Relating port performance to levels of capability maturity

A comparison of the performance of different ports at stages of vessel handling: How this can be related to a port capability maturity model to identify potential investment opportunities?

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Capability Maturity is a business model that helps people assess the current effectiveness of their business and ascertain what capabilities they need to acquire next in order to improve their performance.
Presentation overview

The role of performance measurement in capability maturity

Overview of our work to measure port performance

Conclusions - Can the measures of performance be related to port capability and inform investment decisions?
Performance measurement is integral to investment management cycle

**Performance management cycle**
- Measure performance
- Review
- Corrective action
- Day-to-day activities

**Strategic technology investment cycle**
- Identify tech. options
- Select investment options
- Strategic review
- Build/acquire implement

Current capability maturity

Increased capability maturity
Different levels of performance measurement

**Level 1 - Initial**
Typically operation is undocumented and in a state of dynamic change, tending to be *ad hoc*, uncontrolled and reactive.

**Level 2 - Repeatable**
Process discipline is unlikely to be rigorous, but where it exists, ensures that processes are maintained during times of stress.

**Level 3 - Defined**
Sets of defined standard processes established and subject to some degree of improvement over time.

**Level 4 - Managed**
Using process metrics, effective achievement of the process objectives evidenced across a range of operational conditions.

**Level 5 - Optimizing**
Continually improving process performance through both incremental and innovative technological changes/improvements.

Diagram:
- **Performance vs. Time**
  - Level 1: Unknown, highly variant delivery
  - Level 2: Continuous improvement
  - Level 3: Less variation, more consistent delivery
  - Level 4: Control is evident
  - Level 5: Step change in capabilities
Our work to measure port performance

We are exploring how far we can go independently of any port involvement:
• what metrics can be produced?
• how reliable are the metrics?
• can they be related to port capability maturity?

We have used a variety of data sources

Process models of Port Activity

Geofenced top 2500 ports, berths, terminals anchorages, globally

Over 5 years of detailed vessel voyage data for each vessel in the global fleet
Our work to measure port performance

Data has been gathered globally for every vessel every day for over five years.

Artificial intelligence was used to identify geographic areas of interesting activity

- Anchorages
- Terminals
- Berths
- Windfarms
- Holding patterns
Our work to measure port performance

Detailed vessel-to-vessel interactions

Vessel activity identified
Our work to measure port performance

Geo-fenced top 2,500 ports, dock, terminals, berths and anchorages globally
Review of our research into port performance

Further Artificial intelligence generated geographic areas where interesting activity occurs

Areas of interest English Channel, Antwerp and Rotterdam
Example – Dover and Dunkerque RoRo service

- We will look at the vessel Delft Seaways, one of the three vessels running the service
- Time period April 2017 to March 2018
- Metric is visit duration

Metric explored is visit duration from

Variation in visit duration of the three vessels

Delft Seaways
Dunkerque Seaways
Dover Seaways
Example – Delft Seaways - Dunkerque

Standard RoRo turnarounds

12 days annual service after the Christmas and New Year?

Longer regular weekly stops – bunkering?

Weekly stops are shorter during peak holiday periods
Comparison of the regular Delft Seaway visit durations in Dover and Dunkerque
Conclusions - What have we found so far?

Using open sources of data, earth observation data and satellite AIS, it is possible to create objective and comparative metrics on port operations down to the individual berth.

We can:
• see a range of vessel handling activities: towage and pilotage
• see how consistently each terminal and berth operates
• compare the handling of each vessel, type and size of vessel
• track and replay stages of an operation eg windfarm construction into operation and maintenance
• identify similar port operations handling the same and similar vessels and we can rank the turnaround times at each stage
• produce comparative indexes despite the inherent structural differences between ports
• detect step changes in performance and in some cases associate this with publicized investment

We cannot see information private to the operations:
• the root causes or further detailed information to explain the differences
• the details of the quantity of the cargo unloaded/loaded

NB. These gaps in knowledge are similar in nature to the gaps in independently produced benchmark measures in other sectors.

Next steps:
1. Increase the information we have on past and current investment projects
2. Look to team up with other interested organisations
Thank you for your time

If you are interested in any further information then please contact:

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