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VALUATION OF EFFECTIVENESS PERFORMANCE OF LATVIAN PORTS

Abstract of the Dissertation

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The dissertation is written in Latvian. It contains 3 sections, an introduction, conclusions, bibliography, 14 appendices, 18 figurēs, 79 tables, in total 195 pages without appendices.

CONFORMATION

I coŋfirm that this dissertation is worked out and submittedfor revieiv to Riga Technical Universihjfor obtaining the Doctor's Degree in Economic Sciences. The dissertation is not submitted to any other university for obtaining the scientific degree.

Jānis Vanags

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GENERAL DESCRIPTION OF THE WORK

Relevance of the Theme

The importance of Latvian ports in the national economy has tightly connected with advantageous state geographical situation respecting to those countries with large economic potentials and large consumer markets. Last decade the importance of Latvian ports was strengthened by regaining of independence and gradual transition to market economy relations.

Convenient location near the Baltic see provides Latvia possibility to participate in see cargos shipment by using 3 large and 7 small ports. Geographically advantageous position is even more enforced by land border with Russia - country in which territory concentrates the world's largest nature resources. It is more important that Latvia border with Russia will become north-eastern European Union border in the nearest future. These natural advantage, state domestic and foreign policy, as well as many other economical and political factors determine most important development tendencies for Latvian ports also nowadays.

So far port functions were more explored in relation with state transport system development problems. Little attention in theory of economics is paid to researches about ports as subjects of economic activity, their impact on development of national economy, to effectiveness analyses of port performance. According to the author, scientific research about significance of ports in national economy and development of methodology that shows effectiveness of port performance will supplement theoretical opinions in economic science not only in a field of cargos shipment, but also in coherence with other aspects that influence performance of ports and national economy.

Ports are one of the most important stages in transportation logistics chain of cargos and passengers, because see transport is related with different kinds of land transport. Therefore it is even more important to organize capacity of ports in way that allows to integrate existing and perspective land cargos flow and development of infrastructure. The biggest part of cargos turnover in Latvian ports makes transit cargos, which main direction is from Russia and other former soviet union countries to Western countries , USA, Canada. Therefore transhipment of cargos volumes in ports is largely dependent from economic policy of countries that dispatches and receives frights.

From 1990 till 2002 turnover of cargo in Latvian ports increased by 44,2% and reached 52,5 million tons in 2002. Dispatched frights made most of the turnover, and their impact in revisory period has increased from 84% to 93%. That indicates the increasing impact of cargos transit and multimodal transport on total see cargos flow and port economic indicators.

Investigating the influence of ports on different fields of national economy, it was concluded that performance of ports influences development of 15 industries of national economy. Most tight ports are related with such industries us transport and communications, forestry, extractive and processing industry as well as different utility fields. The wide range of port economic activities and their relationship with many industries promotes dynamic port development and the port development pace is notably faster than state economic growth. If the cargo turnover from 1990 till 2002 has increased 1,44 times, then gross domestic product in comparable prices has not reached level of 1990, dropping behind from it 31 %. That confirms that ports have overcome the economic crises of this period more faster in compare with other economic industries. Ports can use existing resources more effectively and are able to adapt to variably market demands more efficient.

Important tendency can be noticed in performance of ports in the last years of revisory period - the added value in territory of ports has increased. That tendency is related with diversification of services provided to ships entering in the port and with production of new goods in the ports' territories.

Analyzing port operations from added value point of view, the research clarified, that during the last 5 years newly originated value increased by 31,5% but in the country - only for 15,2%. As it can be seen also from this aspect the port notably leads in development speed, if compared with country economic development. This is important when defining priorities in national economy. Besides, ports favourably influence development of country's foreign trade. Due to the possibility to use wide range of port services, the competitive capacity of Latvian export goods increases in the world markets. That leaves good impact not only on country's gross domestic product but also on balance of payments and stability of national currency.

Favourable entrepreneurship environment is created in ports in the revisory period, therefore a number of companies that work here increases every year. At the end 2002 there operated more than 390 different companies which employed more than 12 800 employees.

It shows that importance of ports have been increasing in national economy. The issues related with development of ports are regularly in

attention of state government. The government has worked out the national program of transport development and the state program of Latvian ports development. These documents describe the main tendencies of ports development and most important tasks to increase competitiveness of ports in international sea cargo market, taking into account changeable circumstances of economy globalization.

Considering the significance of Latvian ports in national economy has increased in the revisory period. Taking into account large competition between other ports located in north of Baltic see, it is very essential to maintain competitive capacity of the ports inside the country and also in international level. This target is related with ports' ability to offer existing and potential customers high quality services with competitive price. Therefore main part of the treatise is devoted to develop methods of valuation effectiveness of ports' performance by using experts method and mathematical model. A systemic approach is used to develop the model, that enables to consider port as jointed system consisted of four interconnected subsystems. The developed system will give possibility to analyze effectiveness of ports economic, finance, management and technical operations. It will allow constantly to improve usage the disposal resources of the ports and increase competitive capacity.

Topicality of the research has increased by the prospective entering of Latvia into European Union and NATO. It is expected that competition between ports of northern Baltic see region will increase notably in the new market situation, particularly in transit cargo sphere. Wherewith meaning of port services price will significant increase for cargo forwarder and direct recipient to choose the most suitable port for cargo transportation. Besides in the ftiture important will be not only question about expenditures effectiveness of ports services but also additional competitiveness factors like security of the ports, reliability, quality of services provided, and environment safe technologies.

The *Objectives and Tasks of the Research*

The objective of the present research is to provide scientifically pragmatic perception on importance of ports in national economy, and to develop valuation methods of effectiveness of the ports' performance, suitable for port management and projection of port development, thus, would be created methodological base for more intensive exploitation of ports' resources and to activate entrepreneurship in the ports area. Thereby, it will facilitate increasing of competitiveness of Latvian ports business in local and transit cargo shipment and increase their influence in state economic growth.

In order to reach the objective of the following tasks are nominated:

1) to analyze the existing problems of development Latvian ports and characterize suitability of the ports to perform the main state economic function;
2) to identify ports influence on development of state economy and increasing ports' competitiveness comparing with other industries of state economy;
3) to identify the quantitative indicators of ports resources and analyze the trends of their development;
4) to analyze the impact of Latvian ports on transport and other industries;
5) to investigate the ports impact on Latvian foreign trade and to recover possibilities to increase competitiveness of exported through the ports;
6) to develop economical, technical and managerial system of Latvian ports;
7) to analyze definitions of economical science such as "effect", "resource", "effectiveness", "economical effectiveness", "port" and improve these definitions accordingly object of the dissertation;
8) to make investigation the indicators of economical effectiveness who are most widely applied in evaluation of different economical processes;
9) to develop the model of valuation port performance considering more significant elements of port technical, economical and organizational structure;
10) to establish the most significant efficiency indicators of port performance by experts method;
11) to recover possibilities to apply port efficiency indicators in the different levels of port management and authority;
12) to use the system of efficiency indicators in practise, exploring efficiency of port of Riga and to recover facilities to increase efficiency of Riga's port performance;
13) to define the most significant efficiency indicators of ports performance who could be used for port management and projection of ports' technical and economical development.

The Methodology of the Research

During the research general quantitative and qualitative methods of economic science were used. The most widely used methods were grouping, syntheses and analyses, induction and deductive, logically constructive, as well as mathematically statistical and expert methods.

*Scientific **novelty** and **Main Results***

Scientific novelty of the research are:

1) developed and economically motivated mathematical model that enables to perceive wide influence of ports on state economy;
2) worked out model of ports' economical, technical and managerial system;
3) worked out definition of *"port"* where are associated technical aspects of port foundation with logistical and economical function of port;
4) defined   and classified efficiency indicators of port performance accordingly to the model of ports' economical, technical and managerial system;
5) worked out the system of ports' efficiency indicators that discover role of different elements of port to achieve main objects of port performance;
6) designed mathematical model of port efficiency indicators that gives possibility to evaluate different aspects of port technical, managerial, economical and financial performance;
7) developed the   model of applying ports efficiency indicators that could be used in working out economic foundation for decisions regarding to different aspects of ports performance and development;
8) worked out integrated research about technical, economical, financial and managerial efficiency port of Riga for the first time during the political independence of Latvia.

During the research the following significant results were acquired:

1) after total political and economical crisis of 1990 sea cargo flow in the Latvian ports considerably declined, but notwithstanding that, the recession was managed within three years and after 1993 begun dynamical increase of cargos turnover in the ports;
2) economical and technical development of Latvian ports was increased in the second part of 90-ties of the last centaury and gets ahead the pace of the national economy development. Besides, the ports overcome economical crises and adapts to new market conditions more faster and effectively than other industries, thereby the influence of ports in national economy has increased;
3) analyzing results of cargo turnover and trends of the qualitative indicators of disposal resources of ports, is concluded that actual performance of ports more than ten times transcends cargos flow who are indispensable for the state. As a result the performance of the ports is interlinked with international logistic system therefore the ports performance are highly dependent on transit cargos flow

through the country that makes around 90% from total freight turnover in ports.

4) the performance of ports influences not only development of transport industry. That beneficially influences many other industries of national economy that produces and/or consumes the goods of foreign trade whose are included in the ports cargo as well as are used in the supplied port services and in the production of goods and services for ports;

5) performing calculation on correlation relevancies, it is proven that dynamic of cargos turnover in the ports is tightly dependent on cargos transported by railway but less dependent on cargos transported byroad;

6) ports services and good environment conditions of entrepreneurship leave favourable influence on cargos flow of external trade. Calculations of correlation proves tight relation between cargos turnover in the ports and flows of such goods of external trade as wood and related products; paper and cardboard; metal and metal products; food; chemical and textile goods. In that way the ports facilitates increasing competitiveness of Latvian export goods in international market;

7) in a structure of added value in port territory dominates services related with loaded and unloaded cargos, thereby added value gradually has been increased in the ports territories. That tendency is evaluated as economically significant in port performance;

8) growth of the tax incomes in the ports territories considerably exceeds increment rate of the revenue of the consolidated budget of the state;

9) worked out the model of applying of port efficiency indicators in the different levels of port management, expands facilities to put those indicators to analyze effectiveness of ports performance, to design development of ports as well as to control and supervise ports operations;

10) expert method is used to evaluate efficiency of port performance and these results provides additional information about more significant efficiency indicators of ports;

11) acquired results of correlation relevancies acknowledges interconnectedness and interactivity different groups of ports efficiency indicators. That confirms the importance of practical usage of port efficiency indicator system and discovers different aspects of the character of port operations. Thus, the possibility of practical applying of the system worked out is expanded.

12) the essential efficiency indicators of port operations was defined by mathematical data processing of obtained results of correlation analysis;

13) analysed and compared results of valuation effectiveness of ports performance, obtained by using expert and statistical correlation method. According acquired results is concluded that both methods gives similar results but statistical method gives more comprehensive information about effectiveness different aspects of port performance;

14) obtained results of the research could be used in order to motivate acceptation of different decisions regarding to port functions and development in the level of ports authorities as well as in the council of Latvian ports and in ports boards.

The Practical Application of the Research

The results of the scientific research are used in order to restructuring and improve business activities of Riga port, to improve legal bases of the port and to optimize port managerial system.

On this basis the author has made several proposals for Ministry of Transport about necessary complements and changes in the rules of Cabinet "Rules about entrance of ships in port and exit from it", "Rules in ships assigning" and Riga port rules related with improvement of management effectiveness. The author has participated in preparation amendments of Law of ports and Law of Riga Freeport as well as in elaboration and expertise of several normative acts with regard to ports performance and economical development, by using results of the research.

The results acquired during the scientific research allowed to launch quality management system according ISO standards in the Riga port, as well as improve and supplement regulating acts of the port management functions. More practical value has normative acts on changes in port fees, activation of entrepreneurship, control on cargos flow and improvement of follow-up in port territory, worked out by the author. That enables to make more detailed analyses about intensity of usage port resources and notably reduce unregistered cargos flow in port territory. Thereby, entrepreneurship environment in the port territory was improved.

The scientific cognitions obtained during working out the dissertation respecting valuation efficiency of ports and it significance in economy of state, were availed to prepare proposals concerning participation state of Latvia in the such international projects as "North Dimension" and "MATROS" *(Development of Spatial Planning and Transport Infarstructure Planning Methods for an Integrated Maritime Transport System in the Baltic Sea Region).* The aim of these projects is to optimize of utilization resources available for Northeast part of Europe

and to increase the role of Baltic sea ports in cargo transit operations in economical system within united Europe.

Developed valuation methods of efficiency of ports performance was practically used in research effectiveness of operations in the port of Riga from 1995. till 2002. The correlation comparative method of the time-series of ports efficiency indicators was used in the processing the results of the calculations.

Analyzing the results obtained with both mathematical and experts method, confirms that ports efficiency indicators of utilization fixed assets of port takes central place in the system of port efficiency indicators.

Publications

The author has prepared 7 publications about different issues regarding ports development, it influence on state economy, and has managed processing upwards than 20 important documents in Ministry of Economics about state economic development problems, as well as performed in 8 different conferences and workshops in Latvia and foreign countries.

Publications:

1. The significance of Riga Port in Industrial Development // Industrial Development in the Transition Period. Scientific materials of the International Scientific Conference in Riga, December 10,1999. - Riga.: Riga Technical University, 2000 - pp. 132. - 136 (with co-author).

2. The System of Effectiveness Indicators and its Importance in State Economy // Role of Engineering Economics in the Development of Entrepreneurship, Scientific materials of the International Scientific Conference in Riga, November 24, 2000.. - Riga.: Riga Technical University, 2002 - pp. 65. - 69. (with co-author).

3. Aspects of Port Marketing Development in Circumstances of Economics Globalization // Globalization of Economics and Its Problems, Scientific materials of the International Scientific Conference in Riga, Mart 15, 2002. // R.: University of Latvia, 2002 - pp. 251. - 265. (with co-author).

4. The Influence of Latvian Ports on State Economy // Economics and Business Economy: Theory and Practice. Series 3, Volume 2 - R.: Riga Technical University, 2002 - pp. 136. - 145. (with co-author).

5. A systematic Approach for Managing Normative Acts: a Business Modeling Perspective// Transactions in International Information Systems, Systems Analysis and Development Theory and Practice 2001. No 3.// The Wroclaw University of Economics Wroclaw 2001. p. 39. - 57. (co-author).

6. Globalization of economy and development of Riga port in the 21st century.// Economics and Business Economy: Theory and Practice,

Scientific proceedings of Riga Technical University, Riga, „RTU" 2000., p.60-70. (co-author).

7. The Role of Normative Acts Based Business Modelling in Port's Management Information System. // Scientific Proceedings of Riga Technical University, Series 5 - Computer Science, Volume 8 - Applied Computer System // R.: „RTU" 2001., 92.- 99.1pp. (co-author).

Scientific Conferences:
1. Influence of Latvian Ports to industries of State Economy // 2nd World Congress of Latvian Scientists, Riga, 14 - 15 August, 2001. Congress Proceedings//Riga-2001., pp 162.
2. Valuation of Latvian Ports Competitiveness in North - East Region of Baltic Sea // 43nd International Scientific Conference of Riga Technical University. Riga, October 10 - 14. Abstracts of Presentations. - R.: RTU -2002.-pp. 24.
3. Effect of Increasing Effectiveness of Ports Performance on Latvian economy // Role of Engineering Economics in the Development of Entrepreneurship, Scientific materials of the International Scientific Conference in Riga, November 24, 2000.. - Riga.: Riga Technical University, 2000 - pp. 60. (with co-author).
4. Impact of Latvian Ports to State Economy // International Scientific Conference "Current Development Trends of National Economy and Education". May 17, 2002, Riga, Abstracts of Presentations // R.: „RTU" - 2002., 54.1pp.
5. Technical and Economical Characteristic of Port Entrepreneurship// 42nd International Scientific Conference of Riga Technical University. Riga, October 11-13, 2001, Riga. Abstracts of Presentations// - R.: RTU-2001.-pp. 24.
6. The Role of Riga port to Development of Latvian Industry // International Scientific Conference of Riga Technical University. Riga, December 10, 1999. Abstracts of Presentations // - R.: RTU - 1999. - pp.

Author has managed and participated in elaboration number of conceptual documentation concerning different issues of develop of national economy. Matters of greater importance are as follows:
1. Tariffs of Riga Port., Riga Port Authority, Riga, 1999,56 pp.
2. Report of Economic Development of Latvia, Ministry of Economy Republic of Latvia, Riga, 1997. - pp. 131.
3.' Report of Economic Development of Latvia, Ministry of Economy Republic of Latvia, Riga, 1998. -pp. 136.
4. Report of Economic Development of Latvia, Ministry of Economy Republic of Latvia, Riga, 1998.-pp. 133.

5. National Program of Foreign Trade Republic of Latvia, Ministry of Economy Republic of Latvia, Riga, 1998. - pp. 76.

6. Concept of Development of Manufacturing Republic of Latvia, Ministry of Economy Republic of Latvia, Riga, 1998., 56 p..

7. Concept of Innovative Activity, Ministry of Economy Republic of Latvia, Riga, 1998., 56 p..

8. Concept of National Program of Foreign Trade, Ministry of Economy Republic of Latvia, Riga, 1999., 127 p.

9. National Program of Market Surveillance., Ministry of Economy Republic of Latvia, Riga, 1999., 75 p..

lO.National Program of Development of Standardization in Latvia., Ministry of Economy Republic of Latvia, Riga, 1998., 66 p.. 11 .Regulations of Latvian Innovation Fund,. Ministry of Economy Republic of Latvia, Riga, 1998., 16 p.. 12.Terms of Project Application and Procedure of Granting and Control of Resources of the Regional Fund., Ministry of Economy Republic of Latvia, Riga, 1999., 36 p..

The Structure and Volume of Dissertation

The dissertation consists of 3 chapters and 15 branches. The total volume of dissertation is 195 pages without appendixes. It is included 79 tables, 18 figures and 14 appendixes in the treatise.

The structure of the dissertation:

I THE INFLUENCE OF PORTS PERFORMANCE ON DEVELOPMENT OF NATIONAL ECONOMY

1.1. Suitability of ports for performance different functions of national economy:

1.1.1. The essential tendencies in the development of Latvian ports;

1.1.2. The analyze of main tendencies of cargo turnover;

1.1.3. The analyze technical indicators of the ports;

1.1.4. The main tendencies of exploitation ports territories and berths;

1.2. Influence of ports performance on state economy:

1.2.1. Impact of ports on growth of state DGP;

1.2.2. Significance of ports in development of transport industry;

1.2.3. Influence of ports on cargo transit, rail and road transport;

1.2.4. Effect of ports on the foreign trade;

1.2.5. Relevance of ports in fiscal function of state.

n DEVELOPMENT OF VALUATION METHODS OF PORT PERFORMANCE

2.1. Conception of economical efficiency and its theoretical aspects:

    2.1.1. Classification indicators of economical efficiency;

    2.1.2. Widely used indicators of economical efficiency.

2.2. Port as system of economical, technical and organisational activities:

    2.2.1. Definition of port conception;

    2.2.2. Model of port as system and its main elements.

2.3. Development mathematical method of valuation of port performance:

    2.3.1. Determination efficiency of port economical activities;

    2.3.2. Determination efficiency of port financial activities;

    2.3.3. Determination efficiency of port technical operations;

    2.3.4. Determination efficiency of port management.

    2.3.5. Using potentialities of port efficiency indicators in ports management and state supervision.

2.4. Arrangement of expert methods for valuation efficiency of port performance.

HI PRACTICAL ADOPTION METHODS OF VALUATION EFFICIENCY OF PORT PERFORMANCE

3.1. Justification of choice Riga seaport for application methods of valuation efficiency of port performance;

3.2. Calculation indicators of technical efficiency for Riga seaport:

    3.2.1. Calculation efficiency of technical exploitation port territory;

    3.2.2. Calculation of technical efficiency exploitation port infrastructure;

3.3. Calculation economical efficiency indicators of Riga seaport:

    3.3.1. Economical efficiency of exploitation port territory;

    3.3.2. Economical efficiency of utilization capital assets of the port;

    3.3.3. Economical efficiency of employment port labour resources.

3.4. Calculation efficiency indicators of financial activities of port of Riga

3.5. Calculation efficiency indicators of port management

3.6. Correlation comparing of efficiency indicators time series of performance Riga seaport:

The topicality of the theme, the goal and tasks, the methodology as well as die novelty and practical application of the research are expounded in the introduction of the dissertation. The conclusive part of the treatise consists of the conclusions and proposals, bibliography and appendices.

The present research is accomplished at Riga Technical University, the Faculty of Engineering Economy, in the professors' group of Manufacturing and Managerial Economics in accordance with law "On Scientific Work", Cabinet regulations (Nr. 134, of 06.04.1999.), instructions by the Council of Science of Latvia Republic and resolutions by the Senate of Riga Technical University

THE MAIN SCIENTIFIC ELABORATIONS

1. The author has showed close connection of ports performance with state economy by using different investigation methods of the dissertation. The relevance of Latvian port in the development of the state economy has increased after regaining of independence of state and reformation of the state economy accordingly principles of free market economy.

Ports is one of the natural advantage of the state and purposeful development of them enables to increase positive influence on economical development of the state. Effectiveness of the ports and it economical significance are tightly connected economical categories. Intensification exploitation of the ports disposal recourses creates the economical basement for reduction tariffs of ports services and increasing competitiveness of ports performance. These cognitions are used to draw conclusions as follows:

=> increasing of ports effectiveness is not the end in itself, but the instrument to achieve strategically significant goal for ports development;

=> increase of ports influence on economy of the state is closely connected with intensification of utilization disposal resources of ports.

2. The author has showed tendencies of economical and technical development of the largest state ports and suitability of these ports to carry out different economical and technical functions. Main attention is paid to discover factors who influences performance of me ports and to analyze indicators of different operations of ports. The most significant factors that influences ports performance are as follows:

=> Location by the East coast of the Baltic see that washes borders of 8 European countries, is one of the most intensive sailing regions in the world;

=>Non-freezing west cost of the state and allocation there port of Liepaja, port of Ventspils and port of Pavilosta whose provide regular supply of different cargos also in winter navigation period;

=> Location in neighbour to Russia - by means of territory and market potentials is one of the largest country in the world;

=> Location in the West-East cargos flow corridor that connects not only West European countries with Russia and Central Asia countries in transit through Russia, but also provides export and import cargos flow from America, Australia un West African

countries to Russia and its transit countries. Latvian ports can positively contributes the competitiveness of that transport corridor by offering reliable basic services like:

- water deep enough in aquatorium of ports;
- good availability of quays;
- suitable and compatible equipment;
- efficient handling and storage possibilities;
- good general service level and compatible tariffs.

=> Free port status for ports of RTga, Ventspils and Liepaja and attractive business environment;

=> State and municipality investments   in the development ports infrastructure;

=> Economical policy   of foreign countries respecting to Latvian ports;

=> Globalization tendencies of economy, occurrence of international terrorism and   development of movement against globalization.

The factors with positive influence on the development of ports have facilitated it natural and comparative advantages in competition with other ports in these region of Baltic sea and other kinds of cargo transportation. Therefore reorganization, assessment, utilization and development these advantages is very important strategic goal for ports development that facilitates increasing competitiveness of Latvian ports and influence of ports on state economy.

3. In the first part of the dissertation are characterized more significant tendencies in technical and economical development of the Latvian ports from 1990. till 2002. For that reason the indicators of ports cargo turnover and potential performance as sum of performance terminals of different kind of cargo are used.

To valuate effectiveness of exploitation bulk cargo terminal following equitation is applied:

$$E_{BCT} = \frac{\sum BC_i}{\sum BCT_j} \times 100\%, \qquad (1)$$

where E_{BCT} - effectiveness of exploitation bulk cargo terminal;

$\sum BC_i$ - total amount of cargo reloaded in bulk cargo terminals;

$\sum BCT_j$ - total performance of bulk cargo terminals;

The effectiveness of liquid and general cargo could be calculated in the like manner.

Taking account equitation Nr.l, an effectiveness of exploitation port performance could be determine by applying following equitation:

$$EI_{POR} = \frac{\sum BC_i + \sum GC_k + \sum LC_l}{\sum BCT_j + \sum GCT_m + \sum LCT_n} \times 100\%, \qquad (2)$$

where EI_{POR} - indicator of exploitation of port performance;

$\sum BC_i$ - total amount of cargo reloaded in bulk cargo terminals;

$\sum GC_k$ - total amount of cargo reloaded in general cargo terminals;

$\sum LC_l$ - total amount of cargo reloaded in liquid cargo terminals;

$\sum BCT_j$ - total performance of bulk cargo terminals;

$\sum LCT_n$ - total performance of general cargo terminals;

$\sum GCT_m$ - total performance of liquid cargo terminals.

Equitation Nr.1 and Nr.2 are applied to valuate both intensity of exploitation different kinds of terminals and effectiveness ports.

Port Ventspils is the biggest port in terms of cargo turnover, who specializes in shipping of oil and oil products. The main tendencies of cargo turnover in port of Ventspils are showed in the table Nr. 1.

Table Nr1

The Main Indicators of Development Port of Ventspils

Kind of cargo in the port	Performance of port terminals (thous.t)			Cargo turnover (thous.t)			Effectiveness indicator (%)	
	1990. gads	2002. gads	2002.g to 1990.g %	1990. gads	2002. gads	2002.g to 1990.g %	1990.	2002.
Liquid cargo	51500	62 100	121	25 163	20 539	81,6	48,9	33,1
Bulk cargo	7 000	10 500	150	3 817	7 605	199,3	54,5	72,4
General cargo	3 700	8 600	232	520	560	107,7	14,1	6,5
Sum	62 200	81200	131	29 500	28 704	97,3	47,4	35,4

Share of liquid cargo in the total turnover of cargo in this port constitutes 66,4%. After deepening of port shipping channel and other technical work the port is ready to take tankers of 100 - 120 thousand tons carrying capacity.

Ventspils port is maintained the status of biggest port in the Latvia as well as in the area of Baltic sea till year 2002, although cargo turnover in the port is reduced by 2,7% in the revisory period. Yet the total performance of port terminals has grown by 1,31 times and thereof the indicator of utilization port performance has decline by 12%. Bulk cargo terminal performance is better utilized. It is increased by 17,9%, but utilization of general cargo terminal performance has decline more than 2 times and constitutes only 6,5% in 2002. These indicators recover serious

economic zone attracting significant investments for reconstruction of Liepaja port

Table Nr3

The Main Indicators of Development Liepaja Port

Kind of cargo in the port	Performance of port terminals *(thous.t)*			Cargo turnover *(thous.t)*			Effectiveness indicator (%)	
	1995.	2002.	2002. % to 1995.	1995.	2002.	2002. % to 1995.	1995.g.	2002.g.
Liquid cargo	800	1200	150	106	888	838	13,3	74,0
Bulk cargo	700	1000	143	10	800	8000	1,4	80,0
General cargo	2 000	3600	180	1324	2 631	199	66,2	73,1
Sum	3 500	5 800	166	1440	4318	300	41,1	74,4

Port business in Liepaja was renewed in 1993. by handled 0,4 milj.t of cargo, but cargo turnover reached 4,3 milj.t port in 2002. Within 7 years the port performance has increased from 3,5 milj.t till 5,8 milj.t. or 1,7 times, but volume of handled cargo has increased 3,0 times. Thereby the indicator of efficiency of exploitation bulk, liquid and general cargo terminals performance in Liepaja increases 70%, but efficiency of utilization performance of balk cargo terminals has achieved 80%. It is the best result of utilization port facilities between the largest port.

There are 7 **small** *ports* in Latvia and cargo turnover of them constituted 1,02 milj.t. in 2002. The most important indicators of economical activities of small ports are collected in the table Nr.4.

Table Nr4

The Main Indicators of Development small ports

Kind of cargo in the port	Performance of port terminals *(thous.t)*			Cargo turnover *(thous.t)*			Effectiveness indicator (%)	
	1995.	2002.	2002. % to 1995.	1995.	2002.	2002. % to 1995.	1995.g.	2002.g.
Liquid cargo	0	0	0	0	0	0	0	0
Bulk cargo	200	400	200	43	99	230	21,5	24,8
General cargo	750	950	127	627	925	148	83,6	97,4
Sum	950	1350	142	670	1024	153	70,5	75,9

After economical crisis in 1990. the business in the small ports had come to a stop. The cargo flow gradually was renewed after 1993. Simultaneously the reconstruction of infrastructure of the small ports was commenced to adiust to die new conditions of carso transoortation market.

The structure of handled cargo shows that small ports have significant influence on regional development. Thereby in these ports dominates cargo produced by local enterprises, those are peat, woodchips, pulpwood as well as fishes.

The turnover of bulk cargo has increased 2,3 times in the small ports within 7 years, but turnover of general cargo - 1,5 times. The general cargo dominates with 91% in the volume of handled cargo in the small pots, accordingly the efficiency of utilization of general cargo terminals has reached 97,4% and share of utilization performance of all small ports constitutes 76%.

4. Analysis of cargo turnover in Latvian ports shows that port operations have been influenced by different economical and political crisis in the state and foreign countries. This influence reflects in the graphical modelaccordingfigureNrl.

Figure Nr.1.   **The graphical model of cargo flow in Latvian ports**
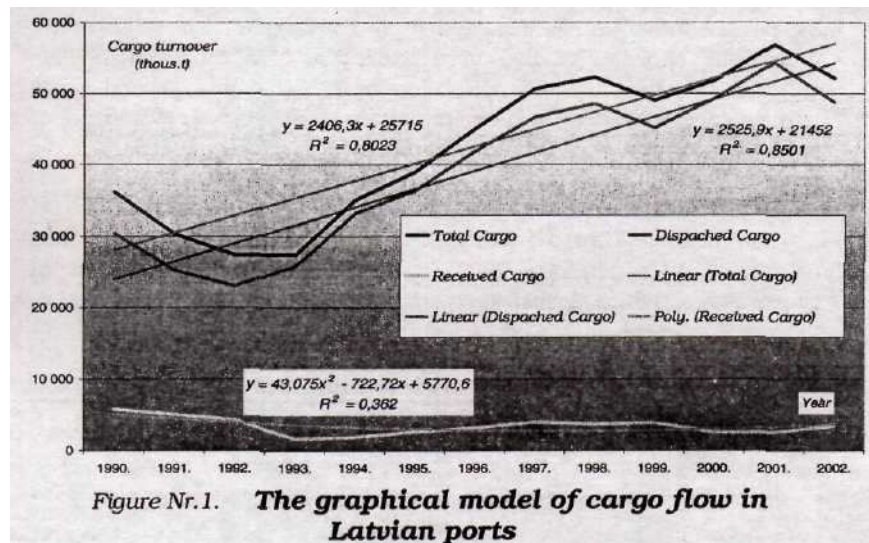
The figure Nr. 1. shows that character of tendency of reduction cargo turnover in the beginning of 90-ties was different in the group of delivered and received cargo comparing with common cargo flow. Most lasting and biggest decrease is in the group of received goods, it continued till 1993. and in this year was received only 1,6 milj.t of different goods in Latvian ports or 3,6 times less than in 1990. More optimistically situation we can see in the group of delivered cargo. The lowest point in that group of cargo

- 23,1 milj.t was achieved in 1992. Thereby decrease of delivered cargo flow was 25,3% to compare with 1990.

The tendency of common cargo flow as well as volume of received and dispatched cargo are characterized by following functions of trend:

$$\text{- common cargo flow-} \qquad y_{NK} = 2406{,}3x + 25715; \qquad (3)$$
$$\text{- dispatched cargo} \quad - y_{NK} = 2406{,}3x + 25715; \qquad (4)$$
$$\text{- received cargo} \quad - y_{VK} = 43{,}067x^2 - 722{,}6x + 5770{,}2; \qquad (5)$$

The equitation of trends function indicates that tendency of common cargo flow and dispatched cargo has linear character but character of received cargo flow is more difficult. That confirms that port operations, but especially received goods has been influenced by different inland and outland factors who are difficult predictable.

5. The author has developed system of economical and technical indicators to assess the technical suitability of ports for realization its basic functions in connection with transport system and state economy. This indicators enables to investigate significance of ports in state economy and analyse changes in the ports operations corresponding to economically growth of state. Mentioned indicator system is divided on following groups:

=> joint territory of port and share of available land for business activities;

=> number of berths in the port, it length and warrantable draft of the ship served at the berth;

=> square of aquatorium and basins of shipping;

=> length and width of main basin of port and warrantable draft of ship entered in the port;

=> the length of rail and road subways and it location in the port territory;

=> technical level of superstructure in the port terminals and it performance;

=> capacity of warehouses for short-time storage goods in the port territory;

=> performance of terminals in port area and common performance of the port.

In these groups were included technical - quantitative indicators of the port, who are increased by the qualitative indicators. The qualitative indicators were obtained by dividing with each other functionally connected quantitative indicators as well as by dividing quantitative

indicators of the effect of port operations such as total cargo turnover in the port; number of ships served in the port; DW and GT of those ships by corresponding indicators of disposal port resources.

Thereby the system of indicators for port technical characterization are developed. This system gives clear concept about technical readiness of port to serve defined size ships and recover possibilities of port to participate in the inland and inter-state logistical systems as well as to facilitate economical growth of the state.

The main indicators of increment technical potential of ports is showed in the table Nr.5.

Table Nr.5.

Comparison of Main Technical Indicators of Latvian Ports

Indicator	Port of Riga	Port of Liepaja	Port of Ventspils
2002. compare to 1990. *(in per cents)*			
Territory of port	100	134	269
of which: - land	100	176	381
- port aquatorium	100	100	100
Number of berth	118	109	110
Length of berth	123	108	117
Maximal draft of served ship	110	136	118
Square of warehouses - total	147	197	131
of which: - open warehouses	142	193	146
- closed warehouses	219	218	111

The figures in the table Nr.5 indicates that land territory of port has increased in Ventspils and Liepaja in revisory period, but aquatorium has remained without any changes in the all ports. The number of berths has extended in the all ports, but major extend is in Riga port - by 18% . This tendency is connected with ambitions of Riga port to increase competitiveness in the field of services bigger size ships. Thereof in port of Riga is biggest enlargement of berth length.

More intensive is explored port territory in port of Ventspils. There were reloaded 14,2 thousands ton per hectare of land, but in port of Riga -2 times less and 6,8 times less in port of Liepaja comparing to port of Ventspils.

Qualitative indicators of exploitation of port territory and berths indicates that from 1995. to 2002. intensity of exploitation of port territory and berths has increased in port of Riga and port of Liepaja, but decreased in Ventspils port. It could be explained with augmentation of cargo flow in

these ports while cargo flow in port of Ventspils has decreased in the revisory period.

Main indicators of intensity exploitation of ports territory and berths is located in the table Nr.6.

Comparison of Main Technical Indicators of Latvian Ports

Indicator	Riga Port	Liepaja Port	Ventspils Port
2002.			
Cargo turnover in the port *(thous.t)*	18 108	4 318	28 704
Of which: per lha of port territory	7.2	2,2	14,2
per 1 ha of port land	17.5	3,7	16,6
per 1 ha of port aquarium	12,1	5,3	96,0
per 1 berth	160,2	88.1	441,6
per 1 m of berth length	1,3	0,4	2,8
2002. compare to 1995. (in per cents)			
Cargo turnover in the port *(thous.t)*	242,9	299,9	96,9
Of which: per lha of port territory	246,7	217,0	36,0
per 1 ha of port land	242,8	174,3	25.5
per 1 ha of port aquarium	242,2	296,2	96,9
per 1 berth	208.7	299,7	88.0
per 1 m of berth length	187,2	220,3	82,0

Analyze of quantitative and qualitative indicators of exploitation of port territory and berths confirms that ports has possibilities to increase cargo turnover considerably without enlargement investment in the terminals and berths, but for that it is necessary to develop port transport infrastructure in the territories of ports and connections with main railways and motorways of state.

6. The author has used graphical model of cargo turnover in the ports and GDP growth to assess tendencies of competitiveness Latvian ports and compare to growth trend of state economy within period from 1990. to 2002.

The graphical model is showed in the figure Nr,2.

The trend character of cargo turnover in the ports and GDP growth are reflected by following functions of the trends:

- cargo turnover $-y_c = 2\,406{,}3x + 25\,715;$ (6)
- growth of GDP $- y_{GDP} = 477{,}81\,x^2 - 7\,271{,}4 + 50\,698;$ (7)

The quotations show that trend of cargo turnover in the ports has linear character, despite of notable decreasing cargo flow after financial crises in Russia in 1999. But character of GDP trend has polynomial of 2nd degree and it confirms that character of GDP growth is more difficult compare to trend of cargo turnover in the ports.

Figure Nr.2. **Graphical model of growth GDP and cargo turnover in the ports.**
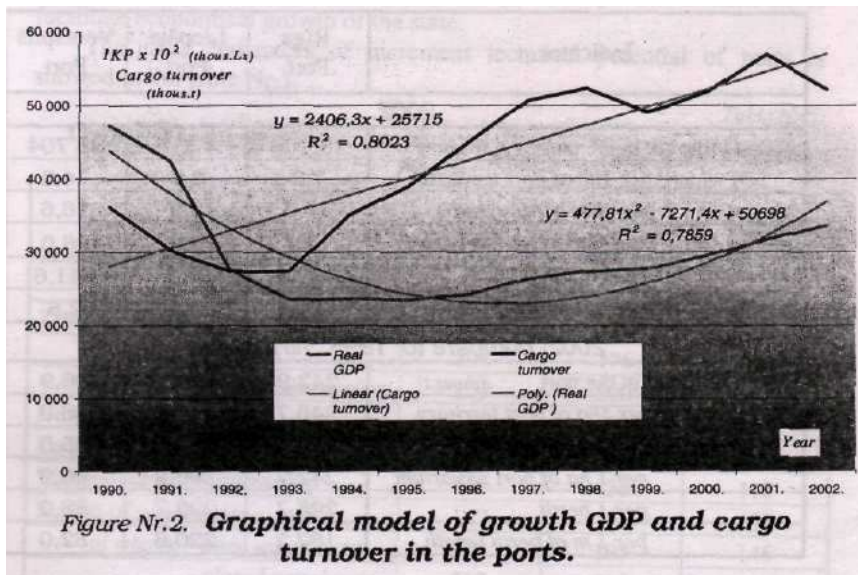
Graphical models shows that increasing of cargo turnover in the ports is credibly faster compare to growth of GDP. That confirms increasing of ports influence in the production state GDP in the revisory period and thereby competitiveness of ports overtakes competitiveness of many others units of sate economy.

7. To obtain more precise point of view concerning interaction of the ports and state economy, the author has developed matrix where is shown influence of the ports on the different industries of state economy and social processes. More significant of them are as follows:

=> facilitation of development transport and other industries;
=> developing advantageous environment for entrepreneurship;
=> facilitation of foreign trade;
=> attraction inland and foreign investors;
=> favourable impact on employment policy of the state;
=> fortification of state defends power;

=> popularisation of state image in the world;

=> creation some advantages for smuggled goods flow. From point of view economical development of state, the most significant factors of port activities in the state are favourable influence on development of transport industry and facilitation increasing competitiveness of export goods. The positive impact of ports activities is very substantial related to attraction investments in the ports territories and out of them, thereby are facilitated the growth of state economical capacity, different activities of business and employment.

8. To clarify the influence of the port on economy the author has analyzed dynamic of added value in the ports territories and in the state economy on the whole in the period from 1998. till 2002.

Growth of added value in the ports are showed in table Nr.7.

The added value created in Latvian ports

Indicator	Added value year after year *(thous.Ls)*					2002. to 1997.%
	1998.g.	1999.g.	2000.g.	2001 .g.	2002.g	
Added value (AV) in the ports	1 084,9	1 037,7	1 124,1	1444,5	1 410,4	130,0
increase per year (%)	XXX	0,96	1,08	1,29	0,94	XXX
AV per 1 ton of cargo turnover in the ports *(Ls/t)*	0,022	0,023	0,023	0,025	0,026	117,1

Source: Unpublished dates of Central Statistical Bureau of Latvia

The dates collected in the table Nr.7 shows that added value in the ports territories has increased by 30% but in the state economy by 25,5% in the revisory period. Future more added value per 1 ton of reloaded cargo has increased by 17%. It indicates on development other kinds of business in the ports besides main port services - cargo shipment and cargo discharge.

9. The coherence of correlation relationships is used to analyze ports performance on transport industry and state economy on the whole. In that case cargo turnover in the ports is correlative compared with dynamic of added value in the transport industry and state economy. Calculation results has collected in the table Nr.8.

The results in the table Nr.8 discovers very tight correlation between time series of added value created in the ports and added value in the transport industry and in the state economy on the whole. The correlation coefficients - 0,872 in the first case and 0,942 - in second one indicate on

that relationship. This result confirms significant influence of ports activities on development of transport industry and state economy.

Correlation of time series of cargo turnover and added value

Indicator	Cargo turnover			AV in the transport industry	AV in the state economy
	Total	Shipped cargo	eceived cargo		
AV in economy	-0,137	-0,225	0,772	0,720	xxxx
AV in TI	0,545	0,603	0,366	xxxx	0,721
AV in the ports	0,992	0,994	-0,776	0,872	0,942

Abrivations used in the table: AV- added value; TI - Transport industry

Result of correlation time series of the added value in the transport industry and state economy indicates on close coherence between those indicators. It confirms significant impact of transport industry on state economy.

10. Interesting result has obtained concerning influence of ports activities on operation of state railway by analyzing cargo turnover of railway and applying method of correlation comparison between time series of cargo turnover in the ports and rail cargo turnover.
The cargo brought in the port by railway has increased 1,4 times from 1990. till 2002., although total volume of railway cargo turnover in the state has decreased almost 2 times (by 52,4%) in the revisory period. It indicates that activities of the ports has considerable influence on operations of railway in Latvia.
It is used correlation calculation for more detail analyze relationship between port activities and railway operation.

Results of correlation between cargo turnover in the ports andjreight transport by rail

Indicator	Cargo turnover in the ports		
	Total	Cargo loaded	Cargo unloaded
Freight transport, total	-0,205	-0,294	0,796
of which: - domestic traffic	-0,357	-0,437	0,743
- international traffic	0,318	0,273	0,328
- transit cargoes	0,889	0,876	-0,047
of which through ports	*0,977*	*0,955*	*0,009*

Calculated indicators in table Nr.9 confirms hypotheses about tight connection of freight transport by rail and ports activities, but transit cargoes transportation by rail has connected in higher extent. It is indicated by values of correlation coefficient - 0,889 and 0,876. It witnesses that ports activities and rail operations in the state has connected in the one logistical system and one transport hub.

Applying method of correlation to analyze the coherence between ports activities and road transport operations was recognized that ports has influenced this kind of cargo transportation too. It is confirmed by results of correlation calculations.

Correlation analyze of time series of reloaded cargo structure in the ports and time series of indicators of auto transport operations shows that cargo transportation by auto is closer connected with destination containers and goods for consumption as well as wooden goods.

11. Analyzing influence of port activities on foreign trade was proved that ports have significant impact on export and import. Results of calculation concerning correlative relationship between cargo turnover in the ports and different groups of export and import goods are displayed in the table Nr.10.

Table Nr.10.

Results of Correlation Cargo Turnover in the Ports and Foreign Trade

HS section	Cargo turnover in the ports			Cargo turnover in the ports		
	Total	Cargo loaded	Cargo unloaded	Total	Cargo loaded	Cargo unloaded
	Value of export			Volume of export		
TOTAL	0,909	0,917	0,490	0,903	0,911	0,491
IX	0,942	0,947	0,559	0,911	0,919	0,502
X	0,948	0,944	0,658	0,800	0,822	0,287
XV	0,790	0,818	0,221	0,823	0,831	0,449
	Value of import			Volume of import		
TOTAL	0,965	0,967	0,603	-0,148	-0,137	-0,211
X	0,991	0,989	0,657	0,944	0,956	0,475
XI	0,984	0,982	0,648	0,948	0,953	0,564
XVI	0,961	0,965	0,574	0,818	0,841	0,289

The indicators accumulated in the table Nr.10 points out that value of correlation coefficient between total cargo turnover, loaded cargo in the ports and total volume of exports goods is accordingly 0,91 and 0,92. That result confirms existing close relationship between the total cargo turnover, loaded cargo in the ports and total value of export goods.

Alike coherence is recognized in the correlation between cargo turnover in the ports and export goods from HS section IX (wood and articles of wood), section X (pulp of wood; waste and scrap of paper or paperboard) and section XV (iron, steel and other metals). In that case the value of correlation coefficients are from 0,79 till 0,95.

Analyzing correlative relationships of value and volume of import goods and port activities it was proved that close connection exist between cargo turnover in the ports and import goods from section X (paper and paperboard); section XI (textiles and textiles articles) and section XVI (machinery and mechanical appliances). The values of correlation coefficients from 0,84 till 0,99 confirms that conclusion.

Obtained results of correlation analyze confirms that impact of ports entrepreneurship activities in great extent facilitates expansion of foreign trade and increasing competitiveness of several export goods in the world. Besides, ports activities promotes decreasing prices of import goods, thanks of comparative low transport tariffs and possibility of state to deliver wide range of import goods by sea transport.

In the process of investigation ports activities was clarified that discount policy of ports authorities facilitates attraction of import and export goods to ports. Besides me policy of discounts is favorable for goods produced in the state with low added value too, who are exported in the large quantity. Thereby the ports activities makes positive impact on transport industry and state economy on the whole.

12. Analyzing impact of ports activities on state economy is concluded, that ports not only essential element of state logistic system, but significant source of incomings for state un municipality budgets. Results of tax funds due to ports operations is showed in the table Nr. 11.

Table Nr. 11.

Tax Revenue in the Ports Territories

Indicator	1998.	1999.	2000.	2001.	2002.	2002. against 1998. (»)
Tax revenue *(thous.Ls)*	85 548	81 500	90723	107 283	108 459	126,8
Growth per year *(%)*	xxx	95,3	111,3	118,3	101,1	xxx
Cargo turnover *(thous.t)*	48 575	45 145	49 276	56 915	52 155	107,4
Growth per year *(%)*	xxx	92,9	109,2	115,5	91,6	xxx
Tax revenue per 11 of cargo turnover (Ls/t)	1,76	1,81	1,84	1,88	2,08	118,1

The figures in the table Nr.ll shows that total revenue from economical operations of ports has increased by 26,8% from 1998. to 2002., but cargo turnover has extend only by 7,4% in the same period. It indicates on expansion diversification of entrepreneurship in the ports territories. This tendency is connected with increasing set of services provided by enterprises for vessels in the port and broadening process of production new goods in the territories of the ports. Therefore the sum of tax paid by enterprises in the ports has increased per 11 reloaded cargo by 18,1%. This growth is more than two time bigger compare with increasing cargo turnover in the ports.

13.The effectiveness of ports performance becomes more topical in conditions of globalization economy caused by two significant aspects as follows:
- possibility and necessity to utilize disposal resources of ports more preferable and intensive thus, increasing ports impact on development of state economy;
- strengthening competitiveness of Latvian ports in the North - East region of Baltic sea by offering high quality port services and compatible tariffs.
Thereby, the main way to keep and extend market position in the global network of logistical system is to ensure effectiveness in the all processes of ports activities as well as to be elastic in connection with invariably changeable demands of ports clients.

14. For examining utilization disposal resources of society *an effectiveness* in economic science has been applied to evaluate an intensity of different economic processes in connection with obtaining certain economical targets.
In different publications of economic theory, term *an effectiveness* is defined unequivocally because each author explains it from different point of view. However, each definition has constant approach concerning to necessity to compare obtained result with resources utilized in order to reach certain result. Summarizing definitions previously formulated by different scientists, the author offers following definition of *an effectiveness:*

"Effectiveness" is comparable evaluation of the process or purposeful action of individuals that is assigned against resources used in order to obtain respective result

15.It is very important to acquire objective information about usefulness utilization resources in order to evaluate obtained result of

researching different economical processes, and it isn't possible to gain satisfactory result by applying one or a few efficiency indicators, thereof the group of efficiency indicators might be used accordingly the content of the explored object and the goal of the research. Thus, selected efficiency indicators forms definite, interconnected system of efficiency indicators that correspondent to the structure and purpose of the object of research.

After investigation efficiency indicators used in the literature of economical theory the author has classified the efficiency indicators. Thereby the efficiency indicators were divided in two large groups - general indicators of efficiency and special indicators of efficiency accordingly a structure of the indicators who forms an effect and resources of the defined efficiency indicators. Investigating ongoing processes in different economical systems, the author has divided them in the following groups:

> => technical efficiency indicators;
> => efficiency indicators of economical activities;
> => efficiency indicators of financial activities;
> => efficiency indicators of management.

That classification of efficiency indicators creates possibility to gain more clear insight concerning to ongoing processes in different economical activities and to develop system of efficiency indicators - the most appropriate for objectives of research work.
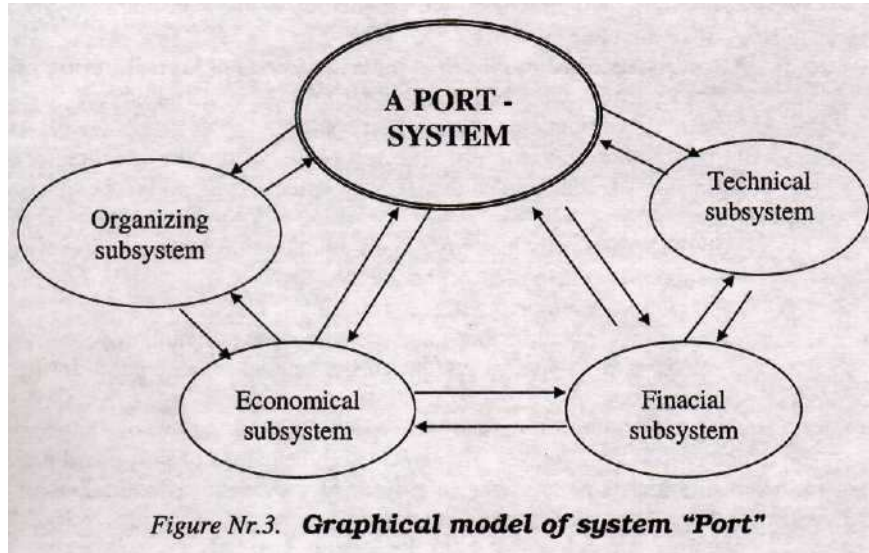
16. The system of efficiency indicators have to be developed on a base of precise study of the object and the processes within the object. In this scientific research the object of exploration is a port. In order to develop the system of efficiency indicators of port, it is necessary to define structure elements of port and reveal the most significant ongoing processes in the structure of port.

,,A Port" is the main object of the dissertation and therefore the system of ports' efficiency indicators is developed to define different elements in a structure of a port and to discover ongoing processes as well as interconnecting of them.

The author has developed following definition of *A Port* after evaluation port definition of different authors:

" *A Port* is a demarcated and constructed land in a special geographical area (a sheltered deep water area such as a bay or river mouth), where ships are brought alongside land to load and discharge cargo as well as who are appropriate for other business activities".

To take into account mentioned definition of a port and the most important functions of a port operations, the model "A Port as System" was developed, where main elements of port are showed. On the bases of that model, the author has developed a structure of technical, financial, economical and managerial subsystems, discovering a significance of "port -system" elements in the operations of a port and character of interconnections and interrelation of them. That approach enables to develop the system of efficiency indicators of a port.

Figure Nr.3. **Graphical model of system "Port"**

The goal of the development of the system efficiency indicators is to provide essential information for institutions of state and municipality with for supervision and control ports operations. The efficiency indicators of a port is significant indispensable for state ministers and other officials to take optimal decisions in connection with different operations of ports, having regard rapidly variable environment of ports activities. Thus, intensity of utilization disposal recourses of ports and competitiveness of ports could be increased in the circumstances of worlds' globalization.

17. The system of efficiency indicators consists of technical, economical, financial and managerial subsystems. In the dissertation in term "management" is combined two operations concerning with managerial procedures - guidance and authority:

- guidance - as advice or instructions on how to do something and the process of controlling the course of something as it moves;

- authority - as institution of government or municipality to administrative public services or enterprise; institution of power, administration.

Why it is important? The ports as difficult logistical and economical system are under supervision of state and municipality, but real administrator in the port is the port authority. And each part of port management has different position concerning processes in the ports.

In die guidance of the port is included institutions, who affects the ports operations by indirections, with mediation of the port authority and the executive director:

- such state institutions as -Latvian Council of Ports; Ministry of Transport; Ministry of Finance; Maritime Administration etc;
- council of municipality and port board.

But port authority consists of executive director of port and directors of departments of the port authority who affects the ports operations directly.

In the area of responsibility of port guidance are such main issues:
- supervision activities of the ports;
- strategic development of the ports;
- state investment for ports and budget of the port authority;
- leasing of capital assets owned by state and municipality in the port territory.

But port authorities mainly deals with tactical issues of the port development, they organizes implementation decisions of port board and other institution of ports guidance as well as they controls operations of ports and organizes marketing of the port.

18. To estimate the effectiveness of different port operations such general equitation is used:

$$OER_i = \sum Q_i : \sum R_i, \qquad (8)$$

where OER_i - indicator of ports' effectiveness for activity i;

$\sum Q_i$ - total result of ports' activity i;

$\sum R_i$ – total resources utilized to obtain result of ports' activity i.

To calculate different indicators of ports' effectiveness the following indicators of effect of ports activities are used - cargo turnover; added value in the territory of the ports; the ships entered in the port; GT and DW of the ships entered in the port; incomes in the port budget; profit; and other indicators. To characterize resources utilized in the different activities of the port, following indicators are used - area of the land and aquatorium; labour force in the port; capital assets of the port; infrastructure of *the* port and other indicators.

19. To define efficiency indicators of economical performance of the port such indicators of port operations are used:

> - indicators of effects of port activities - cargo turnover; added value in the territory of the ports; incomes in the port budget and profit;
>
> - indicators of resources - area of the land and aquatorium; labour force in the port and capital assets of the port.

To define efficiency indicators of financial activities of the port such indicators of port operations are used:

> - indicators of effects of port activities - incomes in the port budget and added value in the port territory;
>
> - indicators of resources - expenditures of port budget; equity capital; value of assets.

To define efficiency indicators of technical operations of the port such indicators are used:

> - indicators of effects of port activities - cargo turnover; the number of the ships entered in the port; GT and DW of the ships entered in the port; the volume of cargo brought in and out of the port by rail and road transport;
>
> - indicators of resources - area of the land and aquatorium; number and length of berths; length of road and rail in the port territory.

To define efficiency indicators of managerial activities the port authority such indicators are used:

> - indicators of effects of port operations - cargo turnover; incomes in the port budget; added value in the port territory and profit;
>
> - indicators of resources - financial resources for port authority and port board; number of employed people in the port authority; fond of wages of port authority and the board; capital assets of port authority and the board.

Thus, the indicators' system of the port effectiveness was developed by using mentioned indicators of effects of port operations and indicators of utilized resources. That system was divided on 9 groups who characterizes effectiveness of technical, economical, financial and managerial activities of the port. Obtained groups of ports' effectiveness indicators creates., full economical transparency about broad range of port operations.

This system could be applied to analyze effectiveness of technical, economical, financial and managerial activities of the port.

20. It is proposed to use worked out system of efficiency indicators to obtain full spectrum of information for subjects of port management concerning effectiveness of different processes of the ports. That information are significant necessary for optimization decision making processes and to provide increase the intensity of utilization disposal resources of ports as well as to increase ports competitiveness.

Analyzing the normative acts who regulates ports operations the author has defined 7 levels of supervision and controlling of ports activities including the state institutions and municipality: 4 of them concerns to guidance of the port, but 3 of them - to port administration.

Examination of decisions made by Ministry of Transport and corresponding municipalities concerning the ports operations from 1998. till 2002. proves that decisions were made in the conditions deficit of information about effectiveness of utilization disposal resources of the ports. Thus, decisions made by state authorities were not optimal and therefore they couldn't facilitate development of ports sufficiently and provide more effective way of utilization state aid for the ports.

To prevent mentioned luck of usefulness information for port management the author has developed model of applying system of effectiveness indicators for different levels of management. The model shows whose indicators might be applied for certain level of port management to make decision in connection with economical and technical development of the ports. Applying of the model enables analyzing the ports' performance more detail and recover reserves in intensification of utilization disposal recourses. The decisions made on bases that information will be more optimal in the concrete situation and more effective for improving operations of the port. Thus, a lot of sate money could be saved and ports competitiveness could be increased simultaneously.

21. The developed model of the valuation of effectiveness of ports performance is put into practice to analyze effectiveness of port of Riga from 1995. till 2002. The preference of Riga seaport is motivated by following arguments:

> => The port of Riga is the second biggest Latvian port with clear tendency of development and wide diversification of cargo;
> => Port of Riga has formed as complicate transport and cargo logistical centre with wide possibilities of cargo processing;
> => Port of Riga is located in the territory of states' capital and has become as significant economical object for municipality;
> => Port of Riga has rich history of economical and technical development and it contents the best experience of Europe in the field of ports building and management;

=> The operations of Riga port is wide diversificated and therefore the large amount of liquid, bulk and general cargo comes in;

=> The author of dissertation has personal experience of work in the Riga port authority;

=> The author has made investigation about different issues of activities of entrepreneurship and problems of business development in the port of Riga.

Analyzing obtained results is concluded that growth of cargo turnover in the port of Riga has been achieved both - by increasing effectiveness of utilization disposal resources of the ports and by increasing volume of disposal resources of the port. Results are collected in the 9 groups of effectiveness indicators, who forms single system of effectiveness of the port. Calculated indicators of effectiveness Riga port confirms that developed system of efficiency indicators is universal and could be applied for investigation such difficult economical system as port.

22. To evaluate effectiveness of the port performance the method of the experts was used as additional method to mathematical one. Applying expert method were defined the most significant and useful effectiveness indicators.

The data obtained in process of experts inquiry was mathematically processed and results are displayed in the table Nr. 12.

According to consideration of experts the most significant indicators of effectiveness of the ports are as follows:

1) The experts considers, that the most important indicators of effectiveness of the ports are from group of economical effectiveness and they are indicators: EE - 17 and EE - 18 with 11 and 12 points accordingly. These indicators is related with effectiveness of utilization capital assets of the ports:

- the indicator EE - 18 characterizes effectiveness of utilization capital assets in connection with added value in the ports' territory;

- the indicator EE - 17 characterizes effectiveness of utilization capital assets in connection with cargo turnover in the port.

2) Indicators of technical effectiveness follows very closely to indicators of economical effectiveness and takes the second place. These indicators are TE - 1 and TE - 9 and they are related with effectiveness of utilization of territory of the port:

- the indicator TE - 1 characterizes effectiveness of utilization ports' territory in connection with cargo turnover in the port;

- the indicator TE - 9 characterizes effectiveness of utilization land of the port in connection with cargo turnover.

3) Indicators of financial effectiveness FE - 4 and FE - 5 according to the experts point of view are similar and takes the third place of applying

significance. These indicators are related with utilization financial resources of port:

    - the indicator FE-4 characterizes effectiveness of utilization ports' finance in connection with added value in the ports' territory;

    - the indicator FE - 5 characterizes effectiveness of utilization ports' finance in connection with profit.

Table Nr. 12.

Summary of results of the Experts inquiry

Index of effectiveness	The result of the experts opinion
Indicators of economical effectiveness of the port (EE)	
EE- 1	3
EE- 17	11
EE- 18	12
Indicators of technical effectiveness of the port (TE) efektivitātes rādītāji	
TE- 1	9
TE - 9	8
TE- 5	4
Indicators of financial effectiveness of the port (FE)	
FE- 5	8
F E - 4	8
F E - 9	4
Indicators of effectiveness of management of the port (ME) efektivitātes rādītāji	
ME- 10	6
ME- 12	9
M E - 4	3

4) Indicators, of management effectiveness the experts put in the forth place. According point of view of experts the indicators ME - 10 and ME - 12 are more significant in that group.

    - the indicator ME - 10 characterizes effectiveness of utilization employees in the port authority in connection with cargo turnover;

    - the indicator ME - 12 characterizes effectiveness of utilization employees in the port authority in connection with added value in the ports' territory.

Thereby, according the experts view, the most significant results of the port operation are - added value in the ports territory; cargo turnover in the port and profit. Dividing these indicators by corresponding indicators of the resources - the total port territory and land; employees; capital assets and financial resources are obtained more significant efficiency indicators who could be applied for investigation ports effectiveness.

23.The method of correlation comparing is applied to analyze results obtained by calculation time series of effectiveness indicators of different aspects of operations port of Riga. Applying this method the large amount of different correlation coefficients are obtained and in the furtherer mathematical processing are entered the indicators whom value of correlation coefficient R fulfils the condition $R \geq 0,5$.

To obtain additional information concerning to interrelations of groups and subgroups of effectiveness indicators, the values of correlations relationships are grouped and analyzed according absolute value of the correlations coefficients.

The results obtained after mathematical processing of values of correlation coefficients are displayed in the table Nr.13.

Table Nr.13

Summary of results of the correlation time series of the efficiency indicators of the port

Nr.	Group of efficiency indicators (EI)	Proportion of cases if R ≥ 0,5 (percents)
1.	El of utilization of the capital assets	68
2.	El of utilization of the ports' territory (ships)	65
3.	El of utilization of the transport infrastructure	62
4.	El of utilization of the ports' employees	59
5.	El of utilization of the ports' berths	58
6.	El of financial activities of the port	56
7.	El of ports' management	56
8.	El of economical utilization ports' territory	54
9.	El of utilization of the ports' territory (cargo)	54

The information in the table Nr.13 reveals, that correlation of time series of efficiency indicators of the capital assets with other time series of the efficiency indicators shows result when correlation coefficient R ≥ 0,5 in the 68% of all cases. This is the highest result in the all system of efficiency indicators of the port and it means that efficiency indicators of the capital assets of the port takes "central place" in to all system of port efficiency indicators. The next highest result - 65% is presented by efficiency indicators of utilization territory port related to ships entered in the port and after that group follows efficiency indicators group of utilization ports' transport infrastructure - with 62%.

The value of the correlation coefficients R in the all groups of efficiency indicators more than 50% of all cases fulfils the condition when R ≥ 0,5. It confirms that:

- the system of the effectiveness of ports' performance is developed correctly and is available for valuation of ports operations;

- all groups of the port effectiveness are interconnected;
- changing effectiveness in the one ports process creates changes in the effectiveness of the other processes.

Evaluating the results of the table Nr. 13 is concluded that developed method of valuation of the ports' performance enables to get a extend taste about interconnections of main processes of the port performance and effectiveness of these processes.

Thus, the developed system is successfully tested in to practice, analyzing effectiveness of the port of Riga. The expert method confirms results obtained by mathematical method. Obtained results proved that developed methods of valuation port performance could be applied for investigation operations of other ports in the Latvia and other countries.

24. Applying different methods to valuate effectiveness of the ports and comparing obtained results is made relevant conclusions as follows:

=> according point of view of the experts as the most important indicators of effectiveness are defined effectiveness indicators of utilization capital assets of the ports and that result corresponds with result obtained by mathematical method;

=> of in the second place of significance the experts proposed indicators for evaluation effectiveness of total territory and the land of the port. This results conforms to results of mathematical method;

=> according to the third position of significance results obtained by different methods are different. The mathematical method indicates that efficiency indicators of utilization ports' infrastructure holds the third position of significance, but experts points out that on the third position must be efficiency indicator of financial activities - costs effectiveness and profitability;

=> taking into account mentioned above, the difference of results obtained by different method of valuation of effectiveness of the pots' performance couldn't be considered as essential therefore the both methods could be applied to investigate intensiveness of utilization disposal resources of the ports;

25.Considering that results obtained by mathematical and expert methods to valuate results of different operations of the ports following efficiency indicator are applied:

I The grope of efficiency indicators of economical activities:
=> efficiency indicators   of utilization   capital assets in connection with cargo turnover in the port;

=> efficiency indicator of utilization   capital assets in connection with added value in the port;
=> efficiency indicator   of utilization   territory of the port in connection with added value in the port;

II The grope of efficiency indicators of ports'technical activities;
=> efficiency indicators of utilization   of the ports' territory in connection with cargo turnover in the port;
=> efficiency indicators   of utilization   of the ports'   land in connection with cargo turnover in the port;
=> efficiency indicators   of utilization   of the ports'   land in connection with coming ships in the port.

III The grope of efficiency indicators of ports'financial activities
=> efficiency indicators of utilization   of the ports' finance in connection with added value in the port;
=> efficiency indicators   of utilization   of the ports'   finance in connection with ports' incomes;
=> efficiency indicators of utilization   of the ports' self capital in connection with added value in the port.

IV The grope of efficiency indicators of the port management
=> cargo turnover in the port divided by employees in the port authority;
=> added value in the port divided by employees in the port authority;
=> efficiency indicators   of utilization of finance of the port authority in connection with added value in the port.

26. Applying different methods of valuation of ports' performance are defined 12 most significant efficiency indicators who characterizes different processes of technical, economical, financial and management activities in the port. The possibilities to increase influence of the ports on development state economy are very tightly connected with effectiveness of utilization disposal resources of the ports, thus, the issues of intensiveness of ports performance are very pending matters who is directly connected with competitiveness of the ports.

CONCLUSIONS AND PROPOSALS

During the research, becoming acquainted with cognitions of economic science, by using practical experience in the port management and analyzing ports influence on national economy, the increasing ports significance in economy of the state is proved. According to the results of the research, ports beneficially influence transport, manufacturing, mining, forestry and other industries. The developed system of efficiency ratios enables to determine most important ports development directions with the aim to increase efficiency of utilization available resources by the port.

The theoretical issues acquired during the research were used in practice in order to prepare several proposals about changes in state normative acts with an aim to decrease ports management costs un to increase competitiveness of entrepreneurship environment in ports territories,

In the course of the research the following conclusions and proposals are developed:

1. After 1990, when Latvia regained independence, the state economy was stroked by economical   crises. This crises initiated important reforms that led to restoring of market economy principals in state economy system. However, total cargo turnover in Latvian ports decreased by 24,3% within 2 years.

2. The ports were able to implement successfully most important economical reforms and to involve in international cargo shipment in short period of time. As a result in 1993 decrease in ports cargos turnover was stopped and in 1994 the ports were able to increase cargos turnover by 28%. In 1995 cargos turnover overachieved level of year 1990 by 7,8%. This indicates ports ability to overcome economic crises successfully and to adapt to new economic conditions.

3. Decrease of ratios regarding utilization of ports capacities in specialized terminals can be noticed in Latvia due to the changes in cargos structure and inaccuracies in projects regarding increase of ports capacities. Port Ventspils is touched by this problem the most of all - during the respective year capacity of liquid cargos terminals has been increased by 21% but cargos turnover increased only by 17%.   As a result utilization of capacities in the group of liquid cargos decreased from 49% to 47% but the capacity of all port is utilized only by 35,4%.

4. Difference in proportion of cargos received and shipped gradually increases. In the respective year turnover of received cargos has

dropped from 16% to 6,6% in total cargos turnover. As result cargos transportation effectiveness has decreased that can jeopardize competitiveness of Latvian ports in the future.

5. Added value created in the ports increases two times faster than added value in the country. That shows growing significance of ports in national economy and ports' increasing competitiveness if compared with other industries.

6. During the research tight connection between ports operations and cargos transportation through railway and auto road was proved. That shows that strategic development plans in the ports have to be harmonized with proportional increase of railways' and roads' capacities.

7. The operations of ports are beneficially influenced by foreign trade. Thanks to close distance from manufacturing plants, the ports facilitate the increase competitiveness of several Latvian export goods in world market.

8. The effect and effectiveness are existent categories of economic theory that make the economical fundament of market economy. Different publications of economic theory defines the term of efficiency differently. Each author explains "efficiency" from distinctive angel, however, each definition has common approach- the result is compared with resources utilized to reach the respective result.

9. Analyzing complicated economic processes, several efficiency indicators have to be used that correspond to content and target of the object researched. The chosen efficiency ratios make defined, mutually connected system of efficiency ratios. These indicators are mutually connected and influence each other more or less.

lO.The theoretical cognitions about efficiency indicators and practical experience in usage of them provide ground for statement that there is no any defined system of efficiency indicators that can be used in the research of different economic processes in macro and micro level. Therefore each specific research has to be supported by its own, unique system of efficiency ratios, content of which is determined by target of the research.

11.Taking into account the opinion of different authors about definition "port", the author in the research has made his own

definition, that reflects ports tight connection with geographical place in direct closeness of deep water, that is constructed purposefully in order to make cargos transfer operations from land transport to water transport and vice versa.

12.The developed "port - system" consists of mutually connected elements - organizational, economic, finance and technical sub-systems, which provides complete overview about different aspects of ports' performance.

13. During the research the author has developed system of ports efficiency ratios that gives complete perception on ports total efficiency and shows effectiveness of utilization disposal resources by the port. The developed efficiency indicators was divided in groups as follows:
  1) efficiency indicators of utilization port territory;
  2) efficiency indicators of economical activities of port;
  3) efficiency indicators of utilization capital assets of port;
  4) efficiency indicators of utilization labour in port territory;
  5) efficiency indicators of financial activities of port;
  6) efficiency indicators of utilization port infrastructure;
  7) efficiency indicators of port management.

14.The system of ports efficiency ratios developed by the author can be used in development of economical justification for different projects and decisions regarding development and operations of the port.

15. By applying expert method in valuation effectiveness of port performance it was justified that more significant efficiency indicators of port operations are efficiency ratios of utilization port capital assets, territory and finance resources.

16,By using system of ports efficiency ratios in calculations of Riga port efficiency was confirmed that the system can be used in order to analyze the utilization of resources available by Riga port. The efficiency ratios in Riga port indicates that increase in cargos turnover was achieved mainly on account of increasing effectiveness of utilization resources available by the port.

17.Analyses of correlation coherences of time series indicating ports efficiency ratios testifies mutual connection between time series of efficiency ratios. Accomplishing calculations of correlation coherences

it was verified that there is tight connection between several time series and their groups. That confirms that system of efficiency indicators has been developed correctly.

18. Division efficiency indicators in groups provides additional information of utilization different disposal resources of port and gives full overview on efficiency changes in the respective period of time.

19. Summarizing results of grouping correlation indicators, it was concluded that correlation coherences of time series indicates efficiency of usage ports fixed assets with those of other time series indicating other ports efficiency measurements, in 68% of all time series the absolute values of correlation coefficients **R** correspond to condition - **R ≥ 0,5**. It means that changes in ports fixed assets and efficiency of utilization of fixed assets influences other indicators reflecting ports performance. Ports fixed assets utilization efficiency indicators are followed by group of ports territory utilization indicators with *65%* and group of ports transport infrastructure utilization indicators with 62%, when in correlation coherence value of correlation coefficient R correspond to R≥0,5.

20. In order to improve efficiency of Riga port, the utilization intensity of ports fixed assets shall be increased. It can be made by facilitating cargo flows and growth of added value in ports, by using ports land and available docks more intensive, by promoting expansion of manufacture in the territory of port.

21. Comparing the results obtained by mathematical and expert method, it is recognized, that obtained results by applying both methods are similar. Thereby, it is defined quite 12 the most significant efficiency indicators by using mathematical and expert methods for valuation ports operations. These efficiency ratios enables to investigate the most important elements of ports activities - technical, economical, financial and management ones.

22. The results of research of effectiveness of port performance and practical applying of them, confirms that the developed methodology of valuation effectiveness ports operations is universal and it is applicable for analyzing such complicated system as port without reference on port locality, structure of reloaded cargo and type of port.