

Körber Supply Chain

# How to put KPIs at the center of your terminal planning



## Introduction

This paper has been written to provide terminal managers with an introduction to the power of using computer simulation and Applied Modelling Algorithms (AMA) to develop the best terminal operating plan.

Terminals are coming under increasing pressure to increase performance and maximize the potential of its real-estate to facilitate the movement of cargos in a timely fashion, create performance differentiation and increase customer value. To meet this demand terminals have made significant investments in terminal management systems to address improvement in operating efficiency, focusing on the efficient movement of the cargo in the terminal. This paper shows the value of looking to optimize the total vessel call, in particularly the value of putting port KPIs at the center of the vessel schedule to assist port performance in both operating and planning efficiency.

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# Contents

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<b>Introduction</b>	<b>2</b>
<b>KPIs the measure of success</b>	<b>4</b>
<b>A new way to plan your terminal</b>	<b>5</b>
<b>The value of putting KPIs at the center of the vessel schedule</b>	<b>7</b>

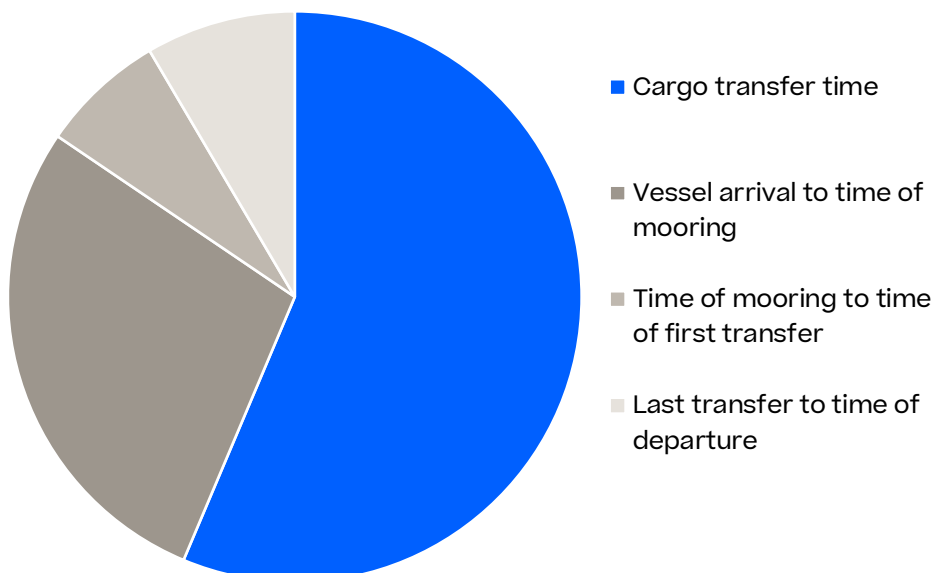
# KPIs the measure of success

Ports tend to be measured and compared based upon their throughput, the amount of commerce conducted inbound and outbound of the port. The intention of this paper is not to debate the merits of different KPIs as port comparators but the importance of putting them at the center of all planning decisions. It is, however, worth emphasizing that the ports function is to process cargo, be it a passenger a lump of coal or a container the ports reputation is based on its ability to do this well and reliably.

To maximize efficiency the port must drive improvements in both operating and planning, a recent study showed that of the total port dwell time 55% of that time was spent transferring cargo. The remaining 45% of the time represents a considerable opportunity to gain untapped benefits through optimization beyond crane moves. Only by addressing the vessel turn-around time can you truly start to address performance.

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

## % Vessel turn-around time





# A new way to plan your terminal

In our research, covering over 75 ports and terminals around the world, it has been quite a revelation to find that despite the importance of the vessel schedule, ports are either poorly served by technology or have been slow in adopting technology to construct, organize and plan the vessel calls. Manual systems dominated our research, namely the white board with spreadsheets being the nearest to a technology solution most ports get. Some ports operate on a “first come first served” basis, they do not attempt to plan the vessel, and focus on crane utilization, processing quay to gate, and see the vessel queue as an aid to ensuring cranes are well feed with cargo and therefore utilized. However, getting stuck behind an 18,000 TEU container ship may not be appreciated by other port customers! A recent report published by PWC #1 (Final Report, study aimed at supporting an impact assessment on the “Measures to enhance the efficiency and quality of port services in the EU”) showed port customers wanting the:the overriding priority is to produce product and make profits:

**“Ability to reserve berthing windows so that scheduled services are not disrupted by unforeseen delays waiting for a berth”**

The reasons for this lack of investment in scheduling tools may be varied, one concern that we do know exists however, is that a “person” needs to be in control and not a computer. In fact the two are not mutually exclusive, the vessel planner can still have the final word, but their decisions can be supported by a planning application, and dare I say, improved by Applied Modeling Algorithms

**“what gets planned, gets managed”**

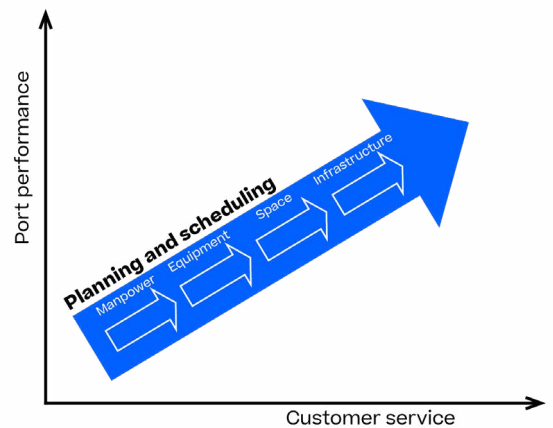
(AMA). Today, with the advent of AMA, the old adage “what gets measured gets managed” can finally be re-written as “what gets planned, gets managed”. This is because KPIs can become active in the planning process rather than being a post planning activity. That is to say no longer do you need to take an action and then measure its success, rather the action itself is controlled by the KPI so the outcome is predetermined.

Applied Modelling Algorithms are intelligent applications designed to optimize vessels and model the potential outcomes. They can be configured to take the KPIs into account when evaluating the best possible schedule. The act of scheduling actually needs to take into consideration a considerable number of parameters, for example:

- Operating hours permitting; the terminal may be limited to daylight working hours, the terminal may be in tidal waters. So vessel movements will need to be controlled in accordance with these safe operating conditions and shift working patterns.
- Traffic & H&S permitting; health and safety rules may limit the movement of some cargo of vessel types while other vessels are transiting to and from the port.
- Tugs and pilots availability; the vessel may require assistance to move to and from the quay, so tugs and pilots resource needs to be available.
- Berth availability; there must be free berth or quay space available for the vessel to berth and safe working distances achieved between neighboring vessels.
- Cranes, pipelines and equipment resource; the berth location or quay position must have available appropriate equipment for the movement of the vessel cargo.
- Inventory and space availability; cargo to be loaded must be available at the berth and conversely inventory storage capacity needs to be available for the unloaded cargo.

These factors all add a level of complexity to the decision-making, and each is linked to the port's KPIs. The management of these interrelationships, and optimizing all of them, is therefore central to achieving good KPIs and ultimately customer satisfaction. So having a tool that can make scheduling suggestions based on your predefined criteria is a great asset and still enables the scheduler the option of overriding the decision.

An intelligent scheduling application that supports the decision making process is also an essential tool to help maintain an optimized working plan. In a port, there are many criteria that can significantly disrupt the schedule, the main factor often being bad weather. This disruption impacts ETAs, requiring the plan to be changed accordingly. The considerable time needed to plan manually and efficiently leads to plans very quickly becoming sub-optimal. As a decision support tool, AMA is capable of fitting late vessels into the plan to minimize impact on all the other vessels and if other vessels are impacted this can be highlighted and the decision taken by the scheduler, thus continually maintaining optimization.



KPIs need to be achieved collectively and consistently in order to achieve customer satisfaction. PWC #1 report highlights customers desire for consistency of service, rather than excellent headline statistics which are not always achieved.

# The value of putting KPIs at the center of the vessel schedule

- Ensures you are taking KPIs into consideration for every vessel call and therefore increase the chances of hitting them
- Balance movement and flow rates from vessel to quay to yard to gate
- Maintaining assigned windows increases customer service
- Increases port efficiency, making use of existing assets to the full
- Flexibility manage schedule disruption, meet customers' needs and switch resources to accommodate more urgent jobs
- Give the port a competitive edge, improved quality and service experience

