Green Inland Ports

Good Practices

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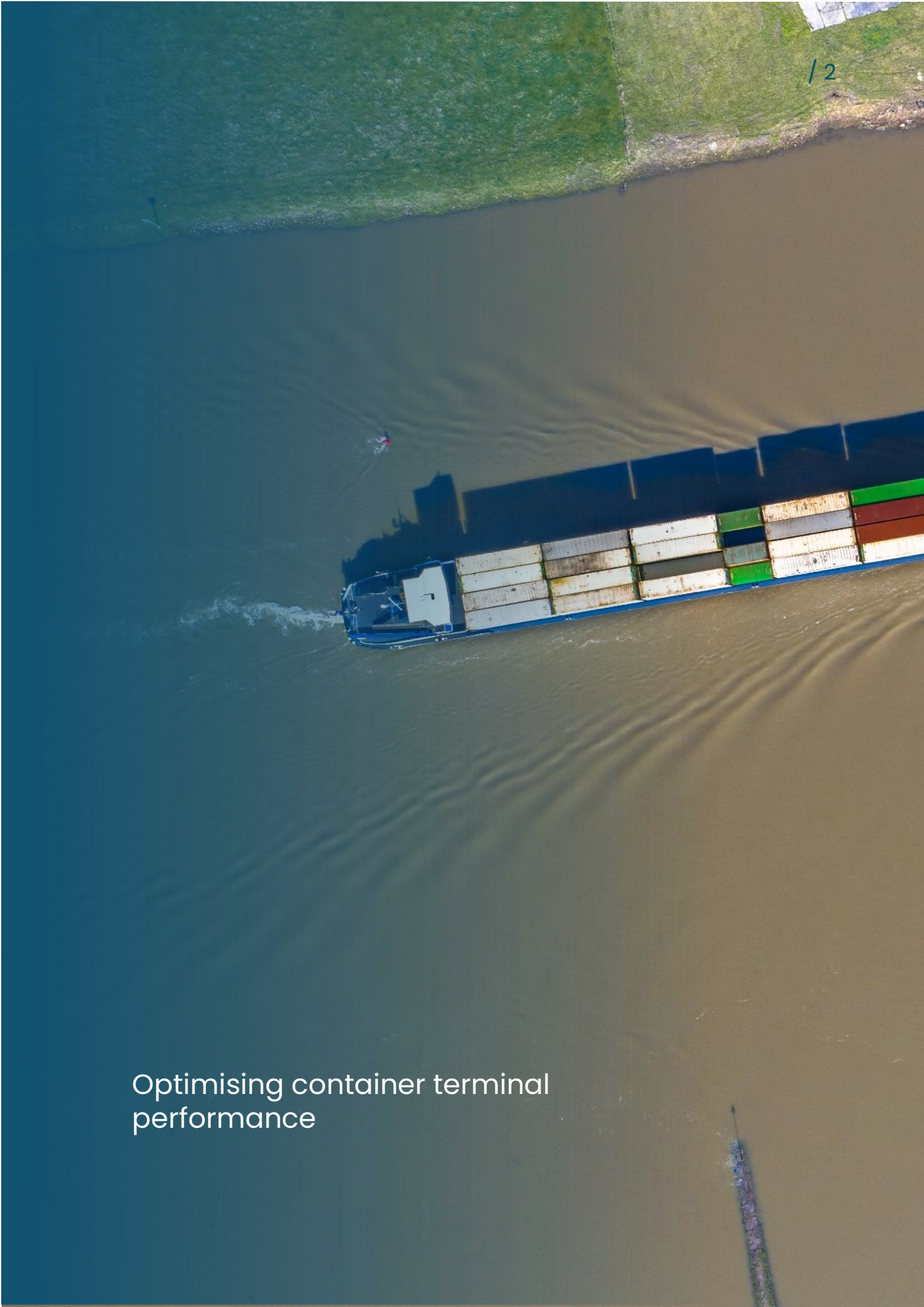

Optimising container terminal performance

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1.1 Description

The major influencing factor of port productivity is the cycle time for loading and unloading of vessels, which includes multiple activities that require various pieces of equipment. Lack of equipment availability, caused by factors such as waiting times, can lead to delays and, consequently to lower productivity levels (Paramita, A. D. & Vanany, I., 2019). Wang, L. & Zhu, X., (2019) have carried out an analysis for rail-truck intermodal terminals on the most efficient container loading sequence with the lowest handling time and container reshuffling. While this analysis may not have been conducted on inland ports, it can still be considered to minimise energy consumption of the container handling process.

By minimising energy consumption from empty crane movements and reshuffling, inland ports can significantly reduce the total handling time and energy consumed. This optimisation not only streamlines operations but also lowers reshuffling times and energy costs. use. Through an algorithm, the most economic and eco-friendly container handling configuration can consequently be calculated.

1.2 Aim

There are several options to optimise the performance of a container terminal. The overarching goal is to decrease energy consumption and transportation costs through eliminating redundant parts of the port process. Lower energy usage reduces both operational costs and greenhouse gas emissions, as most power sources contribute to pollution or greenhouse gas emissions when consumed.

1.3 Terminals that apply software to improve operations

Multiple terminals worldwide apply new algorithms to improve terminal operations.

1.4 Stakeholders

Terminal operators can add software (with new algorithms) and hardware which result in more efficient port operations.

1.5 Voluntary or mandatory

Although these measures are voluntary, maintaining competitiveness often necessitates cutting costs and conserving energy wherever possible. More efficient operations are critical to achieving these objectives.

1.6 Realised/potential impact

Aisha, T. A. et al., (2020) proposed a new layout for a container terminal in a seaport which can improve sustainability of port activities by decreasing the distance between the berth and interface points and avoiding double handling. Findings reveal that for a case study port, the proposed layout can achieve a reduction of 46.5% of total transportation costs and 21.6% of emissions.

Budiyanto, M. A. et al., (2021) calculated the energy consumption of two different container terminals based on the number of movements and distance travelled by container-handling equipment. Even though it is nearly impossible to generalise all container terminals, this study shows that in general, container equipment such as cranes and reach stackers form a substantial share of the CO2 emissions within many container terminals. These emissions can be reduced by implementing this good practice.

1.7 Possible obstacles

- Financial Barriers: Developing an optimal port performance process, an optimal port layout or even acquiring a container yard in the vicinity are expensive actions. Renewing and modernising outdated port infrastructure, such as berths and equipment can also be time-intensive due to manufacturing constraints.
- Data Challenges: Optimising port activities can be a data intensive task. When other stakeholders, such as terminal operators, need to provide data, it may be hampered by difficulties in generating and integrating data from existing systems.

1.8 Key learnings

- By optimising the container (un)loading processes within port areas, a substantial GHG and air pollution reduction can be realised. However, it requires financial resources and prior research to optimise the (un)loading process or to realise a container yard to make the processes more effective and minimise unnecessary movements of equipment.
- For each port, the most effective way to optimise the (un)loading processes of container handling may differ based on the initial layout and availability of space within the port area. There is no one-size-fits-all solution.

1.9 Sources

Aisha, T. A., Ouhimmou, M. & Paquet, M., 2020. Optimization of Container Terminal Layouts in the Seaport - Case of Port of Montreal. *Sustainability.*

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