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Group of Experts on Benchmarking Transport Infrastructure Construction Costs

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Transport Infrastructure Construction costs:
Presentations of terminologies used

Terminology/Questionnaire on Benchmarking Ports Infrastructure Construction Costs*

Submitted by the Gdynia Port Authority (Poland)

I. Mandate

1. In accordance with its Terms of Reference, the Group of Experts is expected to complete its work within two years (2016-2018) and to submit a full report of its accomplishments (ECE/TRANS/WP.5/GE.4/2016/1). The Group of Experts shall assist in:

(a) Identify models, methodologies, tools and good practices for evaluating, calculating and analysing inland transport infrastructure construction costs;

(b) Identify and list terminologies used in UNECE region for construction costs of inland transport infrastructure, if possible, create a glossary of agreed terminologies and related explanations;

(c) Collect and analyse data in order to prepare a benchmarking of transport infrastructure construction costs along the ECE region for each inland transport mode - road, rail, inland waterways - including intermodal terminals, freight/logistics centres and ports. Analyse and describe the conditions / parameters under which these costs have been calculated on.

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2. In carrying out its main tasks, the Group of Experts will, among others, also identify suitable methodological approaches, models and tools for gathering and disseminating information, i.e. conducting studies, distributing questionnaires, using existing studies and national strategies, existing best practices in calculating transport infrastructure construction costs, among others.

II. Terminology

A. Infrastructure

3. Port infrastructure - port basins and freely accessible facilities, devices and installations within the area of the port or harbour, associated with the functioning of the seaport and intended for performing tasks intended for the port by the port managing entity.

4. Infrastructure providing access to ports - fairways and facilities, devices and installations associated with their functioning, leading to each sea port and located within the area of a sea port. These include port entrance channels, fairways, anchorages, turning basins, VTS and VMTS.

B. Hydrotechnical infrastructure

5. Breakwater - a structure providing complete or partial protection to coastal waters and coast from tides. Depending on which facilities are protected breakwaters. ($/m) They can be subdivided into:

(a) Port - (external), separating port basin from the sea;

(b) Internal - called groynes, dividing a basin into smaller areas.

6. Pier - permanent structures not supported by the seashore, in the form of bridges located in a port, at sea or above coastline, which do not transfer earth pressure of the adjacent terrain. ($/unit).

7. Jetty - a pier positioned perpendicularly or diagonally to the shore, connected with the shore by one end. Cargo handling jetties can be utilised from both sides and can be connected to the shore by a smaller pier. ($/unit).

8. Dolphin - a separate sea structure, situated on a sea body and mounted on the seabed. Their various types have different purpose, such as: mooring, breasting, navigating, guiding, protecting, docking, and measuring. ($/unit).

9. Wave absorber - a structure preventing from forming rebound waves in a dock, a separate unit or a part of a quay or a breakwater. ($/unit).

10. Turning basin - a basin located between docks and port channels or fairways, with special provisions for the safe performance of rotating manoeuvres of ships to allow them to enter port channels, change course, or align in port with the use of its own thrusters or with the help of tugboats. The diameter of a turning basin should correspond to 150% of the length of the largest vessel to use its area. ($/unit).

11. Outer harbour - area of water within the port adjacent to roadstead and the entrance to the port, separated from the port by breakwaters. Used for performing manoeuvres by entering and exiting vessels, it is also the area where waves act differently and their height and influence becomes much less severe. (---).

12. Entrance channel - a section of the fairway leading from the territorial waters to sea port, located before the port entrance, which includes the entrance itself. ($/unit).

13. Port basin - area of water surrounded by quays or other port structures, maintained at the required depth level, by which ships are berthed and their cargo is exchanged. ($/unit).

14. Port channel - fairway within the seaport connecting port basins with one another and with the entrance to the port (maintained at the required depth level). Some ports have loading/unloading and parking quays along port channels. ($/unit).

15. Dredging works - works for the purpose of deepening ports and entrance channels in order to maintain desirable depth of basins, for vessels of intended draft. ($/m2).

C. Quay

16. Quay - structure intended to frame the area of the port from the sea, rising to the surface from the sea bed, covering the border of the area adjacent to the basin, creating technical-utility space (together with necessary installations and facilities - berthing, breasting, and loading/unloading devices, power, telephone, water and sanitary installations). ($/unit).

17. Types of quays:

(a) massive reinforced concrete box caisson;

(b) massive caisson foundation;

(c) on a cellular cofferdam;

(d) L-shaped wall;

(e) with capping beams and anchor slab;

(f) with capping beams and raking trestle;

(g) with capping beams;

(h) slab quays.

18. Bollard - mooring post for the purpose of berthing of ships and other vessels to a port structure. ($/unit).

19. Fender - a device protecting berthing ships and port structures from impact force of berthing ships. ($/unit).

D. Road infrastructure

20. Roads - designated communication route providing a means of moving within the port to deliver / receive cargo. ($/km).

21. Service yard - a designated concrete-paved part of a quay with markings. ($/m2).

22. Car parks - parking areas, where vehicles wait for reception or delivery of cargo from/to the port. ($/m2).

E. Rail infrastructure

23. Siding - railway connected with a rail line used to load and unload wagons, stabling of trains, as well as to move and introduce trains into railway traffic. ($/km).

24. Loading point - a designated spot on the quay or by the storage yard or warehouse for the purpose of loading and unloading of cargo from and onto wagons. ($/unit).

25. Wagon scale - a scale to weigh large industrial loads, with a high durability platform. It is used to weigh loads and burden wagons for the purposes of contractors' settlements and safety measures. ($/unit).

26. Railway loading platform - structure used for direct loading and unloading of cargo from and onto wagons. ($/unit).

27. Traffic post - serves to provide efficient and safe rail traffic in the port. ($/unit).

28. Traffic signals - the entirety of devices, signals and regulations used to conduct rail traffic safely and efficiently. ($/unit).

F. Water supply infrastructure

29. Water supply infrastructure - it is a system of devices and technical facilities, main and distribution water networks which provide, treat, divide and distribute water of appropriate technical properties and quality to the port facilities and other port infrastructure. ($/unit).

30. Water supply infrastructure of the port includes:

(a) Inlet of underground water;

(b) Pumping station and water treatment works;

(c) Retention basins;

(d) Pump and pressure boosting systems. and pressure tank units;

(e) Main and distribution water pipes with plumbing and support devices.

G. Sewage infrastructure

31. Sewage infrastructure - port infrastructure of sanitary sewage system is a system of devices and technical facilities, networks, tunnels and collectors, which are meant to collect and remove domestic, municipal and industrial sewage from port facilities and into the public sewage network. ($/unit).

32. Sewage system infrastructure of the port includes:

(a) Networks, tunnels and collectors of sewage system, both gravity-flow and powered;

(b) Sewage pumping station with reservoirs, plumbing and hydraulic systems as well as power and control devices.

H. Storm water sewage infrastructure

33. Storm water sewage infrastructure - port infrastructure of storm water sewage system is a system of devices and technical facilities, networks, tunnels and collectors, which are meant to collect, pre-treat and remove storm and thaw water from port facilities and into the public storm water sewage network as well as drains into the port channel. ($/unit).

34. Storm water sewage system infrastructure of the port includes:

(a) Networks, tunnels and collectors of storm water sewage system with the system of inspection manholes;

(b) Retention basins;

(c) Separators and settling tanks with equipment;

(d) Storm water sewage pumping station with reservoirs, plumbing, hydraulic system as well as power and control devices;

(e) Storm water sewage system exits.

I. Heating infrastructure

35. Heating infrastructure - port heating infrastructure is a system of devices and technical facilities, distribution and transmission networks, which generate, transfer, divide and deliver heat energy of appropriate technical properties and quality to the port facilities and other port infrastructure. ($/unit).

36. Heating infrastructure of the port includes:

(a) Heat sources, including oil and electric boiler plants;

(b) Overhead and underground, low and high-parameter heating pipes with plumbing equipment and supplies;

(c) Group, individual, single and multi-function heat transfer stations and heat distributors with equipment and supplies.

J. Electricity infrastructure

37. Electricity infrastructure - port electricity infrastructure is a system of devices and technical facilities, distribution and switchgear networks, which transfer and deliver electricity of appropriate technical properties and quality to the port facilities and other port infrastructure. ($/unit).

38. Electricity infrastructure includes:

(a) Transformer/switching station MV/MV, MV/LV;

(b) Medium voltage (MV) and low voltage (LV) cable lines as well as control cable lines with complete equipment and cable supplies;

(c) Switching substations as well as medium (MV) and low voltage (LV) service cabinets;

(d) Grounding and bonding system;

(e) Terminal switchgear devices, including crane socket outlets and distribution boards.

K. Terminals, (specific equipment)

39. Container terminal (intermodal) - They are the basic point infrastructure in intermodal transport networks. Equipped with appropriate handling devices, they allow exchange of intermodal units between various means of transport. They are located in large seaports and their land distribution centres. The highest performance, speed of operations and low costs are guaranteed by fully automated sea container terminals. ($/unit).

40. Bulk terminal - universal terminal providing services of loading, unloading, storage, FIBC packaging and sorting of bulk cargo typical of port-maritime trade. ($/unit).

41. LNG terminal - installations for the purpose of receiving and regasification of liquefied natural gas (LNG). Investment includes pipelines for receiving LNG from ships, LNG containers and regasification stations. ($/unit).

42. Liquid fuel terminal - a facility for the purpose of storing, loading and unloading of crude oil and petroleum products. ($/unit).

43. Ro-ro terminal - terminal for the purpose of loading and unloading of vessels by the means of rolling cargo onto and off the ship. ($/unit).

44. General cargo terminal - universal terminal dedicated to loading and unloading of small cargo. These include cardboard boxes, parcels, crates, sacks, Euro-pallets. ($/unit).

45. Passenger terminal - building or a group of buildings, being a separate part of the port dedicated to passenger traffic and providing services to passengers arriving, leaving and remaining within the port. ($/unit).

L. Loading and unloading infrastructure

46. Gantry crane - (also known as portal crane) a loading device, which has a “gate-like” appearance and straddles transport routes (e.g. railway tracks) It has its undercarriage and wheels on rails and its own motorised drive, which allow it to slide along the quay. On top of the base, a rotary crane is mounted, its boom equipped with a hook or a claw for lifting cargo. Lifting capacity (for bulk cargo) is usually 5-15 tons, with an efficiency of 70 tons per hour. ($/unit).

47. Semi-gantry crane - (or semi-portal) a loading device that differs from the gantry crane by having half of its base resting on the quay and the other on the wall or roof of a warehouse building. ($/unit).

48. Bridge crane - a loading device with an extended shape (even up to 100 m) mounted on rails perpendicular to the quay. Under its base are transport routes and (sometimes) open-air storage yards. The claw of the crane moves along a fixed bridge. Bridge cranes are used to load and unload loose cargo (e.g. coal and ore) ($/unit).

49. Crane vessel - a loading device, mounted onto a barge or pontoon for the purpose of loading/unloading cargo in cases where it is necessary to access the loading bay from the sea (e.g. necessity of unloading on the roadstead) Larger crane vessels have their own engine, crew compartments and ballast tanks filled before lifting exceptionally heavy batches of cargo. ($/unit).

50. Overhead gantry - a crane equipped with a winch or a hoist, capable of lifting and lowering. Designed to transport materials vertically and horizontally within an area limited by the length of the track, height of the crane and width of the bridge. ($/unit).

51. Devices for loading of loose materials (conveyor belts) - port loading/unloading devices in form of a system of conveyors, used for loading and unloading ships, mostly for loose materials. ($/unit).

52. Ro-ro loading ramp - a ramp, which allows rolling of vehicles from the quay onto a berthed ship despite variable sea levels in the port basin and variable draft of a ship. ($/unit).

M. Real properties

53. Warehouses - buildings used to store cargo unloaded from a ship or meant to be loaded onto a ship. ($/unit).

54. Cold storage - Building equipped for the purpose of handling all goods requiring below freezing temperatures (fruit, vegetables, dairy, fresh and frozen meat). A warehouse equipped with refrigeration systems. ($/unit).

55. Storage yards (for bulk products, timber, containers, etc.) - provided with an appropriate surface area, drainage, road and railway network, cargo handling machinery, as well as electrical, fire-prevention, water, sewage and telephone facilities. ($/unit).

56. Office buildings - buildings for the purpose of office work for authorities managing the port, logistic operators, terminal managers and other authorities operating within the area of the port. ($/unit).

57. Conveyor (grain silo) - a device for the purpose of unloading and loading of loose materials. There are pneumatic conveyors (lifting the cargo vertically by the means of suction) and mechanical conveyors (lifting cargo vertically by the means of buckets) ($/unit).

58. Liquid fuel containers - containers in open space for the purpose of storing gas, crude oil, or other liquid fuels, with a system of pipelines for the purpose of handling liquid fuels. ($/unit).

N. Environmental protection facilities

59. Noise measurement equipment - fixed and mobile devices for the purpose of measuring sounds of frequency between 16 and 16 000 Hz. ($/unit).

60. Air pollution measuring devices - equipment for the purpose of measuring air pollution by substances which constitute health hazard or are dangerous for other reasons, regardless of their physical properties. ($/unit).

61. Permanent monitoring station - a container with measuring equipment for the purpose of 24-hour measurement of concentration of substances and dust or noise. ($/unit).

62. Ship sewage removal installation - all fixed, mobile and floating installations for the purpose of removal of sewage from ships. ($/unit).

O. Fire safety infrastructure

63. Watchtower of the fire prevention unit - port fire brigade unit - a building, garage and storage base, social base and a place for fire-fighting vehicles, tools, and extinguishing agents. The foundation of ensuring fire safety in the port. ($/unit).

64. Fire pump rooms with equipment - a room or a building which houses fire-fighting pumps with water-foam installation, for supplying fixed fire-fighting installations. ($/unit).

65. Fire monitor - Fire-fighting equipment for launching water and/or heavy foam. ($/unit).

66. Flow pipeline - a network supplying fire pump rooms and fire monitors. ($/unit).

67. Sprinkler flow pipeline - a network providing protection from heat radiation to fire-fighting installations and protection of evacuation routes. ($/unit).

68. Fire-fighting pipeline - provides water for external extinguishing of fires. ($/unit).

P. Safety infrastructure

69. Fence - obstruction preventing access to people unauthorised to enter the port area. ($/m).

70. Entry gates - gates where the authorisation to enter/exit the port is verified. ($/unit).

71. Security posts - offices of port personnel or security, who verify the authorisation to enter/exit the area of the port. ($/unit).

72. Cargo monitoring system - IT system for the managing of cargo entering and exiting the port. ($/unit).

73. CCTV monitoring system - a set of video surveillance cameras monitoring the area of the port to ensure safety. ($/unit).

74. Access control system - electronic access system to specific areas or buildings in the port, which also allows issuing passes to authorised persons. ($/unit).

Q. ICT infrastructure

75. ICT infrastructure - the entirety of software-hardware solutions forming a basis for the implementation and operation of substantially and technologically advanced IT systems providing assistance in the management of the port. ($/unit).

76. VTS / VTMS - (Vessel Traffic Services) - Monitoring system of maritime traffic for the purpose of improving safety and optimising maritime traffic in the areas supervised by the VTS. The system comprises integrated network of maritime sensors as well as safe and infallible communication links. VTS system operators monitor the maritime and weather conditions in real time, and also determine positions of ships with the use of sensor systems, such as radars and the automatic identification system of vessels (AIS). With the help of this data, the operators of VTS system inform authorities and ships of potential dangers in order to prevent accidents, such as collisions. The system allows to monitor the situation at sea, and also facilitates early warning of adverse shipping conditions and ecological dangers as well as performing rescue operations. ($/unit).

77. VTMS (Vessel Traffic Management System), as an expansion of VTS, is a system of management and control of ship traffic, incorporating existing VTS functions with the capability of managing ports and safe transit of cargo. ($/unit).

R. Other

78. Land purchases.