Climate Change and Adaptation Planning for Ports (气候变化和物流中心的适应规划)

ADOLF K.Y. NG

Professor
Dept. of Supply Chain Management, Asper School of Business, University of Manitoba, Canada

Associate Director
University of Manitoba Transport Institute (UMTI), Canada

E-mail: adolf.ng@umanitoba.ca

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Coastal and Marine Natural Disasters can be Very Costly

- Estimated damage by Sandy exceeds USD 18 billion (NBCNews.com, 2012). Earlier, Katrina caused damages worth USD 146 billion (National Geographic, 2012).
- Hurricane Sandy’s cost to marine insurers are estimated at USD 2.5-3.5 Billion (Lloyds’ List No. 61,014).
- In addition to such “one-shot” disasters, climate change and rising sea could bring more serious, long-last damages.
• Damages associated with coastal disasters can be reduced with proper investments in ports and coastal regions:
  – Raise height of roads (causeways), improvements of groins, dikes, levees and seawalls; Improvements to port’s storm water system
  – Example of “Terminal Groin” (a long wall or hardened structure that extends out toward the ocean, usually perpendicular to the coastline, and adjacent to an inlet or at the end of coastal land mass that is prone to beach erosion.)
Projects may be long and costly

- The Saint Petersburg Flood Prevention Facility Complex costs **USD 3.85 billion** - construction started in 1979; finished in 2011.
Right after Sandy’s surge on New York City…

It was argued that a sea wall barrier could have stopped Sandy’s 14-foot storm surge.

The price tag of a sea barrier is **USD 6 billion**
In Gulfport (Mississippi), only days after Sandy hit NYC...

(only 7 years after Katrina)...

US$570 m in Federal Community Development Block Grant money for post-Katrina restoration and expansion

Change 25-feet elevation to 12-15 feet for West Pier

US$ 120-140 m can be saved for deeper water channels for ‘additional jobs and business’
• Quoting the Port Commissioner of Gulfport:
  – "That's based on 15 being something our contractor told us he could reach in a relative quick period of time. 12 or 14 being what some of our tenants said was comfortable for them."
  – “…if we get our elevation up to somewhere around 15 feet that's going to mean something to somebody that is bringing cargo to our port to be exported…if we get it up to 15 feet we'll be in good shape.”

• Quoting Governor Phil Bryant (Mississippi):
  - “...Not to evaluate (the West Pier to 25 feet) was a good decision...we should now concentrate on better serving current tenants, attracting new business and creating an additional 1,200 jobs.”
Why all these complexities?

We have done much to reduce the uncertainties of the cause, consequences, impacts and costs of climate change, but the reduction of uncertainties of the decision-making process of climate change adaptation is still largely unaddressed

(cf. USA’s National Research Council’s reports on climate change, 2010)
Major Discussion Questions

• Who pays for it?
  – port vs. tenants, each believes that the other side should be responsible.

• How much to invest?
  – excessive investment will not produce extra benefits.

• When should investment be made?
  – Limited but growing knowledge.
  – Early investments -> buying insurance earlier.

• What should the Government and other stakeholders do?
  – In many cases, governments has no better, if not worse, knowledge than the industry.
Major Discussion Questions

- **Uncertainty: The “Timing” Problem**
  - Stern Review (2007) early action: delaying now means more drastic emissions reductions in the future; Early action now gives the option of less efforts in the future; high risk otherwise.
The major issues

• Invest or not (the ‘commitment’ problem)?
• When to invest (the ‘timing’ problem)?
• The role of government and other port stakeholders
• The ‘right approach’ in addressing the challenge
The major issues

• The kaleidoscopic nature of climate change and its impacts...
  - not just hurricanes and SLR!
  - both a global and highly localized issue

• Can adaptation transform climate change ‘challenges’ into opportunities?
The major issues

According to UNCTAD’s *Ad Hoc* Expert Meeting on Climate Change and Port’s Adaptation (Geneva, Switzerland, Sep 2011):

“Substantial input and the sharing of both global and local experiences are required so as to better understand the issue of adaptation to climate change. Furthermore, reliable data, information and experiences on this issue is seriously inadequate, if not unavailable altogether.”

(UNCTAD, 2012)
The major issues

• Economic analysis

• Case Studies

• ‘Partnerships’ and ‘consortiums’ (the criticality of interdisciplinary and research facilitation)
Economic Analysis

Port investments on coastal and marine disasters prevention: Economic modeling and implications

Yi-bin Xiao\(^a\), Xiaowen Fu\(^b,\)*, Adolf K.Y. Ng\(^c\), Anming Zhang\(^d\)

\(^a\)School of Mathematical Sciences, University of Electronic Science and Technology of China, China
\(^b\)Institute of Transport and Logistics Studies, University of Sydney, Australia
\(^c\)Department of Supply Chain Management, I.H. Asper School of Business, University of Manitoba, Canada
\(^d\)Sauder School of Business, University of British Columbia, Canada
Four Benchmark Scenarios

• **Scenario 1:** Early investment (*period 1*) with individual investment decision

• **Scenario 2:** Late investment (*period 2*) with individual investment decision

• **Scenario 3:** Early investment (*period 1*) and coordinated investments maximizing joint profits of the port and terminal

• **Scenario 4:** Late investment (*period 2*) and coordinated investments maximizing joint profits of the port and terminal
Figure 5. Comparison of expected profits Case
Key Results

• If the probability of negative impacts ('disasters') is large in the foreseeable future ('period 1'): (private) port stakeholders would be better off with early investments, and coordinated by government

• Low (or implicit) in the foreseeable future: then investments should be postponed to long term ('period 2')

• Neither too high nor too low ('uncertainty') in the foreseeable future: should invest early, but government coordination may NOT be the best solution
Key Results

• The problem of government coordination in this case:

  – Ambiguous (sometimes ambivalent) interest and objectives ~ difficult to identify priorities under budgetary and other constraints

  – The ‘free-ride’ problem

  – Institutional constraints and ‘path-dependent’ practice
Case Studies

Port of San Diego

- Adaptation planning and strategies of the *Climate Mitigation and Adaptation Plan (CMAP)*
- The first US port to develop a climate plan with substantial elements for adaptation
- The preparation process of CMAP, as well as its perceived implementation...

- Adopted by the PSD’s Board of Directors in December 2013, but implementation finally scrapped (‘postpone unlimited time’) in 2014
Port of San Diego

• More a visionary guide than real action plan

• Nearly 50 strategies being proposed with “maximum flexibility” to its stakeholders to choose from

• At least 17 of them were about “more studies”, “obtaining more information” and “more planning”
Port of San Diego

- Stakeholders (notably port tenants) remained very speculative and provided little input and feedback, and so public participation, in practice, was largely absent.

- Highly skeptical about the study by PSD on SLR, and thus the urgency for adaptation.

- Insisted that “the meaning of the strategies, and how to implement them in the future” had to be interpreted by them.
Port of San Diego

Private Firms

Facilitator

Facilitator

Facilitator

Inter-Govt. Agent

Inter-Govt. Agent

National Agent

National Agent

Provincial Agent

Provincial Agent

Local Agent

Local Agent
The key issues here

• Inadequate reliable information
  - not just data on when disasters would struck, but also the ‘lessons learnt’ from global experiences

• Research remains segregated and piecemeal

• Coordination is important, but currently lacking ‘soft’ elements in the coordination and adaptation planning process

• The importance of ‘partnerships’ and ‘research facilitation’
Climate Change and Adaptation Planning for Ports (2016)

http://www.routledge.com/books/details/9781138797901/
Partnerships and Consortiums

Global Survey on the Attitude of Ports and Port Stakeholders located in 5 Continents in Adaptation Planning of Port and Port Infrastructures to Climate Change Impacts

(49 scholars (from 15 universities/academic institutions), policymakers and industrial practitioners)
Partnerships and Consortiums

- Engineering: 12
- Economics & Management: 11
- Environmental Studies & Planning: 9
- Geography: 7
- Oceanography/Meteorology: 5
- Political Science: 3
- History: 1
- Information Technology: 1
Partnerships and Consortiums

THEORY AND METHODOLOGY
1. Time to Act: The Criticality of Ports in Adapting To the Impacts Posed By Climate Change
2. Seaport Adaptation for Climate Change: The Roles of Stakeholders and the Planning Process
3. Analyzing Risks Posed By Climate Change on Ports: A Fuzzy Approach

LOCAL EXPERIENCES – NORTH AMERICA
4. Climate Change and Adaptation Strategies of Canadian Ports and Shipping: The Case of the St. Lawrence- Great Lakes System
5. Climate Change and the Adaptation Planning Of Inland Port and Rail Infrastructures in the Province Of Manitoba in Canada
6. The Impacts of Hurricane Sandy on the Port Of New York and New Jersey: Lessons Learned For Port Recovery and Resilience

LOCAL EXPERIENCES – EUROPE
7. Climate Adaptation of German North Sea Ports: The Example of Bremerhaven
8. Port Planning and Climate Change: Evidence from Italy
Partnerships and Consortiums

LOCAL EXPERIENCES – ASIA

LOCAL EXPERIENCES – LATIN AMERICA
11. Terminal Maritimo Muelles El Bosque, Cartagena, Colombia 12. Climate Change Adaptation in the Panama Canal

LOCAL EXPERIENCES – AUSTRALIA AND OCEANIA

ADAPTATION AS OPPORTUNITIES – ARCTIC DEVELOPMENT

CONCLUSION, PROPOSED RESEARCH AGENDA AND COLLABORATION
17. The State Of Climate Adaptation for Ports and the Way Forward