

# Sea ports: the development strategy background for the water- borne transport of Ukraine

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*Analysis of the role of the waterborne transport in the structure of Ukrainian economy is presented. Participation in the Euro-Asian line of the world trade system is considered as well as strategic priorities in the development of national transport system are discussed. Special attention is paid to the waterborne transport and ports of Ukraine, their technical characteristics and ways of improvement maritime transport work.*

## Introduction

Geopolitical location of the sovereign state of Ukraine predetermines the vital role of transport in the structure of its economy. The effective use and further intensive development of the country's transport system are to contribute considerably to the process of integration of Ukraine into the world economic system. A predominant role of waterborne transport, and especially marine transportation, in the country's transport infrastructure is undeniable. Maritime transport, therefore, has to play and will play an ever-growing role in the economy of Ukraine in the period of transition into market economy.

The latest period of 20 years is characterised by conceptual maturing of a large-scale project aimed at creation of a unified global transport system by means of integration of those continental transport communications that have strategic value for cargo and passenger exchange between Europe and Asia, Asia and America, Europe and Africa. In this situation the first route (Europe - Asia) appeared to be in this focus of primary attention since its extreme points - Western Europe and Asian - Pacific Ocean Region involve the largest possible territory where the major events of the world trade of the XXI-st century are to unfold. From here there has been derived popular nowadays, concept of Euro-Asian transport passages as major intercontinental poly-routes as well as similarly named market of transport services, that is being developed at the junctions of European and Asian roads of the above mentioned passages. One of its sections spreads over the Black Sea - Azov Sea coastline and is referred to as the most promising one for Ukraine at the market.

## Euro-Asian transport corridors and Ukraine

Pushing into the foreground the Euro-Asian line of the world trade system is the result of combined and synchronous manifestation in time of the two macroeconomic factors: instability of the world economy and intensification of integration processes in Western Europe.

The first factor showed itself in a succession of industrial declines in one areas of the world with simultaneous rise in the other ones, the factor that held the world market of goods in the permanent tension and caused serious fluctuations in its conjuncture. The latter circumstance lead to deep structural

shifts in the world trade that in particular intercontinental refocusing of its strategic orientations and change of segmental and niche structure of the world commodity market. Thus beginning with the mid-lights of the passing century these became steady the tendency of the increase of commodity exchange between the countries of Western Europe on one hand and Asian - Pacific Region, South - East Asia and Indian Subcontinent on the other giving the annual average rate of 5-12%. In the years to come and until recently this tendency remains unchanged and will continue in the visible future according to the predictions of leading research

and business centres of Western Europe, USA and Japan, and, as expected, together with the growth of commodity volumes from Europe to Asia there will be considerably increasing exchange in the reverse direction.

Parallel to changes in macroeconomic situation there grew and became stronger the commercial activity of business West European magnates in advancing and putting into life integration initiatives in the formation of common economic environment of the Old World to make it the world's largest territory for free flow of commodities capitals and services. The prospects for transformation of European market gave impulse to the development of integration progresses in Europe's transport as well; their indispensability was most deeply reflected in the reports of Selfets, Zeelfeld and Karosino published between 1972-1983. The above authors advocated the idea of common All-European transport policy. This idea found accord and was reinforced by the acts of EC transport governing bodies and organisations and embodied in concept of Trans-European transport axes (The Committee of EC Transport Ministers Declaration, 1983), then inter-modal transport bridges (the 1st All-European Conference on Transport, Prague, 1991) and finally of International European Transport Corridors (The 2nd All-European Conference on Transport, 1994, Crete).

It is up to the point to underline that the implementation of the above concept is being quite efficiently put into practice, since the Crete conference named nine major transport passages in the directions West-East and North-South of Europe the arrangement of which was assessed in 50 bin ECU with the deadline in 2010. Practical orientation was also observed at the 3rd All-European Conference on Transport (Helsinki,

1997) which was held in the spirit of finding most radical from the point of view of EC solutions to priority tasks, in the development of transport passages infrastructure, in financial provision of the projects, in information technologies installation and, finally, in facilitating rational utilisation of passages throughout the way. Such way the basic principles of common European transport policy were outlined and reinforced in the Prague Declaration of 1991 thus having become equally bending for member countries as well as those ready to become members of the All-European transport Community. Unfortunately up to 1997 due to well-know reasons Ukraine remained among the countries that “were ready to join ...” and showed no activity in that respect. As a result it left behind the major European route that now run through Russia to the East - into Central Asia and Asian - Pacific Region and being invested by EC with the involvement of world’s financial institutions including European Bank of Reconstruction and Development. Moreover, there appears the danger of complete ousting of Ukraine from these passages, due to the possibilities of bypassing the territory of our country in the North - through Beylorussia, in the South - though Rumania. Understanding of negative economic effects of the arisen perspective gave an impulse to reconsideration by our country of strategic priorities in the development of national transport system, and found its reflection in the Statement of the Cabinet of Ministers of Ukraine “The priority measures for creation of the national network of world transport corridors” adopted in December of 1996 on the basis of the concept elaborated by “Transpolice” enterprise and research institute UKRGIPRODOR for the development of land and sea communications of international significance with the aim of integrating into All-European transport network. In accord with this orientation Ukraine declared its adherence to Common European transport policy by signing a Memorandum of mutual understanding. Thus our country agreed on the inclusion of its transport systems in the four Crete transport corridors: third (Berlin -Kiev), fifth (Trieste - Lvov), seventh (Danube one: Ust - Dunaisk - Ismail - Rent) and the ninth (Helsinki - Moscow - Kiev - Chishineu - Bucharest - Athens with a branch passage to Odessa and Minsk - Klaipeda/Kaliningrad). Nevertheless the problem of including Ukraine in passage to Western Euro-Asian-Pacific Region and Central Asia remains open since the schemes of lengthening of the 4th and 5th corridors and their juncture to Asian major roads have still not been outlined.

The described situation vividly demonstrates that the strategy of development of transport complex of our country for the purpose of integration into Euro-Asian transport network should be oriented at Black Sea coastline in order to utilize the utmost geopolitical and geo-economic potential of a boarder country.

One should say that in the above initiatives Ukraine has achieved certain positive results having acted among initiators at the intergovernmental meetings of The Black Sea countries in 1990-1994 where current and coming tasks of sub-regional integration were discussed. The outcome of

those meetings was the decision to establish an area of Black Sea economic co-operation, establishment of Parliamentary Assembly of Black Sea countries and signing of member of integration agreements on transport to create circular transport corridors round the Black Sea (Istanbul -Burgas - Konsntantsa - Chishineu - Dnepropetrovsk - Donetsk - Rostov-over-Don -Novorossiysk - Tbilisi - Ankara - Istanbul) with branches to ports and other economic centres of member- countries of the alliance.

The all round consideration of integration projects of EC, CIS and Black Sea vividly demonstrates that for Ukraine the key international route is Euro-Asian Crete ninth passage with the main axis at Kiev - Large Odessa (Odessa, Ilychevsk, Yuzhny ports) - Danube (Ismail and Reni Ports). Thus the strategic orientation at Black Sea area in transport policy becomes for Ukraine absolutely evident. At the same time it makes a decisive argument in acknowledgement of significant role of marine transport in integration processes of Ukraine, the need for that transport’s intensive development with the aim of going strong stand in the Black Sea section of Euro-Asian market of transport services.

The through study of the properties of the Ukrainian marine industry today shows that the achievement of the goal named may be based mainly on the port infrastructure of the country.

**Ukrainian sea ports - main characteristics**

The system of sea ports and port terminals of Ukraine stretches all over the country and is an important part of the marine transport complex. This system accelerates the loading, handling, storage and further transportation to the users the whole nomenclature of cargoes. The ports are situated in three main districts: on the shores of the Black and Azov Seas and also on the Danube river. There are 18 sea ports in Ukraine today: the ports of Reni, Ismail, Kiliya and Ust-Dunaysk in the Danube region; ports of Belgorod-Dnestrovskiy, Ilyichevsk, Odessa, Yuzhniy, Nikolaev, Oktyabrsk, Kherson, Evpatoria, Yalta, Feodosiya, Kerch and port-stations Ochakov, Ozharsk, Horlye, Genichevsk, Inkerman, Massandra on the Black sea shore and in the Azov region ports of Berdiansk and Mariupol. The summarized parameters of the territories and sea areas of Ukrainian ports are shown in table 1.

THE NAME OF INDICATORS	INDICATOR
The total area of the territory	727.20
The average area of the territory	40.40
The area of building	130.50
The general deficit of port’s territory	300.00
The sea area	2181.60
Water ways and inner roads	490.72
Operating sea areas	117.81

**Table 1: the parameters of the territories and sea areas of Ukrainian ports (area, hectares)**

The indicators characterizing the berth’s front in the

Ukrainian sea ports and marine channels are shown in tables 2, 3.

The general capacity of Ukrainian ports is more than 120 mln tons of cargo per year. However, taking into account new economic and political situation in Ukraine and countries of CIS as well as connected with these problems changes in directions of cargo flows, the ports experience lack of equipment for handling metals, mineral fertilizers, cement in bales, crude oil and some other types of cargo. One of the most important problems is providing ports with highly productive and ecologically pure complexes for handling bulk cargoes.

The majority of Ukrainian ports are of old construction. Two big ports on the Black Sea - Ilyichevsk and Yuzhnyi, which have been put into operation during last 40 years, are the exceptions. These ports were constructed in limans situated far from cities. This gave the possibility of creation optimum transport structures, including railways and stations, network of highways and so on. Ports adjacent to the cities (Odessa, Nikolaev, Kherson, Mariupol and the others) substantially exhausted the opportunity for increasing the sea areas and territories, as well as for development of railway communications.

the ports of Reni and Ismail.

The hydrotechnical structures in the ports are mostly obsolete both morally and physically. The present state of the quays confirms the necessity of general repair, modernization and reconstruction. Most of the ports have no common conception of development, based on modern principles which answers the new economic realities and market relations in the country. The necessary investments in modernization, reconstruction and construction of port hydrotechnical structures are made only in those ports which handle the continuous cargo flows. These factors are the obstacles on the way of all around development and realization of optimum regional policy in the sphere of marine and coastal engineering. At the same time a considerable scientific and engineering potential in this field exists in Ukraine, e.g. only in Odessa there are Odessa State Maritime University, Southern Scientific Centre of Transport Academy of Ukraine, Odessa State Maritime Academy, Design and Research Institute "Chernomornii-proekt", South Scientific Research Institute of Marine fleet and the other organizations, which deal with various projects related to marine transportation and technologies. Their activities permit to solve a variety of problems not only

Regions	Total	THE CHARACTERISTICS OF BERTHS, UNIT/LENGTH (m)				
		including for				
		bulk cargoes	general cargoes	Liquid Cargoes	passengers operations	Auxiliary functions
Danube	51/6257	9/966	36/4557	-	3/350	3/394
Black Sea	147/25367	43/8374	43/8534	12/1576	24/3375	25/3479
Azov Sea	37/6402	10/1753	19/3666	-	6/782	2/200
<b>Total</b>	<b>235/38016</b>	<b>62/11083</b>	<b>98/16757</b>	<b>12/1576</b>	<b>33/4507</b>	<b>30/4073</b>

**Table 2: general characteristics of the berth's front in sea ports**

THE NAME OF INDICATORS	INDICATOR
The number of approach channels	23
The number of connecting channels	2
The total length, km	274
The average depth of channel, m	7.81
The average length of channel, km	10.964
The maximum length of channel, km	85.562

**Table 3: summary of marine channels characteristics**

Ports situated in health-resort zones (Yalta, Evpatoriya, Feodosiya) are limited in their development. At the same time, port of Skadovsk and port of Oktyabrsk have preconditions for increasing cargo capacity, as a result of the berth modernization. Further development of the Danube estuary by constructing modern port structures is undoubtedly reasonable and perspective, as it will enable to develop the European flows of cargo, using already existing berth front in

for today but also for the future. The forthcoming is a short review of the technical characteristics of the main Ukrainian ports.

Odessa - the largest merchant and passenger port of Ukraine with all year round navigation. Specialization: general cargoes, grain, oil cargoes. The depths at the berths are up to 12 m. Deep-drafted vessels are pre-handled on the roadstead. Currently, the port is performing the programme of construction of new warehouses and sheds on the artificially made territory together with foreign partners. Port is already performing reconstruction of old storage areas and purchasing the new cargo-handling equipment. In 1995 a new 290 m - long quay with depth of 11.5 m was put into operation. The general repair of five existing oil berths was fulfilled in 1997 and it results in increasing the capacity of the terminal up to 12 mln t of import oil and up to 7 mln t of traditional oil products for export. New yacht harbour was constructed during 1997-98. Now new terminal for chemical cargo is under con-

struction.

Ilyichevsk - the port for handling bulk cargoes put into operation in 1957, has 22 cargo berths of up to 12 m depth. It has a specialized container terminal and international ferry-boat systems Ilyichevsk - Varna, Ilyichevsk - Poti, Ilyichevsk - Batumi.

Yuzhny - one of the most prospective Ukrainian ports put into operation in 1978. Port is still under construction and specializes in handling bulk and chemical cargoes. Eight cargo quays of up to 14 m depth and two auxiliary berths are in operation. The development of the berthage for oil and metal cargoes is foreseen for the nearest future.

Mariupol - the largest port of the Azov basin is about 100 years old. It specializes in handling of bulk cargoes and metals. The navigation lasts 280 days. The port has 13 cargo berths of up to 9 m depth, a special coal handling complex and container terminal. The modernization of existing berths and construction of new port complexes (grain and others) are under development.

Ismail - the basic port of the Ukrainian Danube Shipping Company is situated in the Danube estuary. The navigation period is 317 days. The port handles mainly bulk cargoes. 18 cargo berths are now in operation with a total berth line of 2 km and maximum depth of 7.5 m. The long - term plan provides the technical development along the coast line.

As mentioned above, the majority of Ukrainian ports belong to the obsolete models that influenced their territories and sea areas. Some ports are located in the natural bays, harbours and estuaries and this factor has been decisive while forming their sea areas (estuarial ports have no breakwaters but only approach channels). There are 37 approach channels with the total length of about 300 km.

As the territories of the majority of ports were formed long ago and nowadays can not be expanded, the only remedy is to form the areas artificially. This problem concerns such important aspects as fitting out new areas with cargo handling appliances and utilization of dredged soil.

### Quay structures and their potential

The present berth front of the Ukrainian ports was created mainly after the Second World War. The prevailing type of berths are the pile trestles and anchored sheet pilings (types of berths are shown in table 4). Trestle structures, which were mainly constructed in sixties, have been realized on pile sites made of prestressed reinforced concrete piles and steel sup-

ports. 82% of them are constructed on prismatic-shape piles, 12% - on hollow piles with diameter 1,6 m, 6% - on metal pipes. For the upper structures the plate type and the beam type structures are generally used. Anchored sheet pilings, which were constructed in last fifteen years, have mainly been made of metal piles of Larsen-IV and Larsen-V types. The main share of anchor facilities have been performed in the form of reinforced concrete anchor plates.

TYPE OF CONSTRUCTION	PERCENTAGE IN TOTAL BERTHAGE, %
Pile trestles	54,5
Sheet piling and other thin retaining walls	32,6
Gravity structures, incl.:	10,6
masonry walls	6,9
L-shaped walls	1,6
shells of large diameter	2,1
Others	2,3

Table 4: characteristic types of berth structures in the sea ports of Ukraine

The distribution of berthage as to the length is given in table 5.

BERTH LENGTH (m)	PERCENTAGE IN BERTHAGE
75-100	3.5
101-125	4.9
126-150	18.8
151-175	19.4
176-200	34.4
201-225	16.2
226-250	2.1
over 250	0.8

Table 5: distribution of the berthage of the Ukrainian sea ports as to the length

One of the most important indices of the technical state of the hydrotechnical port structures is their operation period. The results of corresponding data analysis as to represented group of berths are given in table 6.

Statistical calculations show that the average age of berths is 28,2 years and average quadratic deviation is 14,36 years. Thus, the berthage of Ukraine can be considered as comparatively "young" when compared with the ports of CIS (the age of berth structures is 42,3 years). Most of berths are characterized by the operation period from 20 to 40 years and practically all berths have not exhausted the standard period of their service. However, one should point out the considerable degree of their obsolescence as to other characteristics. Thus at the beginning of ninetieth the share of indirect physical wear and tear coincides with the share of moral wear as to depths. However, this correlation may not remain steady due to possible replenishment of the fleet, which can lead to the necessity of technical reconstruction of the berthage.

The main causes of the physical wear and tear of port hydraulic structures revealed by the analysis of the technical state of

Operation period, Years	Degree of temporal wear and tear	Percentage, %
more than 50	0,86-1,08	4,9
40-50	0,69-0,86	6,9
30-40	0,52-0,69	20,0
20-30	0,35-0,52	34,8
10-20	0,17-0,35	22,9
less than 10	0,00-0,17	10,75

**Table 6: operation period and temporal wear and tear degree of berth structures**

Type of structure	Share in total berthage, %	Category of building complexity				
		I	II	III	IV	V
Pile-trestles	54,5	-	3,4	4,3	22,6	24,2
Sheet pilings	32,6	-	0,8	4,3	13,0	14,5
Gravity structures, Including:	10,6	-	-	-	-	-
masonry walls	6,9	0,8	2,4	3,7	-	-
L-shape walls	1,6	-	1,6	-	-	-
shells of large diameter	2,1	-	0,8	1,3	-	-
Others	2,3	0,4	0,9	1,0	-	-

**Table 9: distribution of soil conditions of berth structures to their building complexity categories, %**

constructions commonly used in the Ukrainian ports are the following (as to groups of factors):

- 1 - corrosion, rotting, teredo;
- 2 - action of waves, ice, currents;
- 3 - faults in design and construction;
- 4 - violation of operation rules.

The extent of influence of each group of factors upon the physically obsolete structures is given in table 7.

TYPE OF BERTH	INFLUENCE OF EACH FACTOR GROUP, %			
	1	2	3	4
All berths				
Including :	68,9	19,9	9,2	2,0
reinforced concrete and concrete	25,2	4,0	3,3	-
Metal	15,9	1,3	3,3	-
wooden	28,8	14,6	2,6	2,0

**Table 7: main factors acting on physically obsolete berth structures**

These data show that corrosion and effect of waves, current and ice are the principle causes of the physical wear and tear. Engineering-geological parameters of soil foundations are the main characteristics influencing the operational conditions of existing port hydraulic structures or the selection of design. Although the soil conditions on the seashore of Ukraine, which is more than 1000 km long from Reni to Mariupol, vary considerably, it is possible to indicate some general characteristics and regularities concerning all the regions. Tables 8 and 9 present the results of the

soil condition analysis for the berth structure foundations and their evaluation according to the categories of building complexity. This allows us to trace interdependence between the choice of berth structure and engineering-geological conditions.

Five categories of the scale are determined by the totality of lithological, geomorphologic, physical, geological and seismic regional characteristics and peculiarities.

The data given in tables 8 and 9 testify the fact that in most cases clay soils, including silts, sandy loams and fine sands, possessing physical and mechanical characteristics similar to those of silts and clays, constitute port hydraulic structure foundation. Gravel soils and rocks serve as a foundation for small amount of structures. The majority of engineering -geological conditions of structure foundations should be referred to as complex and rather complex (as a rule, this is typical for pile trestles and sheet-pilings).

The obvious feature of the Ukrainian ports is absence of a distinct specialization in cargo types and directions of shipping. Splitting of goods traffic of the same type of cargo became especially evident after the collapse of the USSR, due to the changes in home and foreign transport and economic relations of Ukraine and transfer to market system of economy. That is why ports are mainly equipped with general purpose handling facilities except for separate areas functioning as specialized cargo complexes (terminals). Main of them are listed in table 10.

Main types of general purpose loading facilities in ports are gantry cranes and forklift trucks of various models having rather different parameters, as well as tractors, trucks and the

other facilities for intro-hold, intro-carriage and intro-warehouse works. Ukrainian ports mainly have modern layout with piers wide enough to use gantry cranes for ship handling. Ship's handling equipment is rarely used. A fleet of handling machines in sea ports contains more than 500 gantry cranes, 1200 forklift trucks, 900 trucks and 400 units of other types (floating cranes,

Soil type	Percentage in total quantity, %	Mean value of angle of internal friction, degrees
Silts	9,8	8-14
Loams, clays	41,4	16-26
Sandy loams, fine sands	18,4	20-24
Medium sands and coarse sands	24,2	26-32
Gravels	4,6	35-40
Rock, monolith massifs	1,6	40-45

**Table 8: some parameters of engineering-geological conditions of berthage soil foundations**

NAME OF THE PORT	TYPE OF CARGO HANDLED	VARIANT OF WORK	PUTTING INTO OPERATION
Mariupol	Coal	land transport- maritime transport	1968
Nikolaev	coal, ore	land transport- maritime transport	1973
Odessa	raw sugar	maritime transport-land transport	1968
Odessa	grain	Maritime transport-Land transport	1974
Yuzhniy	coal, ore	Land transport- maritime transport	1985
Yuzhniy	carbomide	Land transport- maritime transport	1979
Yuzhniy	liquid ammonium,super phosphoric	Ships loading,ships loading	1978
Odessa	oil	Ships loading	1950
Odessa	containers	Both directions	1980
Ilyichevsk	containers	Both directions	1981
Ilyichevsk	ferry-boat complex	Ilyichevsk - Varna	1981
		Ilyichevsk - Poti	1996
		Ilyichevsk - Batumi	1998

**Table 10: specialized handling complexes of the Ukrainian sea ports**

truck-mounted and caterpillar cranes, facilities for intro-hold and intro-carriage work). One should point out that technical equipment for cargo handling works in the Ukrainian ports is quite sufficient, as to the quantity and types of machines. The main problem is physical and moral obsolescence of a considerable part of facilities. In particular, about 70% of gantry cranes have been in operation for more than 20 years, about 50% of wheeled loaders have been operated for more than 8 years. Naturally, this increases expenditures for fuel, lubrication, maintenance and repair. Structure of the freight turnover of the Ukrainian ports has greatly changed and its volume has considerably decreased during last years. The cargo turnover of the dry cargoes has fallen about two times. This essential decrease was the result of diminishing of amount of bulk, dry, grain and timber cargoes passing through the ports of Ukraine in and out of Russia. Handling cargo in containers has reduced ten times due to the same cause. The increase of the cargo turnover two times took place as to metals, which formed the Ukrainian own export. Industrial possibilities of the country allow to increase export of cement essentially and building materials up to 2 mil tons a year.

As a result of freight traffic decrease most of all specialized overloading complexes operate with essential under-loading, which effects the port economics.

**Conclusion**

The analysis of present condition of ports has revealed the following investment projects to be fulfilled:

1. Development and modernization of present and construction of new high productive and ecologically safe complexes for reloading of bulk cargoes in ports of Yuzhny, Ilyichevsk, Mariupol and Nikolaev.
2. The creation of complexes for processing import power carriers to provide handling of high tonnage ships.
3. Consecutive modernization of complexes for re-handling

general, grain and other food cargoes by replacing obsolete equipment with a new one.

4. The creation of port industrial areas based on present ports and reloading complexes, which should be able to operate as joint ventures, and free economic areas creation.

5. Development of passenger complexes, public services, modernization and development of port transport infrastructure. These projects are closely related to the consecutive measures for providing ecological safety, building special cleaning systems at the ports and the port cities as well.

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**REFERENCES**

DOUBROVSKY, M.P. AND SMAIL G. (1997) Present state of quay structures in Ukrainian ports and some new efficient coastal and harbour structures. *Proceedings of the Eighth Congress of the International Maritime Association of Mediterranean*. Volume 1. Istanbul Technical University. Turkey, 8.2.1-8.2.9.

DOUBROVSKY, M.P. ET AL. (1996) Problems of reconstruction and technical modernisation of the hydrotechnical structures in shallow-water Black Sea ports. *Proceedings of MARIND'96, First International Conference on Marine Industry*. Volume 3. Varna, Bulgaria. 191-195.

DOUBROVSKY, M.P. (1993) New efficient marine and port structures interacting with soils. *Proceedings of the 4-th Canadian Conference on Marine Geotechnical Engineering*. Volume 3. St. Johns, Newfoundland, Canada, 931-949.

DOUBROVSKY, M.P. ET AL. (1997) Some new structures and technologies for renovation and improvements of quays. *Proceedings of the 4-th International Seminar on Renovation and Improvements to Existing Quay Structures*. Volume 1. Technical University of Gdansk, Gdansk, Poland, 44-59.