic coast ports; and 3) via the Suez Canal and then transloaded at Atlantic Coast ports. With any of these routes, cargo traffic arrives in Michigan via rail from either coast.

The strength of the state’s strategic geographic advantage lies in its proximity to Chicago and its immediate access to Ontario via the Blue Water Bridge at Port Huron/Sarnia and the Ambassador Bridge at Detroit/Windsor\footnote{Construction of a second bridge between Detroit and Windsor was approved by the state’s voters in the November, 2012 election. The bridge project received the Presidential permit in April, 2013 that is necessary to proceed with construction.} as well as rail tunnels at each of these crossings with close proximity to the Greater Toronto Area. It should be noted that the St. Clair River rail tunnel can accommodate double stack rail cars; the Detroit River rail tunnel cannot. Mid-distanced between global multi-modal logistics hubs at Chicago and Toronto, Michigan clearly has the potential to become a logistics and trade hub to both rival and complement these existing hubs. These strategic geographic advantages can build on the state’s robust manufacturing and agricultural sectors that already represent hugely important shipping logistics markets. Thus, a state logistics hub strategy is an organic and coherent approach, not ad hoc or
disconnected from the state’s existing assets and infrastructure. A sound state logistics strategy is a logical extension of the state’s economic base and framework.

Three important factors contribute to a major opportunity for positioning and marketing the state as a logistics hub: 1) the state’s immediate proximity to Ontario, 2) direct rail connections to the Port of Halifax, and 3) offering an alternative to costly rail congestion in Chicago. Michigan policymakers at all levels must be diligent in pursuing a coherent logistics hub strategy with a clear understanding of shippers’ needs and the role of public-private and bi-national partnerships. These important Michigan-Ontario economic linkages are dramatically highlighted by the Canadian federal government’s current commitment to provide upfront funding for Michigan’s share of the construction costs of the second Detroit-Windsor crossing.

Broad regional entities like the Great Lakes International Trade and Transport Hub (GLITTH) and the Great Lakes Global Freight Gateway (GLGFG) are attempting to harness the state’s logistics and shipping potential into practical and effective logistics hub strategies. GLITTH is a bi-national effort—headed by Michigan State University, Prima Civitas Foundation, and Dalhousie University in Halifax, Nova Scotia—that is attempting to transform the region of Michigan and northwestern Ohio into a global freight and logistics hub through coordinated efforts with the Canadian provinces of Ontario and Nova Scotia. At a sub-state regional level, the I-69 International Trade Corridor Next Michigan Corporation is focusing on infrastructure development and marketing this critical corridor as a North American shipping hub.48 The MSU project team is working with the I-69 International Trade Corridor through the St. Clair County EDA as well as with the East Michigan Council of Governments (EMCOG) and the Eastern Upper Peninsula Regional Planning and Development Commission on exporting and logistics hub strategies.

The Great Lakes Global Freight Gateway (GLGFG), headed by Michael Belzer, a Wayne State University economist, sees important opportunities residing in Michigan’s central position vis-a-vis bicoastal Canadian rail and port traffic with British Columbia on the west and Halifax, Nova Scotia on the east. Better utilization of rail links between Michigan and this bicoastal freight traffic and container expansion of inter-modal trade represent tangible strategic goals. Belzer points out that if freight volumes between Halifax and Detroit increase, transit times can be decreased by avoiding rail yard delays in Toronto. A Michigan Regional Inland Port could handle the increasing throughput resulting in 12 hours of one-way time savings from Southeast Michigan to Halifax compared to the current wait times in Toronto.49

In this overall context, Larry Karnes, MDOT Freight Policy Specialist, does not anticipate increased rail traffic in Michigan as a result of the canal expansion. He pointed out that the “future effects of the enlarged canal are subject to an extensive ongoing dialog among the transportation/distribution industry.”

Karnes’ assessment complements Paul DuVoisin’s interview responses in that Michigan may not see any dramatic increase in freight traffic resulting from the Panama Canal expansion as was perhaps expected two or three years ago. However, Michigan could benefit indirectly from the Panama Canal expansion with changes in ocean trade routes. According to DuVoisin, if current state export initiatives like the MEDC STEP program and supported by the opening of the U.S. Export-Import Bank office in Detroit are successful in increasing export volumes, the state could see benefits for outgoing traffic, especially exporting agricultural commodities such as soybeans.

Although efforts to build a Michigan supply chain/logistics hub have historically paled in comparison to those of Illinois, DuVoisin sees a clear potential for developing an inland port in the state with a rail center and logistics hub. He envisions a “superior supply chain” between Atlantic Coast ports in Halifax and Montreal (and possibly Norfolk). This supply chain would also include connections to trans-Pacific trade via Vancouver. Cargo travelling between Michigan and north or south China is transported more quickly via the Canadian ports – Halifax, Montreal, and Vancouver – than United States ports such as New York or Long Beach. The geographic location of Michigan provides optimal access to Atlantic and Pacific ports in Canada:

Halifax, Montreal, Vancouver are just all right, ready to give you a superior supply chain. It’s odd to say they’re all Canadian ports, but they are. Where you’re located and where we’re located, geography makes it perfect.

Proximity to Toronto and Chicago and a direct rail connection to Halifax are strategic geographic assets that Michigan can build on. These strategic assets can contribute to realizing future economic gains resulting from shifting global trade routes that favor the North American Atlantic Coast. The specific extent of the impact of the Panama Canal expansion on the North American Atlantic Coast and Michigan freight and hub logistics, however, remains uncertain but clearly huge gains in cargo traffic are not expected in the near term.

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52 DuVoisin. April 5, 2013.
d. The Potential Impact of Arctic Ocean Diminished Ice Cover on Global Trade Routes

It is worth noting that long-term global trade patterns may be influenced by the impact of global climate change that is diminishing Arctic Ocean ice cover. Diminished sea ice may lead to longer navigation seasons, improved shipping accessibility, and extended use of shipping routes along the perimeter of the Arctic Ocean (the Northern Sea Route and the Northwest Passage). Russian companies are already using the Northern Sea Route across the northern coast of Russia to move petroleum from the Barents and Kara Seas and for mineral shipments (zinc and nickel). The Northern Sea Route could provide an alternative passage to transport goods from northeast Asia to Europe in the summer within 20 years, according to one highly respected Arctic policy expert. Murmansk in Russia, the only port within the Arctic Circle that is ice-free the year-round, has made significant investments in establishing the city as a logistics hub and is planning more (see Figure 7 for a Map of Arctic Ocean Trade Routes).

55 Linda Jakobson. Beijing’s Arctic Ambitions are not to be Feared. May 20, 2013.
The definitive 2009 Arctic Marine Shipping Assessment (AMSA) Report on Arctic Ocean issues states:

There is a possibility of an ice-free Arctic Ocean for a short period in summer, perhaps as early as 2015. This would mean the disappearance of multi-year ice, as no sea ice would survive the summer melt season. It is highly plausible there will be greater marine access and longer seasons of navigation, except perhaps during winter, but not necessarily less difficult ice conditions for marine operations.

In an international meeting on Arctic Ocean issues earlier this year, the difficulty of using Arctic trade routes was emphasized:

At present, capabilities are lacking in terms of appropriate vessels, qualified crews, navigational systems, satellite coverage, infrastructure in general, and—very important for risk calculations—search and rescue capacity. Sailing conditions will continue to be harsh in terms of temperatures, extreme weather, visibility,

ice conditions, and the icing up of vessels which affect their stability... (And) in general, information on meteorological and oceanographic conditions, like winds and waves, in the parts of the Arctic with seasonal or all-year ice cover is poor.  

So, the report concluded, container shipping opportunities are limited while also noting the shipping industry’s flexibility and willingness to pursue new markets and try out new things. Indeed, the report noted, unexpected advances in technology could alter the current equation that calculates little likelihood of Arctic routes being any kind of game changer in the near term.

According to U.S. marine shipping experts, a significant expansion of shipping in the U.S. portion of the Arctic would require the following developments:

- Deep-water ports for ship refueling, cargo transfers, materials storage, and visitor disembarkment;
- Site response plans for offshore anchoring, cargo loss, discharge from ships as well as oil spills and other hazardous material discharges;
- Improvements in weather- and iceberg-monitoring data-sharing protocols;
- New and updated navigational charts;
- Creation of trust funds, financial pools, or other private insurance schemes for accident liability and compensation purposes.

Supporters of the Northern Sea Route (NSR) were encouraged in 2011 when the Japanese-owned Sanko Odyssey, the world’s largest ice-class bulk carrier, made the transit from Murmansk to China in 23 days, or about 22 days less than the Suez Canal route. With its proximity to the Bering Strait, Japan would be a clear winner if the NSR dream were realized. Shipbuilding Korea and trade-dependent China are other key supporters of the Northern Sea Route.

The pace at which the Arctic ice cover is diminishing will determine when the Northern Sea Route can become a reliable transit option. Year-round transit will only be plausible once ice cover has disappeared for the majority of the year which is predicted to occur in the next 40 to 60 years. But technology and economics will be the decisive factors in whether a new generation of container ships will be built that are ice-worthy for a route that won’t be available the year-round for the foreseeable future.

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59 Ibid.
Development of an Arctic Northern Sea Route would be expected to favor the port of Halifax with its northern-most position of the North American Atlantic Coast ports.
5. Conclusion

The research and analysis described in this paper were designed to enhance understanding of the anticipated changes in future global freight patterns resulting from the expansion of the Panama Canal and the use of post-Panamax (and super post-Panamax) ships and their impact on Michigan freight and logistics hub opportunities. Based on a brief literature review and semi-structured interviews with North American Atlantic port authorities and logistics experts, our major finding is that changes in Asian freight patterns could dramatically increase the volume of freight at North American Atlantic ports, but the impact of the Panama Canal expansion on these ports is expected to be more modest (single digit annual percentage increases).

It is increasingly clear that super post-Panamax ships will be a major game changer for global shipping and logistics. But it is not clear how these future changes will play out except to say the science of logistics will be further developed and refined with intermodal hubs becoming that much more important in the global market place.

The U.S. Army Corps of Engineers also concluded that there’s uncertainty surrounding the future impact of the Panama Canal expansion on U.S. ports and shipping volumes and patterns in a response to a Congressional request for a study.\textsuperscript{63} The choices that will determine the impacts of the canal expansion and changes in trade patterns will be made by a huge number of private sector actors (shippers, shipping lines, logistics providers, ports, and others). As their data, deliberations, and decisions are not widely shared, the precise trajectory of the aggregate of these myriad decisions is impossible to clearly anticipate or accurately predict. Despite the uncertainty about the impact of the Panama Canal expansion on Michigan hub logistics, the state appears to be strategically positioned to gain from other shifts in global trade coming from the use of larger container ships and the shift of Asian trade routes to using the Suez Canal.

This paper is intended to make a modest contribution to discussions about state and regional logistics hub strategies and planning. Earlier this year, the MSU CCED project team developed two regional logistics strategies that can help inform the state’s overall approach.\textsuperscript{64} A key to success is the effective


deployment of the state’s abundant knowledge assets and resources, and harnessing the knowledge power of the state’s higher education institutions to create regional strategies that will position the state as a logistics hub. Multi-sector and multi-jurisdictional collaboration are critical to getting it right. Developing public-private partnerships is one way to help create solutions to state logistics and infrastructure challenges, and position the state for success in growing global markets. Invention and innovation need to drive this ongoing strategic process.

Further research is required to determine how Michigan can take advantage of the shift in global trade patterns and create new business opportunities and new jobs in growth sectors, especially for small and mid-sized companies. Specifically, research to understand the logistics needs and requirements of small and mid-sized companies is needed to successfully compete in global markets. And greater understanding of specific foreign markets would represent a major step in developing a well-calibrated, more detailed state strategic approach.

State policymakers should continue efforts in promoting exports by small and mid-size Michigan businesses and identify steps that SMEs can take to seize advantage of lower shipping costs associated with the current shift in global trade routes that appear to favor North American exports. Michigan policymakers should also identify steps to better position the state to capitalize on export and trade opportunities associated with emerging global markets, especially those in South America, East Asia (including China, Korea, and Japan) and southeast Asia (including Viet Nam, Singapore, and Indonesia).
The Potential Impacts of the Panama Canal Expansion and Evolving Post-Panamax/Super Post-Panamax Container Ship Routes on Michigan Freight and Hub Logistics

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The Potential Impacts of the Panama Canal Expansion and Evolving Post-Panamax/Super Post-Panamax Container Ship Routes on Michigan Freight and Hub Logistics


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The Potential Impacts of the Panama Canal Expansion and Evolving Post-Panamax/Super Post-Panamax Container Ship Routes on Michigan Freight and Hub Logistics


Appendix A:
Michigan State University Center For Community and Economic Development
Questionnaire for Atlantic Ports

1. The Panama Canal Expansion will increase imports at your port.
   - Disagree
   - Neutral
   - Agree

2. The Panama Canal Expansion will increase exports at your port.
   - Disagree
   - Neutral
   - Agree

3. Expansion will increase exports from the Midwest (Chicago, Detroit) through your port.
   - Disagree
   - Neutral
   - Agree

4. Expansion will increase imports to the Midwest (Chicago, Detroit) from your port.
   - Disagree
   - Neutral
   - Agree

5. There is a great deal of uncertainty about the potential impacts on your port of the expansion of the Panama Canal.
   - Disagree
   - Neutral
   - Agree

6. Does the Panama Canal Expansion provide an opportunity to compete with North American Pacific Ports for East Asian imports/exports?
   - Click here to enter text.

7. Do you anticipate traffic at your port to increase upon completion of the Panama Canal Expansion in 2015? Why or why not?
   - Click here to enter text.

8. Do you have any concerns with the capacity of rail networks to handle potential increases in imports and exports from your port?
   - Click here to enter text.

9. Do you expect the development of alternative routes or shift in existing trade routes due to the Panama Canal Expansion? If so, to where?
   - Click here to enter text.

10. Are you implementing any infrastructure improvements at your port in anticipation of Ultra Post-Panamax vessels?
    - Click here to enter text.

11. Do you see a need for any infrastructure improvements in the surrounding area in light of increased port traffic?
    - Click here to enter text.
Appendix B:
Michigan State University Center For Community and Economic Development
Questionnaire for Larry Karnes, Freight Policy Specialist
at Michigan Department of Transportation

1- Does MDOT have data on future trends (5-10-years) in rail traffic commodities and volumes from Canada? From specific ports in Canada? Does MDOT have data for the past 5-10 years?

2- Does MDOT have regional incoming freight traffic data on from the surrounding states? Can we identify the specific ports that the freight originated from?

3- Does MDOT have incoming freight traffic data from Canada? Can we trace that data back to Canadian ports?

4- Does MDOT anticipate an increase in rail freight traffic due to the construction of Panamax Canal? Why or why not?

5- Are there infrastructure plans in place or being discussed to encourage or facilitate more cargo from Canadian ports?

6- Are there infrastructure plans in place or being discussed to encourage greater volumes of exports from Michigan to Canadian ports?