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CONTAINER TERMINALS AS KEY COMPONENT OF SUPPLY CHAINS

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This paper explores the role of container terminals in global supply chains and the growing importance of such infrastructure facilities for the Ukrainian economy. Key topics include the functions of container terminals, improving supply chain efficiency, reorganizing logistics routes during wartime, and developing Ukraine's transport infrastructure.

Modern supply chains are characterized by their containerization. Since supply chains usually combine several modes of transport, the use of containers allows you to significantly reduce the time for their reloading and increase the safety of the cargo. All this affects the overall time of the supply chain and its cost.

Container terminal is the main infrastructure facility through which container flows pass. In general, it is a specialized logistics facility for handling cargo in containers, which ensures their reloading, storage and sorting between different modes of transport, in particular sea, road and rail. Such terminals are key components in supply chains that ensure the uninterrupted movement of containers and goods between continents [1].

Modern world trade would not be possible without such infrastructure. The standardization of shipping containers, founded by Malcolm McLean and Keith Tantlinger in the 1950s, revolutionized logistics - it allowed for faster, safer and more efficient cargo handling and significantly reduced transportation costs. The world's largest container terminals are located in seaports such as Shanghai, Singapore, Rotterdam, since the majority of world cargo flows are carried by sea.

Along with container terminals located in seaports, there are so-called «dry ports» or logistics hubs. This is a land-based multimodal terminal that provides services similar to a seaport but without direct access to the sea.

On the basis of one logistics center, the cargo owner can receive a whole range of cargo handling services, including [2]:

- cargo handling and storage;

- loading and unloading of cargo into containers;
- bulk cargo handling and storage;
- customs clearance, inspection, packaging, marking;
- repair of container equipment and transport;
- freight forwarding services;
- banking / insurance / financial services;
- transport booking / brokerage services;
- cargo transshipment to other modes of transport and even delivery of cargo to the final destination.

There are currently over 250 dry ports operating in Europe, serving inland regions. This reduces the burden on seaports and promotes the development of inland waterway transport.

The realities of the Ukrainian economy in the last war years showed the feasibility of developing such infrastructure facilities. Before the war, the main cargo turnover was carried out precisely at seaports, and as life has shown, their complete or partial shutdown destroys almost all export and import logistics. Enterprises had to rebuild all supply chains, focusing mainly on land transportation routes and operating river ports. This significantly increased the load on communication routes, checkpoints and port facilities. To some extent, this was a catalyst for the development of dry ports and container terminals. Thus, in Vinnytsia region, a dry port was put into operation in 2024 [3]. The terminal was built by the Lemtrans group of companies with the aim of creating a logistics center between Odessa ports and Western countries. The appropriate railway infrastructure, container yard, warehouses and a weighing system were equipped on its territory.

A similar infrastructure facility appeared in the same 2024 in the Zakarpatskii region, mainly for the purpose of grain transshipment. The multimodal terminal is equipped with European railway tracks, which allow sending cargo to Romania, Slovakia and Hungary. Currently, this facility consists of a grain terminal, an oil processing terminal and a container yard with cranes.

In 2022, a modern container terminal «Mostyska» was built in Lviv region for handling container, general, grain and bulk cargo. The main logistical advantage of the terminal is the presence of a developed network of 1435 mm and 1520 mm railway tracks, which allows for unloading and loading trains from EU countries. The company's own locomotives perform the loading and unloading of wagons and all shunting operations, which makes it completely independent in planning and processing trains [4].

Over the three years of operation, the terminal has turned into a multifunctional logistics hub, which annually processes over 35,000 wagons

with various cargoes: containers, grain, bulk, metals, railway rails, cars, etc. Its key advantage is intermodality, which allows it to work effectively with all modes of transport.

Mostyska Container Terminal (CTM) became the first and so far the only terminal in Ukraine to receive the r2L certificate and became an official partner of RoadrailLink, a developer of innovative technology for piggyback transportation [5]. Thanks to the implementation of this technology, CTM gained the ability to work with a wide range of cargo, which guarantees fast loading and unloading, safe for the vehicle and cargo, due to the lack of contact with the wagon and the forklift. Among the key advantages of the technology are speed, loading one semi-trailer takes from 5 to 10 minutes, safety and environmental friendliness.

CTM also completed the construction of a modern covered warehouse with a total area of over 4,000 sq. m. The projected cargo turnover will be at least 100 thousand tons per year. The facility is divided into two separate warehouses, which significantly increases the terminal's capabilities for storing and reloading various bulk cargoes, including meal, grains, fertilizers in big bags and other goods.

Conclusions

The role of container terminals in supply chains is that they ensure efficient, safe and fast movement of goods between participants in the logistics network and from one mode of transport to another. Their presence in the multimodal transportation system minimizes time losses and allows for the formation of flexible transportation routes.

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