How to put KPIs at the centre of your terminal planning







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Background

The terminal challenge

The role of computer optimization and simulation

Applied Modeling Algorithms for terminals

Case study: European Terminal

Questions



BACKGROUND



Study aimed at supporting an impact assessment on: "Measures to enhance the efficiency and quality of port services in the EU"

This study was prepared by PwC and Panteia for the European Commission of the European Union, Directorate-General for Mobility and Transport.



Areas for improvement

- 1. Allocated Berthing Windows
- 2. Guaranteed turn-around times
- 3. Better demand planning
- 4. Better congestion management & prioritization
- 5. Improved balancing of port resources
- 6. Historic demand analysis and improved planning
- 7. KPIs average reporting rather than KPI spread

What the customers want:

- Speed: reduced time taken to service ships and cargo
- Reliability: consistency in port performance
- Flexibility: ability to provide alternative solutions when things go wrong or changes occur

Many customers would like to exercise more control over the port services they receive, including:

- Ability to reserve berthing windows so that scheduled services are not disrupted by unforeseen delays waiting for a berth;
- Ability to negotiate service contracts with the port authority or cargo handling company giving them a guaranteed loading/discharge rate or ship turn-around time;

3. Reliability of service is becoming more important with the move towards lean manufacturing and minimization of inventories. There are three main reasons why ports are often still unable to provide reliable services:

- · Peaking of demand and variability of demand:
- · Insufficient investment, resulting in shortages of capacity and co
- Poor integration of operations, including the deployment

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Better open two management is linked very much to the issue of flexibility (see below) but also reflects the way in value port managers define the services they provide. Often port service obligations are seen only in physical terms – to no ve an item of cargo from A to B – with no timeline or other indicator of service quality attached. This, plus the emphasis in port KPIs on average performance rather than performance spreads, is one of the reasons vely so lattic importance is still attached to caliability.



A mismatch between the capacities of different systems components in ports. Common examples are the mismatch between quay and yard capacities, and quay cranes which can handle cargo faster than the yard equipment supporting them; and

CASINO CHALLENGE



Casino Challenge

3 wheels



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TERMINAL CHALLENGE

Terminal Challenge 10+ wheels

THE ROLE OF COMPUTER MODELING AND OPTIMIZATION

Port and Terminal modeling and optimization designed to enable maritime professionals to maximize terminal through-put, optimize asset utilization, resource and infrastructure.

- Operational Decisions maximize terminal throughput by recommending and evaluating next best move
- Investment Decisions Enabling "What-if" questioning to simulate the effect and consequence of port investments
- Service Level Decisions enables decision rules to be constructed that ensure actions are taken in line with key performance targets
- ~ Reviews history, simulates the future and recommends today







THE ROLE OF COMPUTER MODELING AND SIMULATION

Port and Terminal modeling and simulation designed to enable maritime professionals to model the terminal, understand the constraints and improve terminal planning.

- Visualization create 2D and 3D models of the port facility
- Integration works alongside the TMS to enhance operational opportunities
- Simulation provides a means of evaluating port design improvements, maintenance shut downs, outages and design changes.
- Complements existing technology and provides further levels of improvements

The peaking of demand is largely outside of ports' control, but they can do more to plan for it, through analysis of past demand patterns, closer links to customers, integration of IT systems to obtain better real-time information on imminent ship arrivals, and provision of larger margins of reserve capacity.



Cirrus reviewed one European port with the objective of evaluating the opportunities for improving performance through the application of our Applied Modelling Algorithms, configured to put Key Performance Metrics at the center of the port planning system.

- Container Port
- ~155 vessel calls per month
- Vessel sizes range from 90m to over 350m in length
- Channel restrictions
- Using a TMS for container moves





WHAT IS THE OPPORTUNITY?





VARIATION IN MOVES PER HOUR



Better operational management is linked very much to the issue of flexibility (see below) but also reflects the way in which port managers define the services they provide. Often port service obligations are seen only in physical terms – to move an item of cargo from A to B – with no timeline or other indicator of service quality attached. This, plus the emphasis in port KPIs on average performance rather than performance spreads, is one of the reasons why so little importance is still attached to reliability.



CASE STUDY PORT TURN-AROUND TIME



WHAT IS THE OPPORTUNITY?





VESSEL ARRIVAL TO BERTH ANALYSIS





CASE STUDY TURN-AROUND TIME



KPIs often retrospectively measured rather than proactively managed

- Have complex interdependencies
- Can be over- or understated as a average measure

Operational consistency is important

What gets planned, gets managed

KPI		Operating	Planning
Through-put TEUs	TEUs processed from quay to gate	~	~
Vessel turn-around time	Total vessel dwell time from port arrival to port departure	~	✓
Vessel waiting time	Time from arrival in port to mooring at berth	×	✓
Cargo dwell time	Time cargo spends from being unloaded to leaving the gate	~	4
Crane Productivity	Number of moves per hour	✓	✓
Berth Productivity	Number of moves per hour	✓	✓
Truck Turn-around time	Time spent by a truck in port	~	~
Berth Occupancy	Berth utilisation	✓	✓



MANAGE CONSTRAINTS TO MAXIMIZE KPI'S



MANAGE CONSTRAINTS TO MAXIMIZE KPI'S





ONE PROCESS, ONE PLAN





Re-planning using Applied Modelling Algorithms



CONCLUSION

Computer optimization and simulation has a valuable role to play in the validation of operational strategy and can be successfully used to increase performance and customer value.

Speed: reduced time taken to service ships and cargo Reliability: consistency in port performance Flexibility: ability to provide alternative solutions when things go wrong





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THANK YOU

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