

INTERMODAL EVOLUTION. RETROFITTING HARDWARE AND EXPANDING IN EFFICIENCY





Dr. Eva Savelsber, Senior Vice President, INFORM, **Alex Van Winkel**, Director of Strategic Relations and Sales, INFORM, and **Matthew Wittemeier**, Director of Marketing and Sales, INFORM

There is a push in nearly all developed countries to move containerised cargo off roads and onto rail. This modal shift from road to rail is fueled by industry, consumer, political, and social pressures. While this is arguably a good outcome for nearly all stakeholders, at least one player, our intermodal terminal operators, are being moved into a direction where their operations must evolve to adapt to the increased volumes they are seeing today and that are being incentivised in the near future. In this article, we'll look at some of the core pressures behind the modal shift and how intermodal terminal operators can address the challenge of increased volumes most efficiently and cost-effectively.

UNDERSTANDING THE PRESSURES

A quick Google search of "rail vs truck which is better" returned over 49 million responses, and when you look at the first page of results (mostly reputable sources), it becomes clear that the primary advantage of rail vs. trucking is the significant cost and CO2 reductions possible.

According to the US Congressional Budget Office, the average cost to move cargo via rail was about 5.1 US cents per tonne-mile (3.3 Euro cents per tonne-kilometre) compared to 15.6 US cents per tonne-mile (10.2 Euro cents per tonne-kilometre) via truck. Furthermore, the report outlined that the external costs (e.g., road maintenance vs. track maintenance, congestion, etc.) were, on average, 7.5 times cheaper for rail over road transport.

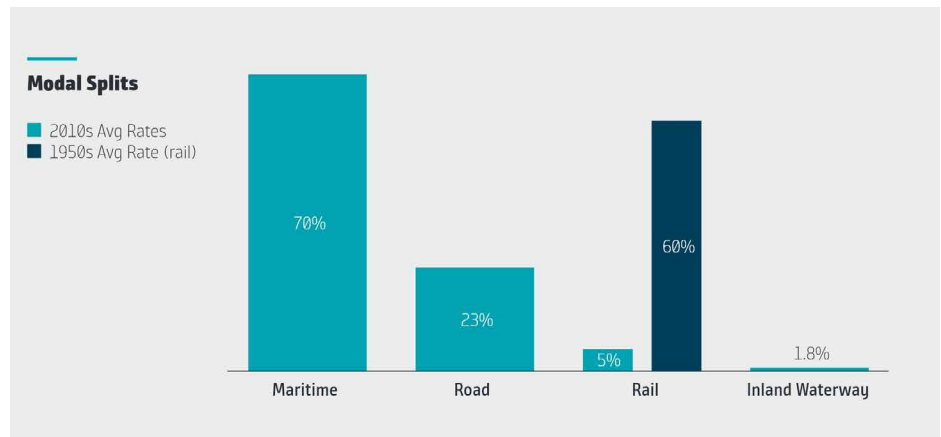


FIG 1. Modal Splits

Also, according to a German government calculation, in Europe, the average freight train emitted around 18 grams of CO2 per tonne-kilometre (12 grammes of CO2 per tonne-mile), which was 16 times better than the average truck, which comes in at 112 grammes of CO2 per tonne-kilometre (77 grammes of CO2 per tonne-mile).

But there are other factors at play here. In many developed countries, attracting and retaining long-haul truckers is a significant issue, with access to skilled labour at all-time lows. Increased trucking congestion at many maritime terminals is also fueling a move towards rail. With the sharp rise in e-commerce over the past decade, consumers are demanding lower-cost goods with low- or no-cost shipping, adding further pressure to margins in supply chains that were already tight. Since the start of COVID-19 in 2020, the supply chain has been front and centre on the world stage and socially, Western societies are adding a lot

of pressure onto logistics providers to improve their operations, build in transparency, focus on environmentally greener transport methods, and improve working conditions for supply chain "essential workers."

Combined, all of the pressures have created the perfect storm, so to speak, pushing politicians to prioritising cargo movement over rail and subsequently making funding available for stakeholders who are ultimately affected by these new changes. Over the past 10 years, the modal split of freight transport across Europe has largely remained unchanged at roughly 70 per cent maritime, 23 per cent road, 5 per cent rail, 1.8 per cent inland waterways, and 0.2 per cent air. Compared to the 1950s, when rail accounted for nearly 60 per cent of freight movements in Europe, this is a marked decline (see figure 1). The European Union (EU) plans to double rail's modal share by 2030, which would equate to a nearly 6 per cent increase in freight volumes



per year for intermodal terminals to accommodate.

INTERMODAL TERMINALS MUST EVOLVE

What is great news for consumers, shippers, and politicians translates into challenges for our intermodal terminal operators. They will need to evolve to accommodate the desired growth in the industry at a significant rate. To help them, government funding is available for projects across their terminals, including purchasing land, construction, improvement of rail

track systems, improvement of road infrastructure, retrofitting of existing handling equipment, and the purchase of new handling equipment. All of these avenues are proven ways to add capacity and improve operational efficiency for terminal operations. However, we want to focus on the two that show the strongest return on investment (ROI) potential in our calculations – retrofitting and expanding efficiency.

WHY YOU SHOULD RETROFIT

Compared to the other options for expanding capacity and improving

ABOVE

KTL Kombi-Terminal Ludwigshafen GmbH intermodal terminal, Ludwigshafen, Germany.

operational efficiency, retrofitting provides the strongest ROI for three reasons:

- **Builds on Existing Investments** – retrofitting leverages your existing equipment investments, allowing for a continued ROI on existing infrastructure assets.
- **Fast Project Cycles** – retrofitting is the quickest path to going live, starting the return period quickly. Lead times for new hardware are measured in months, and for cranes, years. Skipping new hardware

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investments drives the time to go-live down decisively. Furthermore, retrofitting existing assets is much quicker than building up and commissioning new hardware.

- **Risk Is Compartmentalised** – any project on your terminal has some degree of risk, and retrofitting is no exception. However, the risk is compartmentalised for two reasons. One is that you're not making significant physical changes to your terminal's steel and concrete. Changes that aren't effective (while unlikely) can be rolled back more easily to a proven operating structure. The second is that you're changing smaller elements of your operation. The risk of compounding issues is smaller.

There are multiple paths for retrofitting that can be explored. Existing cranes can be retrofitted with renewed drives and/or cranes can be upgraded on your path toward automation. Retrofitting renewed drives will lower maintenance OPEX costs, provide a better overall performance, and lighten the environmental footprint of the lift hardware. These are the basics, but they start to paint the picture. Talk to your hardware manufacturer to get a fuller picture.

When we look at retrofitting crane hardware to provide automation, there is a prominent hardware provider with a solid stepwise solution. The first step is to move operators from the crane cabins to a remote operating station centrally located. Typically, this is done in a one-to-one format. Over time, more elements of the crane's operations can be automated, and eventually, you move to a one-to-two or even a one-to-three operator-to-crane configuration for operations, streamlining your ops. Aside from the obvious cost savings, there are immediate benefits to the lift staff's workplace health and safety. Both of which are positive outcomes for the humans in the equation.

EXPANDING EFFICIENCY

Like retrofitting, expanding efficiency is a quick path to improving operational efficiency and expanding a terminal's handling capacity. Expanding efficiency looks at the other side of the hardware/software equation and focuses on improvements that can be reached through software investments. The same advantages that are highlighted above for retrofitting hardware apply to software-based projects: you're building efficiency into your existing investments (including your new retrofit investments), the project timeframes are fast (measured in months as opposed to years), and through dedicated add-on optimisation modules, the risk is highly compartmentalised. Finally, the cost of software-based projects is comparatively small, even when compared to retrofitting, meaning a lower starting point for your ROI calculations.

In essence, optimisation solutions provide terminals with the ability to "milk their assets," squeezing the most out of their infrastructure investments – both concrete and steel. Smart AI and Operations Research (OR) algorithms can consider a vast amount of information in real-time. Compared to a human operator, an algorithm can process hundreds of transactions with dozens of variables without breaking a sweat. As much as 90-95 per cent of daily operations can be automated or supported in a more manual operation, with dedicated add-on optimisation modules, freeing up human operators to focus on the 5-10 per cent of decisions that require a human touch. This allows operators to move from being purely reactive to managing their operations in a proactive, exception-based way, significantly improving performance and bottom lines. Optimisation can be applied to yard stacking, horizontal transport operations, lift equipment, crane operations, and train load planning.

BUILDING OUT YOUR CRANES

If we continue the logic of improving crane operations, after retrofitting your existing cranes with renewed drives and implementing remote operation stations, the cranes will be able to move into a semi-automated mode of operation. To achieve this, you will require a software solution to sequence job orders. The typical terminal operating system (TOS) will build a job sequence, but it is almost guaranteed to be a first-in / first-out logic which is highly inefficient. Instead, an optimised work queue should be built for each crane that is online, considering the crane's real-time position, existing workload, and handling capabilities and matching these to the operation's desired optimisation goals (e.g., reduce empty travel, maximise performance, prioritise customer X, etc.).

DELIVERING OPTIMISATION

INFORM is a proven partner in delivering optimisation powered by AI and OR. With proven solutions for both maritime and intermodal terminal operators, we have a 25-plus-year track record of delivering operational efficiency for our customers. For intermodal terminal operators globally, we deliver our market-proven optimisation as an add-on to their existing TOS (again reducing cost, complexity, and time to market – think retrofitting your existing TOS). In Europe, we also have a bespoke TOS, our Syncrotess Intermodal TOS, which is built with our market-leading optimisation at its core. Finally, for those operators who have older equipment that hasn't necessarily got the in-built "smarts" or equipment control system (ECS), INFORM can help deliver this advanced component into your technology stack. Any of these approaches fit the existing funding models currently available in Europe. If you are not sure, you should reach out to our helpful team and have an obligation-free

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conversation. We're more than happy to point you in the right direction once we understand your challenges and goals.

THE WEAKEST LINK

We have routinely spoken about the need for investment in our hinterlands. While your maritime cousins often attract the attention with their shiny new investments in technology, the supply chain is only as strong as its weakest link. The current investment into intermodal terminals is a welcome change for the industry allowing the supply chain to improve collectively. As intermodal operators move down this path, it is important to not only try and emulate their bigger maritime cousins, but to look for proven vendors in the intermodal space as the small differences in operations are important details that lead to big differences in your bottom lines.

ABOUT THE AUTHORS:

Dr. Eva Savelsberg is Senior Vice President of INFORM's Terminal & Distribution Center Logistics Division. She specialises in optimisation software that renders a wide range of operational processes which are more productive, agile, and reliable. Eva is also a lecturer at the University of Aachen (RWTH), where she received her Ph.D. in Mechanical Engineering in 2002. Eva has published five books and over 40 papers on innovation in freight transportation.

Alex van Winckel is Director Strategic Partnerships and Sales at INFORM's Terminal & Distribution Center Logistics Division focusing on how to drive optimisation in the logistics sector. Starting his career with INFORM in 2008, he has acquired 15 years of logistics industry knowledge working on projects for HHLA, UK Mail, Hermes, Posten Norge, and APM Terminals.

Matthew Witte-meier is Director Marketing and Sales at INFORM's Terminal & Distribution Center Logistics Division, where he's become a thought-provoking contributor to many industry publications and conferences. He's co-author of the multi-award winning 2038: A Smart Port Story – a novella about the future of technology and the social challenges it may bring.

ABOUT THE ORGANISATION:

INFORM specialises in AI and optimisation software to improve operational decision-making. Based in Aachen, Germany, the company has been in the optimisation business for 50 years and serves a wide span of logistics industries, including maritime, intermodal, and inland terminals. With a broad range of standalone and add-on software modules, INFORM's unique blend of algorithmic-based software expertise, rich industry experience, and big-world thinking delivers enormous value for their customers.