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Terminal Planning: The Selection of Relevant KPIs to Evaluate Operations

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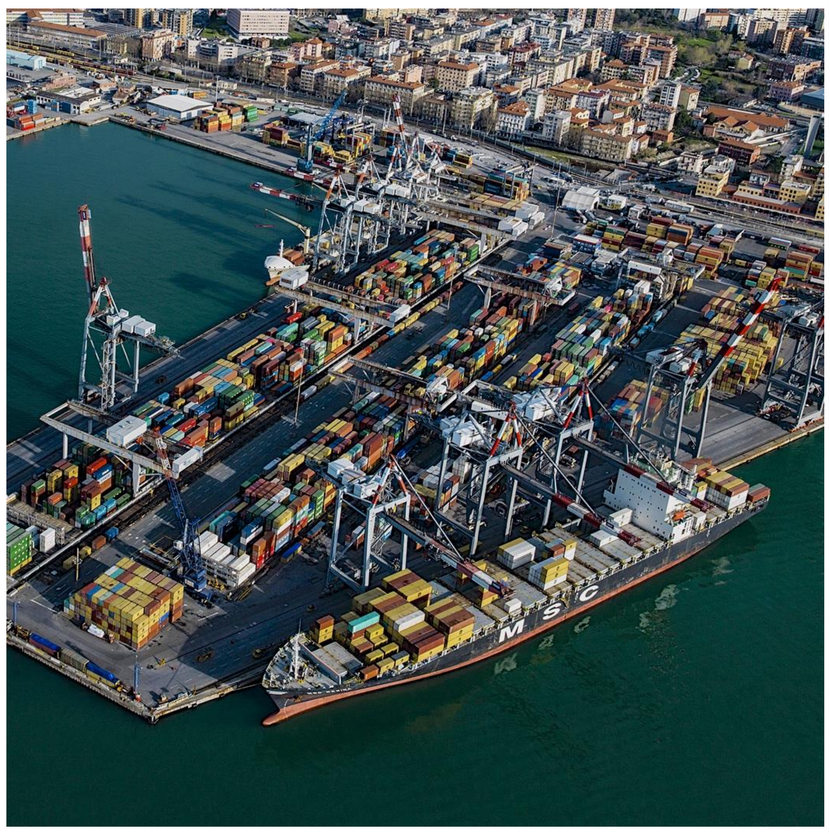

Purpose of the paper: This paper is to analyze the indicators required for terminal planning and compare them with existing KPIs used for measuring the performance of ports and terminals.

Methodology: The methodology consists of the following three phases: 1) Literature search about current KPIs used for evaluating the performance of the ports and terminals and current trends in port industry and marine transport. 2) Workshop, where experts from different stakeholder groups presented their views on relevant KPIs related to the evaluation of port performance and then discussed these KPIs to decide upon a common list of applicable KPIs. 3) The created list of KPIs was evaluated by experts who are specialized to simulate the operations of ports, terminals and other logistics centres.

Findings: Currently, financial performance indicators were seen as the most relevant indicators when evaluating the performance of a terminal or port. However, when planning a new terminal, its owner aims at improve its economic performance and typically financial indicators are not included in the simulation of a terminal operation. However, some of such indicators could be calculated as a part of the simulation already, even if it seems to be very difficult to include the some of the most relevant indicators such as return on investment as a part of the simulation.

Practical implications: There is a need to develop indicators considering the flexibility and adaptability factors and their trade off with the optimization (standardization) of some of the operational indicators. It is also feasible to include environmental indicators to the simulation model along with some financial indicators

Originality/value: The paper shows some development requirements for terminal simulation models. Even if the expert opinion was that especially financial and safety KPIs are difficult to include in current models, this is not perhaps the final truth. Models are developing all the time and can cope with added complexity. Financial KPIs are difficult to measure as costs and other related factors differ greatly between different countries and ports.

Table 1: A list of indicators for evaluating terminal performance. The indicators written in normal text are KPIs while the indicators written in italic are performance indicators. The values for indicators coloured in green are rather easily possible to obtain from simulation models, in yellow are possible to get from simulation if additional calculation model is programmed, but in red are very difficult to obtain from simulation despite the additional improvements for the model.

Operational	Financial	Quality	Environmental	Safety
Intermodal terminal throughput (volume)	Return on investment (ROI)	Turnaround time	Energy consumption per handled unit	Number of road accidents
Equipment utilization	Terminal's profitability	Waiting time	Carbon footprint per unit	Number of railway accidents
Gate utilization	Operating efficiency	Easiness of entry and exit from highways	CO, NOX, SOC, PM emissions	
Labour utilization rate	Operating revenues per unit	Easiness of entry and exit from rail network	Population exposed to high level traffic noise	
Storage area utilization	Operating benefits per unit	Delays produced (reliability) - road		
Rail track utilization	Direct jobs sustained from terminal activities	Delays produced (reliability) - railway		
Berth utilization	Indirect jobs sustained from terminal activities			
	Road and rail track maintenance cost			
Manoeuvring time	*Capital expenditures (CAPEX)*	*Unproductive time*	*Use of alternative fuels from total consumption*	*Accidents related to hazard cargo*
Service time	*Operational expenditures (OPEX)*			
Berthing time	*Corrective maintenance cost (equipment)*			
Idle time (equipment)	*Preventive maintenance cost (equipment)*			
	Corrective concrete structures maintenance cost			
	Preventive concrete structures maintenance cost			

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