PORT ASSET MANAGEMENT: THE ROLE OF PORT AUTHORITIES AND MARINE TERMINAL OPERATORS – A SYSTEMATIC APPROACH

SOTIRIOS THEOFANIS
MARIA BOILE
TREFOR WILLIAMS
ALI MAHER

CENTER FOR ADVANCED INFRASTRUCTURE & TRANSPORTATION (CAIT)

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WHY ASSET MANAGEMENT IN PORTS?

• need to address the exploding global trade and the associated port congestion problem
• need to increase port productivity and maximize the use of port infrastructure
• new forms of ownership and financing port investment necessitating reliable port asset valuation
• scarcity of resources pertinent to investment in port infrastructure development
• need for more effective port infrastructure, superstructure and equipment condition monitoring and maintenance
• unprecedented price premiums experienced in some of the latest sales of port businesses and the need to recover the port infrastructure investments
FUNCTIONS OF PORT AUTHORITY

• The policy making and planning function
• The land developer and landlord function
• The regulatory, supervisory and monitoring function
• The promotion function
• The commercial function
PORT MANAGEMENT TYPOLOGY

• The Landlord Port

Port Authority (PA):
- Owns the basic infrastructure, land, access and protection works
- Leases land to port operators, normally through long-term concession
- Retains all regulatory functions

• The Tool Port

PA:
- Owns the infrastructure, the superstructure and major equipment
- Rents the above to operators
- Retains all regulatory functions

• The Operating (Service) Port

PA:
- Owns and operates every port asset
- Provides all commercial services (nautical-technical and cargo handling) to vessels and cargo
- Fulfills all regulatory functions
# MANAGEMENT TYPOLOGY & DIVISION OF RESPONSIBILITIES

<table>
<thead>
<tr>
<th>PORT ELEMENT</th>
<th>LANDLORD PORT</th>
<th>TOOL PORT</th>
<th>OPERATING (SERVICE) PORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>PA</td>
<td>PA</td>
<td>PA</td>
</tr>
<tr>
<td>Superstructure</td>
<td>T</td>
<td>PA</td>
<td>PA</td>
</tr>
<tr>
<td>Utilities</td>
<td>PA</td>
<td>PA</td>
<td>PA</td>
</tr>
<tr>
<td>Major Equipment</td>
<td>T</td>
<td>PA</td>
<td>PA</td>
</tr>
<tr>
<td>Secondary Equipment</td>
<td>T</td>
<td>T</td>
<td>PA</td>
</tr>
</tbody>
</table>

PA: Port Authority, T: Tenant (port operator/stevedore)
AM INTERPRETATIONS

- A next-generation infrastructure management system,
- A way to bring private-sector thinking into public-sector decisions,
- An economics-based approach to investment planning and decision-making,
- A comprehensive program of facility maintenance or maintenance contracting,
- A management philosophy to secure the future life of transportation infrastructure, and
- A way of combining pavement, bridge, safety, and other maintenance management systems to yield more effective information.

Source: *Transportation Asset Management Guide*
CAN THESE PRINCIPLES APPLY IN PORTS? – POTENTIAL AREAS OF AM APPLICATIONS FOR PA IN LANDLORD PORTS

THE PORT INDUSTRY IS AN ASSET INTENSIVE INDUSTRY

Potential Areas of Application:
• Infrastructure Development and Monitoring
• Property Management
• Maintenance Management
• Utility Management
• Data Integration
PORT ASSET MANAGEMENT: A CONCEPTUAL APPROACH

INFRstructure Development

PROPERTY MANAGEMENT

MAINTENANCE MANAGEMENT

UTILITY MANAGEMENT

DATA INTEGRATION

INFRstructure MONITORING – LIFE CYCLE APPROACH

PA

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WHY FORMAL AM PROCESS WAS NOT ADOPTED SO FAR WIDELY BY PORT AUTHORITIES?

• “Business as usual” attitude
• Diverse and fragmented activities
• Main operating function is “outsourced” to tenants (mainly terminal operators)
• AM is considered merely as a maintenance management issue or an asset inventory issue
• Asset inventory is considered as an administrative issue
• Investment is considered, in many cases, as a budget issue
• Ageing infrastructure problems were not so evident (e.g. corrosion of marine structures)
• Environmental pressures were not so evident
PA – TENANTS CONCESSION ARRANGEMENTS

• Concession contracts merely are limited to set throughput performance targets
• Normally, there is no reference at all for the infrastructure condition. Infrastructure degradation is considered as usual “wear and tear’ issue
• Normally, there are no reporting obligations of the tenants for the condition of the infrastructure
• Concession fees possibly do not cover a life cycle management approach
• Business premiums, attributed to port infrastructure, are not reflected
THE ROLE OF TENANTS (PORT OPERATORS)

Perspectives of the Tenants role:

• BUSINESS PERSPECTIVE

• CONTRACTUAL PERSPECTIVE

• PUBLIC DOMAIN PERSPECTIVE

Tenants, in most cases, apply asset management for their property (mainly cargo handling equipment)
GOVERNANCE OF AM IN PORT AUTHORITIES

Two Approaches:
1. Establish an independent Unit for AM, or
2. Establish a formal intra organization Task Force

IN ANY CASE PUT THE ISSUE ON THE PRIORITY AGENDA OF THE EXECUTIVE DIRECTOR
INTEGRATING AM SYSTEM & EMS IN PORTS

AMS & EMS

DIAGNOSTIC PHASE

AMS
EMS

PLANNING PHASE

AMS
EMS

IMPLEMENTATION PHASE

AMS & EMS

MONITORING PHASE

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PORT ENVIRONMENTAL REVIEW SYSTEM (PERS) SELF DIAGNOSTIC TOOL

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>PERS</th>
<th>EMAS</th>
<th>ISO</th>
<th>SWOT</th>
<th>Ans(%)</th>
<th>Yes(%)</th>
<th>Partial(%)</th>
<th>No(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Has an Initial Environmental Review been conducted?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>93.8%</td>
<td>50.0%</td>
<td>60.0%</td>
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</tr>
<tr>
<td>1.1</td>
<td>Do you have an Environmental Policy?</td>
<td>YES</td>
<td>S</td>
<td></td>
<td></td>
<td>96.9%</td>
<td>61.3%</td>
<td>38.7%</td>
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<tr>
<td>1.31</td>
<td>Is the Policy signed by Chief Executive / Senior Management?</td>
<td>YES</td>
<td>S</td>
<td></td>
<td></td>
<td>59.4%</td>
<td>78.0%</td>
<td>21.1%</td>
<td></td>
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<tr>
<td>1.32</td>
<td>Is the Policy communicated to all relevant interest groups?</td>
<td>YES</td>
<td>S</td>
<td></td>
<td></td>
<td>58.3%</td>
<td>88.3%</td>
<td>11.1%</td>
<td></td>
</tr>
<tr>
<td>1.33</td>
<td>Communicated to all employees*</td>
<td>YES</td>
<td>S</td>
<td></td>
<td></td>
<td>58.3%</td>
<td>88.3%</td>
<td>11.1%</td>
<td></td>
</tr>
<tr>
<td>1.4</td>
<td>Does the Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>1.41</td>
<td>Specify Objectives</td>
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<td>O</td>
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<td></td>
<td>56.3%</td>
<td>86.3%</td>
<td>18.7%</td>
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<tr>
<td>1.42</td>
<td>Publish an Environmental annual report?</td>
<td>YES</td>
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<td>33.3%</td>
<td>16.7%</td>
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</tr>
<tr>
<td>1.43</td>
<td>Continual improvement?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>55.3%</td>
<td>84.1%</td>
<td>5.6%</td>
<td></td>
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<tr>
<td>1.44</td>
<td>Train employees on environmental issues?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>55.3%</td>
<td>77.1%</td>
<td>22.2%</td>
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<tr>
<td>1.45</td>
<td>Introduce an Environmental Management System?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
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<td>41.2%</td>
<td>5.6%</td>
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<tr>
<td>1.46</td>
<td>Reduce resource consumption?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>50.0%</td>
<td>81.1%</td>
<td>18.8%</td>
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<tr>
<td>1.47</td>
<td>Improve environmental standards beyond those required under legislation?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>56.3%</td>
<td>61.1%</td>
<td>33.3%</td>
<td></td>
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<tr>
<td>1.5</td>
<td>Does the Environmental Policy refer to the following issues?</td>
<td>YES</td>
<td>O</td>
<td>()</td>
<td></td>
<td>56.3%</td>
<td>88.3%</td>
<td>11.1%</td>
<td></td>
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<tr>
<td>1.51</td>
<td>Implementation of the ESPD Code of Practice?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>56.3%</td>
<td>38.3%</td>
<td>61.7%</td>
<td></td>
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<tr>
<td>1.52</td>
<td>Operations carried out in the port?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>58.3%</td>
<td>77.5%</td>
<td>22.2%</td>
<td></td>
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<td>1.53</td>
<td>Substances involved in port operations?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>56.3%</td>
<td>66.7%</td>
<td>33.3%</td>
<td></td>
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<tr>
<td>1.54</td>
<td>Emissions / effluents generated by port activities?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>56.3%</td>
<td>61.1%</td>
<td>33.3%</td>
<td></td>
</tr>
<tr>
<td>1.55</td>
<td>Wastes produced in the port?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>56.3%</td>
<td>88.3%</td>
<td>11.1%</td>
<td></td>
</tr>
<tr>
<td>1.56</td>
<td>Cargo loaded / unloaded?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>56.3%</td>
<td>83.3%</td>
<td>16.7%</td>
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<tr>
<td>1.57</td>
<td>Premises and land?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>56.3%</td>
<td>72.2%</td>
<td>27.8%</td>
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<tr>
<td>1.58</td>
<td>Investment and expansion plans?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>56.3%</td>
<td>72.2%</td>
<td>22.2%</td>
<td></td>
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<tr>
<td>1.59</td>
<td>Energy use and energy conservation?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>56.3%</td>
<td>66.7%</td>
<td>33.3%</td>
<td></td>
</tr>
<tr>
<td>1.61</td>
<td>Public relations?</td>
<td>NO</td>
<td>O</td>
<td>()</td>
<td></td>
<td>56.3%</td>
<td>72.2%</td>
<td>27.8%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Palantzas, Wooldridge, Naniopoulos, Theofanis and Boile, 2006

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BEST PRACTICE: PANYNJ Utility Management System (1/11)
Port Elizabeth Newark UMS Database

Source: Danko, R. “PANYNJ UMS”, Presentation to NJ Common Ground Alliance Meeting, CAIT, October 3rd, 2007

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BEST PRACTICE: PANYNJ Utility Management System (2/11)

EWR UMS Database

Source: Danko, R. “PANYNJ UMS”, Presentation to NJ Common Ground Alliance Meeting, CAIT, October 3rd, 2007

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BEST PRACTICE: PANYNJ Utility Management System (3/11)
Conceptual System Steps

Data Collection -> Mapping

Data Maintenance -> Data Loading

Data Loading -> Data Distribution

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BEST PRACTICE: PANYNJ Utility Management System (4/11)
Utility Mapping Concept Design

Source: Danko, R. “PANYNJ UMS”, Presentation to NJ Common Ground Alliance Meeting, CAIT, October 3rd, 2007

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BEST PRACTICE: PANYNJ Utility Management System (5/11)
Utility Mapping Process (1/2)

1. UMS
   - Orthophoto
   - Base map
     + Electric, Comm
     + gas, fuel, water, TDEC, Sewer, Storm
   - Historical file conversion
   - Preparation of Verification Drawings

2. CSG
   - Field verification of historical information
   - As-Built Survey
   - Draft Survey Drawings
   - CSG Team Field Verifies/Field Surveys information
   - CSG stores drawing on CSG Server
   - UMS team adds attributes to CSG Verified drawing
   - UMS team publishes drawing to UMS Viewer

3. UMS
   - AutoCAD
   - Enter of Attributes
   - Publish to Viewer

Source: Danko, R. “PANYNJ UMS”, Presentation to NJ Common Ground Alliance Meeting, CAIT, October 3rd, 2007

Center for Advanced Infrastructure and Transportation
BEST PRACTICE: PANYNJ Utility Management System (6/11)
Utility Mapping Process (2/2)

Source: Danko, R. “PANYNJ UMS”, Presentation to NJ Common Ground Alliance Meeting, CAIT, October 3rd, 2007

Center for Advanced Infrastructure and Transportation
BEST PRACTICE: PANYNJ Utility Management System (7/11)

Utility Mapping - Data Loading Process

1. Identify sources of information
   - Label each feature
   - Prepare dwg for Verification
   - Collect Attribute values

2. Field verify features shown on UMS Drawing
   - Draft Verified features onto verification drawing
   - Store dwg on CSG Server
   - Provide copy of dwg to UMS

3. Enter drawing information from verified drawing into UMS
   - Enter Attributes collected in steps 1 and 2 into UMS
   - Publish drawings and attributes to viewer

Source: Danko, R. “PANYNJ UMS”, Presentation to NJ Common Ground Alliance Meeting, CAIT, October 3rd, 2007

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BEST PRACTICE: PANYNJ Utility Management System (8/11)
Utility Mapping – Data Maintenance Process

1. UMS Request for Survey
   • Traditional Request for Survey
   • Construction Inspection initiated Survey request

2. CSG does field survey
   • Drafts surveyed features
   • Delivers dwg to requestor
   • Updates Utility Base Map
   • Stores dwg on CSG Server
   • Provides copy of dwg to UMS

3. Enter new drawing information from surveyed drawings into UMS
   • Collect Attributes/enter into UMS
   • Re-publish drawings and attributes to viewer

Source: Danko, R. “PANYNJ UMS”, Presentation to NJ Common Ground Alliance Meeting, CAIT, October 3rd, 2007
BEST PRACTICE: PANYNJ Utility Management System (9/11)
Utility Mapping - Data Access Approach

Method 1:
Design contacts CSG person at facility

Method 2:
Design uses UMS tools to request a drawing

Source: Danko, R. “PANYNJ UMS”, Presentation to NJ Common Ground Alliance Meeting, CAIT, October 3rd, 2007

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**BEST PRACTICE: PANYNJ Utility Management System (10/11)**

Utility Mapping – Accuracy Assignment - ASCE Standard quality level

**Level A:** Precise horizontal and vertical location of utilities obtained by actual exposure, “as-Built” (Test Holes/Test Pits) (PA Code EXSV)

**Level B:** Approximate horizontal Information obtained through application of appropriate surface geophysical methods (e.g. toning) (PA Code EXTN, OSTN)

**Level C:** Horizontal information obtained by surveying and plotting visible above-ground features (PA Code EXUV, OSUV)

**Level D:** Horizontal information derived from existing records or oral recollections (PA Code EXUV, OSUV)

*“Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data” American Society of Civil Engineers, July 24, 2001*

Source: Danko, R. “PANYNJ UMS”, Presentation to NJ Common Ground Alliance Meeting, CAIT, October 3rd, 2007

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BEST PRACTICE: PANYNJ Utility Management System (11/11)
Utility Management System Unit

Source: Danko, R. “PANYNJ UMS”, Presentation to NJ Common Ground Alliance Meeting, CAIT, October 3rd, 2007
CONCLUSIONS

• AM is gradually adopted by the port industry as an integrated strategy for this asset intensive industry
• Port management typology, PA mission and specific conditions of each port influence vastly AM goals, structure and implementation.
• Integrating AM system with EMS can provide synergies, save resources and lead the PA into sustainable development strategy
• Best practices from other sectors of the transportation industry can be exploited
• Given the latest developments in port operations and the involvement of the infrastructure investors, the issue of the concession arrangements should be reconsidered in view of adopting a life cycle approach for port infrastructure management and financing