Green Inland Ports

Good Practices

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Using sensors and data to optimise infrastructure and traffic flows

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1.1 Description

Hamburg Port Authority (HPA) uses technology to optimise traffic flow and infrastructure usage within the port area of Hamburg. The main goal is to expand to encapsulate the complete flow of goods.

Optimum data capture and rapid information sharing allow logistics managers, carriers and agents to select the most efficient transport means for logistics flows (Hamburg Port Authority, n.d.). SmartPORT is divided into two different topics, namely SmartPORT logistics and SmartPORT energy. Since smart energy usage has already been addressed in other good practices (see for example LED and smart lighting and Energy management software) this good practice will focus on smart logistics.

The main elements of SmartPORT logistics are as follows (Hamburg Port Authority, n.d.):

- **Navigation in real-time:** HPA combines various services and functions to streamline traffic flows., These include personalised navigation, real-time traffic updates and information regarding available parking and infrastructure.
- **Intelligent railway point**: Frequently used points on the harbour railway are fitted with sensors that transmit data to a central IT system in real-time. The sensors monitor the condition and wear of key operational intersections, allowing early detection of maintenance needs and minimising downtime.
- **The mobile all-purpose sensor:** A mobile GPS sensor wirelessly forwards data to HPA IT system. The sensor can also measure temperature, wind speed and direction, air pollution and the flow of the river.
- **Smart maintenance:** By using mobile devices, measurement data is relayed directly to downstream IT systems, where it can be processed, stored, and managed. This approach increases the efficiency and effectiveness of maintenance tasks.
- **Virtual depot:** To avoid truck journeys with empty containers, a virtual depot has been developed to optimise the movement of empty containers between packing companies. A cloud-based system informs participating operators which containers are to be delivered back to the depot. The packing company then requests these directly, which leads to no more unnecessary empty trips to the depot.
- **Port monitor:** This tool allows the port authority to keep all stakeholders in the port up-to-date. A variety of information is centrally gathered and can be accessed remotely, such as vessel positions, water level data, berths, current construction sites, planned dives and bridge heights and widths.

- **Parking for professionals:** A system helps to detect and manage parking spaces, which should result in optimum utilisation of existing and future truck parking spaces within the ports.

1.2 Aim

The Hamburg Port Authority (HPA) seeks to boost port efficiency through intelligent traffic and goods management. This has many benefits, such as GHG reduction, air pollutant reduction and noise reduction through fewer kilometres per vehicle for both cargo and other flows in and around the port area, and better management of congestion through real-time traffic information. Through SmartPORT applications, HPA is achieving sustainable economic growth and benefits for its customers and the people of Hamburg, while minimising its environmental impact (Hamburg Port Authority, n.d.).

1.3 Ports implemented a system of smart applications

- Port of Hamburg

1.4 Stakeholders

- Port authority: The port authority is responsible for the infrastructure within the port area. This means that they are responsible for gathering data, analysing it, data visualization (information must be accessible by the users of the port), and the corresponding IT systems that are necessary within this good practice.
- (Handling) companies within the port area: These parties can benefit from information that would become public through this good practice. The companies can choose if they would like to use this and become more cost-efficient.

1.5 Voluntary or mandatory

For port authorities, it is voluntary to implement such technology, however ports need to comply with the environmental goals found in the EU's Green Deal (European Commission, n.d.) and the steps need to be taken, within which this technology could be an opportunity. For third parties, such as (handling) companies and suppliers located within the port area, it is voluntary to use this technology, but it can lead to many efficiency benefits that are described in the paragraph entitled "Description".

1.6 Realised/potential impact

According to United Nations ESCAP, (2021), the SmartPORT project has many benefits for the Hamburg Port Authority. A reduction of port operation costs of 75% was achieved and port congestion has reduced by 15%.

1.7 Possible obstacles

- Real-time data transmission and live communication rely on the Internet of Things (IoT)—a network of sensor-equipped devices that exchange information amongst themselves and the cloud. Consequently, a robust, high-speed (ideally 5G) network must be in place within the port area to support these IoT systems.
- Organisational readiness is very important, with both port authority staff and partnering companies needing to adopt new processes, technologies, and working environments (Innovation News Network, 2019).

1.8 Key learnings

- Digitalisation has a large influence on the traditional port industry to reshape its business and make the industry more efficient and sustainable (Innovation News Network, 2019).
- To make it a success, it is crucial that employees within the organisations that are being affected by these technological advances are willing to adapt to and make use of this new technology to reach maximum efficiency.

1.9 Sources

European Commission. n.d. Mobility Strategy, https://transport.ec.europa.eu/transport-themes/mobility-strategy_en.

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