



PSA SINGAPORE: DRIVING A SMARTER, SUSTAINABLE PORT ECOSYSTEM



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Amid growing global supply chain complexities and intensifying climate challenges, the port and logistics industries stand at a pivotal crossroads. The path forward is clear: to remain resilient, efficient and relevant, we must embrace digital transformation not merely as an option, but as a core strategy.

At PSA Singapore (PSA), home to the world's largest transshipment hub, we are proud to lead the evolution of global port operations, driving transformation through purposeful innovation, smart digital solutions, and an unwavering commitment to sustainability. Over the years, digital technology has reshaped our port operations – from vessel arrivals and container handling to truck trip planning. Digital solutions are now deeply embedded in PSA's DNA. Yet, these advancements go beyond productivity and efficiency; they are about future-proofing the supply chain ecosystem for generations to come.

THE iWX PLATFORM: A DIGITAL LEAP TOWARDS INTELLIGENT CONTAINER REUSE AND RETURN

A key example of digital transformation at PSA is the launch of Intelligent Warehouse Exchange (iWX), a digital platform designed to streamline container reuse and return operations. Developed by PSA, it optimises workflows while concurrently enhancing coordination and communication among stakeholders – including ports, warehouses, trucking companies, and shipping lines.

Traditionally, a significant number of trucks make multiple trips between warehouses



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(including PSA's Keppel Distripark) and external depots in western Singapore (Penjuru and Tuas). This inefficiency in container movements and utilisation not only results in operational waste but also contributes significantly to carbon emissions. iWX offers a smarter, more sustainable alternative.

By harnessing real-time data integration, artificial intelligence (AI), and machine learning, iWX streamlines container reuse and return workflows. It facilitates the reuse and exchange of containers by matching tenants needing to export cargo with returning empties, thereby reducing unnecessary trips. When reuse is not feasible, iWX redirects empty containers to the nearest depot, significantly cutting travel distances.

iWX has immense potential to drive both operational efficiency and environmental sustainability, saving more than 1,000 tCO₂e. Its capabilities will expand further with the PSA Supply Chain Hub @ Tuas, due in 2027, advancing our vision

for a more integrated and seamless cargo flow across Singapore.

OPTETRUCK: SMARTER TRUCKING FOR EFFICIENCY AND A GREENER TOMORROW

Digital innovation is also reshaping Singapore's road haulage sector – a major contributor to carbon emissions due to frequent empty truck trips and underutilised resources. To address fragmentation and inefficiencies, PSA developed OptETruck, a cloud-based transport management platform that streamlines truck trip planning and reduces waste. Globally, trucking accounts for 34 per cent of transport sector emissions, underpinning the urgency of such innovation.

Through extensive studies, interviews, and collaboration with government agencies and trade associations, PSA identified key operational pain points and co-developed OptETruck to address them. Powered by AI and data



analytics, it provides a common platform for truck scheduling and coordination, streamlining operations across ports, logistics facilities, and container depots, and overcoming the fragmentation of traditionally siloed operations.

The platform enables hauliers to automate scheduling, pool resources, and reduce empty trips. The results have been remarkable. Haulier companies using OptETruck have reported over 50 per cent reduction in empty truck trips. This translates to annual savings of 10,000 tCO₂e, equivalent to planting 300,000 trees each year.

Beyond emissions reduction, OptETruck supports small and medium enterprises (SMEs) in the logistics industry by improving their competitiveness. In a sector often challenged by limited resources, the ability to share assets and optimise routes levels the playing field and helps these businesses

pursue their sustainability goals. Recognised with the Excellence Award at the 9th Annual Singapore OpenGov Leadership Forum, OptETruck is more than just a technological breakthrough – it is a catalyst for sustainability and industry collaboration.

Most importantly, OptETruck is part of PSA's broader vision to build an intelligent logistics and supply chain ecosystem. Together with our other digital tools such as SmartBooking™ and iBOX™, we are digitally connecting terminals, depots, hauliers, and logistics facilities to enable end-to-end visibility and coordination. This ecosystem approach is how we envision the future of logistics – one that is collaborative, data-driven, resilient, and sustainable; one that supports Singapore's vision of a low-carbon logistics ecosystem and sets a new benchmark for AI adoption in the transport and logistics sector.

OPTEMODAL: SEAMLESS SEA-AIR INTERMODAL CONNECTIVITY

Building on these innovations, PSA and Cargo Community Network (CCN) recently launched OptEModal, a next-generation digital platform that enables faster, smarter, and more coordinated sea-air intermodal transshipment.

Co-created with maritime and air cargo stakeholders, OptEModal integrates real-time data streams across PSA terminals, ground handlers, and airline partners to enable seamless cargo movement between vessel and aircraft, typically within 24 hours of arrival. Its capabilities include multi-party visibility, AI-driven Estimated Time of Arrival (ETA) predictions, proactive delay identification, and smart flight recommendations.

This digital corridor, which provides end-to-end tracking, simplifies complexities, reduces costs, and enhances reliability

for shippers and logistics providers, supporting high-value and time-critical industries such as electronics, healthcare, and e-commerce. OptEModal represents a blueprint for the future of global logistics, where connected nodes come together to form intelligent, adaptive networks that drive efficiency and resilience across supply chains.

OPTEVOYAGE: OPTIMISING PORT CALLS AND DRIVING EFFICIENCY AT SEA

Efficiency doesn't stop at the shoreline. As part of our broader digital transformation, PSA is extending innovation seaward through OptEVoyage, a solution aimed at reducing bunker fuel consumption and emissions by optimising vessel arrivals.

Traditionally, vessels race to port only to end up waiting at anchorage. OptEVoyage flips this conventional model on its head by introducing the concept of Agreed

Berthing Time (ABT). This enables shipping lines to plan their voyages at optimal speeds, arriving just in time when the berth is ready. This reduces unnecessary fuel burn and vessel bunching.

The scale of our OptEVoyage has expanded significantly, growing to more than 3,000 port calls across more than 150 services. The impact has been substantial: over 180,000 metric tonnes of bunker fuel saved and nearly 564,000 tCO₂e emissions reduced in a single year.

Beyond the environmental benefits, this initiative enhances PSA's service reliability and reinforces Singapore's position as a smart, sustainable global maritime hub.

INNOVATION AS A CATALYST FOR INDUSTRY TRANSFORMATION

Initiatives like iWX, OptETruck, OptEModal, and OptEVoyage reflect a clear strategic purpose: to drive meaningful transformation across the port, supply chain, and

logistics sectors and build greater resilience for the future. At PSA, we are committed to working closely with our stakeholders to innovate, collaborate, and lead the industry into a new era defined by operational excellence, sustainability, and agility.

Our approach is rooted in real-world impact. Every digital solution we develop is designed with tangible outcomes in mind – reducing carbon emissions, improving asset utilisation, enhancing berth planning or increasing transparency across the supply chain. In doing so, we are not only elevating our own performance but also helping to catalyse progress across the wider logistics ecosystem.

THE JOURNEY AHEAD

As we continue our journey of innovation and digital transformation, we remain firmly anchored in collaboration, sustainability, and agility.

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