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Peculiarities of Eastern European Maritime Sector Clustering Preconditions Formation

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ABSTRACT: *This paper identifies and codifies the main Eastern European Maritime Sector clustering Preconditions and Risks according to their significant features, associated with increase of Productivity, Innovations and Competitiveness. The essence of combined economic evaluation methodology of Maritime sector clustering preconditions is the systematic attitude towards the integrity and appliance of the research methods, in order to get as much exact and objective data, that ground the preconditions of Maritime sector clustering, as possible by carrying out empirical research and to draw conclusions about the received result that is the benefit or detriment of the country, region, sector, economic activity group, enterprise or affiliated organizations influenced by Maritime Clustering Preconditions.*

Keywords: *Maritime sector, Clustering, Preconditions, Productivity, Innovations, Competitiveness*

I. INTRODUCTION

Assumptions, causes or hypotheses are usually identified as preconditions. In the case of Maritime sector's clustering it is often treated as impact benefits or outcome economic benefits are evaluated. This paper considers the "precondition" as the initial reasoned argument based on predictions with regard to reasoned evidence of similar facts.

The problem of the scientific research - how comprehensively define and systemize preconditions of Maritime sector clustering.

Recently the scientific literature ([1], [2], [3], [4], [5], [6], [7]) have extensively analyzed the clustering processes taking place in the world, the measures to promote clustering; the literature also discusses the business benefits for the individual members of the group and for the state in which the cluster is based on the *bottom-up* approach. Cluster formation initiatives *bottom-up* still has not received the proper attention of scientists [8]. It is noted that studies which analyze clusters in Lithuania ([1], [9], [2]) lack focus on the stages of formation of clusters of common features and their isolation criteria, maturity phase identification of clusters. However, there is lack of scientific publications, which analyze maritime sector clustering and conduct economic evaluation of clustering or its preconditions.

M. E. Porter ([10], [11], [12]), T. Andersson and G. Napier ([13]), T. Andersson et al. ([14]), M.V.Nabadan and A.B.Berde ([15]) analyzed different competitiveness preconditions problems and proposed preconditions methodology. Although there is a gap of research where Maritime sector clustering could be analyzed as evaluation object of Productivity, Innovations and Competitiveness. So far there is no such preconditions methodology enabling economically evaluate preconditions of the maritime sector clustering. This article seeks to create such methodology and empirically adapt it and verify this model in chosen country Maritime sector.

It should be noted that there is no commonly encountered economic approach to analyze the maritime clustering process. Various scientists and scientific and political contexts differently identify clustering, the importance and stages of cluster development and cluster formation often do not correlate with each other; preconditions, reasons, demand and benefit motives are often treated as synonyms of these concepts; the analysis of preconditions of clustering sector usually is carried out by the evaluation of goals of clusters. This suggests that there is no connectivity and continuity in respect of results of previously published researches. The evaluation of proposed preconditions of clustering sector lacks complexity and completeness; demand of a clear methodology for evaluation of preconditions of concrete clustering sector; scientific works often mistakenly equate sector and cluster and its evaluation continues in accordance with one selected scientific research method or industry groups of different countries are called clusters and their economic data are further compared. Economic evaluation of preconditions of Maritime sector clustering is a significant research object of this paper.

In this research, it is considered that the clustering - is the cluster formation process involving integrated companies which operate vertically and / or horizontally in the groups of related economic activities and their tendency to concentrate on the realization of the general activities in Value-added chain by seeking the economic benefits.

While analyzing motives of selecting preconditions of clustering for the increase of Productivity, Innovations and Competitiveness, this paper analyses the relations of Productivity, Innovations and Competitiveness and its interconnections and complementarity.

The aim of the paper - to define and systemize Maritime sector clustering preconditions.

Methods of research: systemic and comparative analysis and synthesis of scientific literature, strategic documents and legislation; statistical analysis of secondary data; empirical research - expert evaluation.
The work systematizes features of preconditions specific to Maritime sector clustering. These features are combined into constructive formulas of preconditions; the list made of preconditions is divided into 3 equal parts in accordance with the impact of preconditions on the increase of Productivity, Innovations and Competitiveness. The risks of Maritime sector clustering are indicated as barriers of increase of Productivity, Innovations and Competitiveness. Clustering risk equivalent is presented for each clustering assumption. By concluding the list of risks and formulas, the same methodical principals were followed as in systematization of preconditions: risks were relatively divided into three parts: increase barriers of Productivity, Innovations and Competitiveness.

II. CHARACTERISTICS OF THE MARITIME SECTOR POLICY BASED ON PRECONDITIONS OF CLUSTER FORMATION

Clustering is based on the essential precondition that the country's or region's economic well-being is not determined by the individual companies, but performance of groups of companies related by productive relations in certain geographical regions. Thus, the main object of clustering policy is no single individual companies but all of the industrial systems of the region that supports such a productive business contacts.
By implementing the clustering-oriented policy, the main focus is paid on the following aspects: (1) creation of conditions for entrepreneurship and formation of clusters and support of potential clusters; (2) promoting the development of clusters when policy measures aimed at the existing clusters but for some reasons experiencing difficulties ([1], [2]). So there must be selected appropriate policy measures to reduce or eliminate problems caused by barriers.
As international experience shows, various clustering processes, especially formation of clusters and creation and development, are not directly regulated by law. General clustering conditions are affected by all laws which regulate general economic, business, innovations and other environment, especially those legal acts which are horizontal policy tools: laws on competition, innovation, technology, etc. Cluster policy regulation is carried out through joint program documents. Major clustering policy instruments in the European Union are: Europe INNOVA Cluster Observatory, Cluster Alliance, EU Structural Funds and various research and development Programs, the core policy makers of the EU's Maritime sector clustering processes associated policy are: Cluster Policy of each European Union member state, Maritime Industries Forum and European Technology Platform Waterborne.

III. RESEARCH METHODOLOGY

Taking into account the specification of the subject, complexity of the analyzed scientific problem and complication of the thesis object, the composed methodology of combined economic evaluation of Maritime sector clustering preconditions includes: Empirical qualitative research - expert evaluation, which consists of two parts: the first part presents ranking of preconditions and obstacles and direct evaluation method, the second part presents qualitative research based on "conversation-interview" method and empirical quantitative pilot study - questioning. The essence of the combined economic evaluation of preconditions of Maritime sector clustering is the systematic attitude towards the integrity and applicability of research methods in order to by the empirical research to get clear and objective data on chosen country – Lithuania - Maritime sector clustering preconditions and on the basis of that, to make conclusions about the results – the benefit or losses of Eastern European Maritime sector clustering preconditions for country, region, sector, economic activities group, enterprise or related organizations.
The methodology of combined economic evaluation of Maritime sector clustering preconditions embraces empirical quantitative researches and the empirical quantitative research. When evaluating regional solidarity, level of clustering, scale of specialization and agglomeration, the quantitative indicators of empirical research were chosen because of their complexity and universality. These indicators are important and have influence over the evaluation of Maritime sector state and are a part of combined economic evaluation of Maritime sector clustering preconditions. Empirical researches were chosen because of their informative nature, causality and opportunities to analyze the data applying the principles of correlation, regression, dispersion and comparative statistical analysis. After having checked the economic evaluation methodology of complex Maritime sector clustering preconditions it was determined that this methodology can be fully applied for evaluation of

clustering preconditions of countrywide working Maritime sector, because under the grounds of this methodology it is possible to evaluate the potential and expenditure possibilities of Maritime sector, to single out the main factors conditioning and limiting the preconditions of clustering. This methodology can be applied in order to compare the clustering preconditions, as an example, of the Baltic States. The suggested methodology of combined economic evaluation of Maritime sector clustering preconditions can be applied for the researches on Maritime sector clustering precondition of other Eastern European countries.

Designed conceptual combined economic evaluation model of Maritime sector clustering preconditions is a visual method (diagram) which presents causal relations between factors and stages, which are significant for the problem analyzed.

According to created and described combined economic evaluation methodology of Maritime sector clustering preconditions, the created model was verified in chosen country – Lithuania - Maritime sector context: conducted evaluation of Lithuanian Maritime sector impact on economy of the country, distinguished and described methods of the empirical quantitative research, using selected research instruments collected significant data, calculated identifying indexed and indicators of clustering characteristics, carried out estimate weight analysis and ranking of expert Maritime sector clustering preconditions and risks, formulated conclusions on analysis of collected data during the expert "conversation-interview", carried out statistical analysis of collected data during empirical research - questionnaire and presented conclusions of data analysis of the pilot research.

There are available fields of economic evaluation methodology of preconditions of certain complex Maritime sector clustering:

1. This methodology can be applied on the national (regional) level for the preconditions of operating Maritime sector clustering evaluation. It can be applied and for other Eastern European countries' research of preconditions of Maritime sectors clustering. Improvedmethodologywould also works inothercountries to evaluate clustering preconditions of Industry sectors but then certaincharacteristics ofindustryclustering should beidentified, to formulatethe clusteringpreconditions andriskсstatementsto suita particularindustrial sector, to evaluate optimal number of selected preconditions and risks, to select appropriate methods for the analysis of clustering preconditions and risks, to evaluate the need to involve experts into the study and identify current experts and to consider need of concrete industry group in with regard tothe establishmentof the clusterorganization.
2. This method can help to evaluate national (regional) potential and development opportunities of Maritime sector, to distinguish the main factors determining and limiting preconditions of the clustering.
3. This methodology can be applied in order to compare preconditions of Maritime sector clustering in different countries.
4. The modified methodology could be a reference tool for business, science and public sector entities which evaluate the clustering of industry sectors.

Limitations of the Research: There are possible uncertainty of the preconditions of clustering concept, subjectivity of expert evaluation and limited expert competence in a certain fields and unreliability of publicly available statistical research data.

IV. PRESENCE OF MARITIME CLUSTERING PRECONDITIONS

The clustering preconditions chosen for evaluation during the empirical quantitative research were arranged according to their importance and the weighted averages of estimates were compared with the risks, which were analyzed according to analogical methodology, with the help of experts. That allowed grinding the importance of the singled out preconditions and risks argumentatively. The stage of transcription analysis of empirical quantitative research, which is half structured "conversation-interview" with the experts has helped to reveal the attitude of respondents towards the determining factors of Maritime sector, demand conditions, strategies of enterprises, structures and competitiveness, the interrelated and mutually supportive branches of industry, the influence and opportunities of the government, while prescriptive analysis allowed to form the suggestions for the improvement of Maritime sector clustering conditions. The data collected from representatives of the enterprises during the empirical quantitative research allowed to analyze the provisions and need for collaboration of Maritime sector, as essential conditions, necessary for realization of clustering preconditions, to get recommendations for increasing of Productivity, Innovations and Competitiveness, to examine the attitude towards participation in Maritime cluster, to evaluate the need for creation Maritime cluster organization and the motives for its benefits.

According to the analysis of scientific literature, strategic documents and the analysis of studies, Maritime sector clustering preconditions systematically are combined into three groups (seven conditions for each group), respectively: "to increase Productivity", "to increase Innovations" and "to increase Competitiveness" and presented in Table 1.

Table 1 - The description of clustering preconditions to increase Productivity, Innovations and Competitiveness

Description of Clustering Preconditions
I group of preconditions - to increase Productivity
a) By disposing of the general business infrastructure, there is a possibility to reduce operating costs, to increase indexes of productivity and efficiency, to ensure optimal the manufacturing process loads.
b) The ability to specialize and focus on the main activity by transferring secondary and additional activities to the sector members who specialize in these activities.
c) Due to the migration of qualified specialists within the sector, business entities there are created conditions to use and optimally use internal capacities of human resources.
d) By disposing of the general distribution channels, the opportunities are created for sector members to create the overall supply chain or use them.
e) Co-operating companies in their respective fields are typical examples of synergy effect.
f) Clustering helps to achieve economies of production scale and scope.
g) Companies working together are in common marketing, distribution strategy and reduction of logistics costs.
II group of preconditions - to increase Innovations
a) Favorable conditions are created for transmission - takeover of "good practice", to search solutions for solving common problems.
b) There emerges an opportunity to reduce various business risks, other costs related to investments, by diversifying these costs between members of business systems.
c) During the sector clustering processes, the socialization is promoted and community-based culture is developed between companies.
d) In cooperation there are formed favorable conditions for promotion of policy of innovation and the development of innovation.
e) In cooperation there is on-going promotion of research and experimental development (R&D) and there is an opportunity of commercialization of higher education products (prototype) developed.
f) Clustering promotes innovative business creation and development, "spin-off" business occurring.
g) In collaboration, representatives of the clustering can reach higher level of innovation by cooperation in the fields of research and technological development.
III group of preconditions - to increase Competitiveness
a) Cooperation gives an opportunity easier, cheaper and quicker to get specialized information about markets, technologies and resources.
b) There are created conditions for the best prices to buy and sell high quality products and services.
c) Co-operating companies are in a strong bargaining power while searching for new clients and suppliers, dealing with the supply or sales questions, raising and discussing issues relevant to business system at national level, by providing designed applications for financial support or for other favorable business conditions.
d) The advantages of geographical concentration of enterprises and access to the shared infrastructure facilities emerge (Ports, infrastructure of railroads, roads and ferries).
e) Joint forces help easier to enter to new local and international markets, to compete, maintain and strengthen positions in markets, develop channels of production distribution, look for potential users, customers, suppliers.
f) Because of the unique intensity of knowledge exchange between members of the business system, innovative ideas are stimulated, new products, services or/ and management systems are created and launched.
g) Cooperation between companies increases foreign direct investment opportunities.

Table 2 presents systematic Risk groups of clustering – "barriers to increase Productivity", "barriers to increase Innovations" and "barriers to increase Competitiveness" as well as their significant characteristics.

Table 2 - The description of clustering risks as barriers to increase Productivity, Innovations and Competitiveness

Description of Clustering Risks
I group - obstacles of clustering preconditions - barriers to increase Productivity
a) Lack of infrastructure level unsatisfying cooperating business needs. Clustering as an advanced instrument of economic policy requires a high level of infrastructure.
b) Raising additional questions on contributions of property, for example, question on results of investment projects and division of property of created infrastructure.

c) The business entity specialization can lead to reduction of the part of qualified personnel, economic indicators rise by lower percentage because the part of certain functions are removed or transferred to other companies.
d) Raising other administrative and financial obligations in different stages of business entity's involvement into the clustering.
e) The vast majority of companies in the sector focus on medium and low value-added products doesn't increase the income of companies in the short and long term - limits development opportunities of companies in the sector.
f) Even seeing the total potential benefits of cooperation, companies individually often are reluctant to show the initiative of formation of the cluster and assume the associated costs and responsibility.
g) The additional administrative and financial burden - maintenance of cluster governing body and funding of additional package of strategic actions: costs for business meetings, for administrative facilities, marketing, etc.
II group - obstacles of clustering preconditions - barriers to increase Innovations
a) Low awareness of businesses about: other companies in the same region, opportunities to provide specialized services, available technologies, implemented projects, other regional business information stop clustering process.
b) Cluster activities are poorly regulated by legal framework which does not systematically and completely cover EU legislation and the realization of the strategies and legislative acts of Lithuania.
c) Lack of entrepreneurship determine low involvement into networking processes, lack of leadership, lack of initiatives and capacity of penetration into markets and domination.
d) Low professional skills of workers and lack of competence - the successful functioning of clusters requires qualified labor force, continuous training and capacity-building.
e) Many companies which are prone to clustering usually lack competence to determine possible cooperation fields, to discern the potential synergies integrating the separate parts of the value chain.
f) Uncertainty of patenting and intellectual property protection of advanced technologies (copyright of products or services, trademarks of goods or services, design) developed within the cluster.
g) Non- confidence culture in Lithuanian business is still widespread, Lithuanian companies are relatively closed for cooperation with competitors; it is difficult to effectively combine interests and mutual benefits.
III group - obstacles of clustering preconditions - barriers to increase Competitiveness
a) Inactive professional and sectorial associations do not adequately represent the interests of businesses; therefore skeptical attention of companies is formed towards other associated business structures and formations.
b) There is a rise in likelihood to buy the product / service at higher than market prices. There is a possible threat of cartel agreements.
c) Different level of technologies and management between separate business entities is related to dissatisfaction of progressive businesses in the quality of provided services due to low technological and managerial levels.
d) An obvious exclusiveness and isolation of region, the lack of accessibility and lack of dissemination of good practice specialists and other elements essential for clustering.
e) Raising threat of power asymmetry - cluster members have different technological equipment, production resources, infrastructure, capital and so on.
f) The emerging asymmetry of risk diversification by the size of business entity, generated incomes, production and marketing scale and so on. Large business likely will have to take greater risk than the medium or small ones.
g) The associated business structures are relatively of limited availability of financing (cost of financing, access to capital and liquidity, confidence in market participants and individual lending strategy of banks).

Scientists ([16], [17]) analyzed the potential barriers clustering process is less advanced regions. They note that the clustering process is usually faced with poorly developed infrastructure, lack of capital, technology and innovation, inaccessibility, regional isolation, low education and low-skilled workers. It is estimated that the physical infrastructure deficit, poor access to capital, technology dissemination weak institutions, regional reticence and isolation, entrepreneurship, skills and opportunities to raise a lack of confidence among potential cluster actor slack of uneven business technology and management level, poor business information systems partners operating experience and a lack of business skills is seen as a major barrier clustering.

Identification of potential risks enables researchers to analyze and assess the reality of these risks specific regions, areas. Article co-author earlier noted ([18]) that the right policy decisions may be partially or completely eliminate the formation of Maritime clusters barriers, thereby causing the clustering.

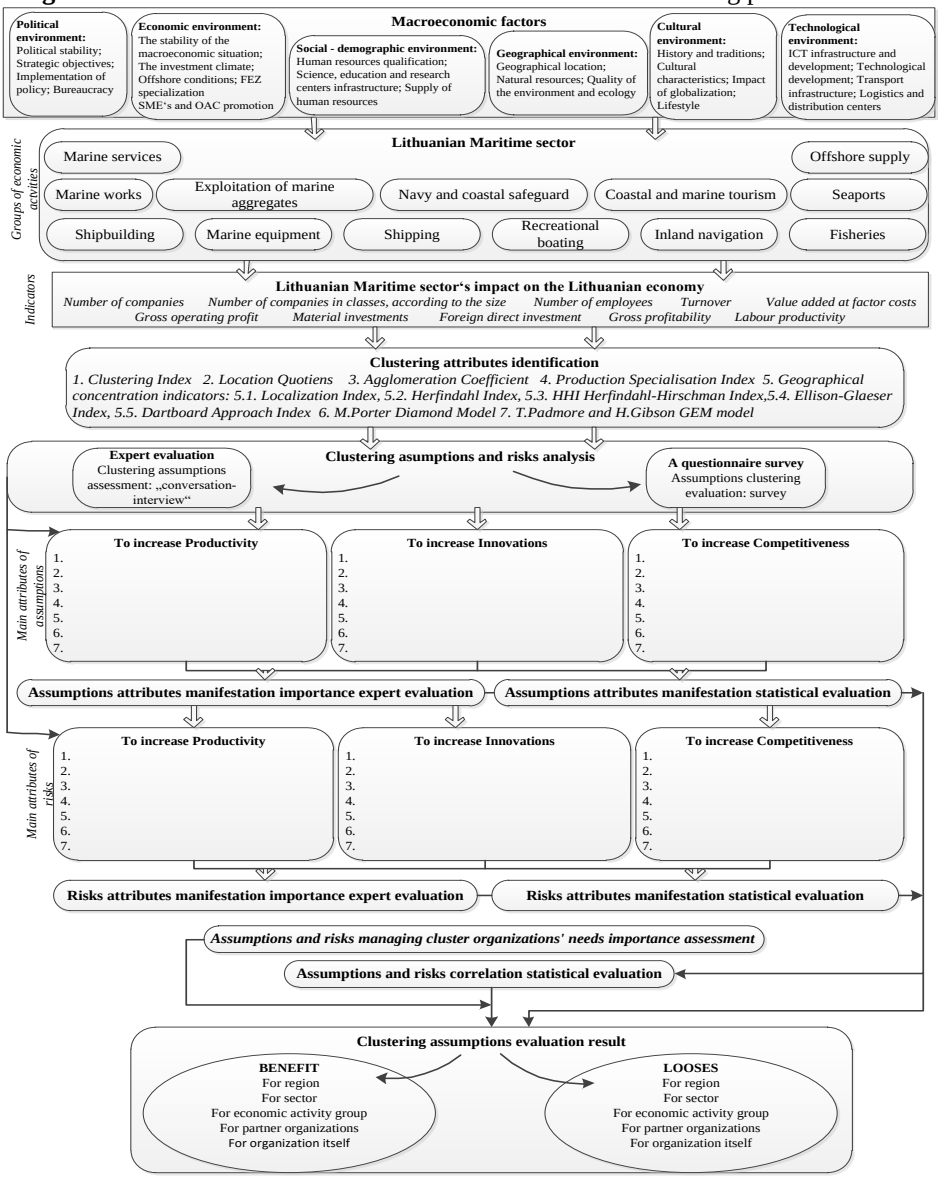
V. MARITIME CLUSTERING PRECONDITIONS EVALUATION MODEL

Model of combined economic evaluation of preconditions of Maritime sector clustering structurally consists of these stages:

1. Identification of macroeconomic factors influencing chosen country Maritime sector. 2. Chosen country – Lithuania - Maritime sector hierarchy in accordance with industry groups. 3. Determination of significant indexes for Countries economy of Maritime sector. 4. Identification of characteristics of Maritime sector clustering. 5. Selection of research methods for the analysis of preconditions and risks of Maritime sector clustering. 6. Identification of the main characteristics of preconditions and risks of Maritime sector clustering for the increase Productivity, Innovations and Competitiveness. 7. Expert and statistical evaluation of the importance of signs of preconditions. 8. Statistical evaluation of correlation of preconditions and risks of chosen country Maritime sector clustering. 9. Evaluation of need of cluster management organization, which would manage Maritime sector risks and preconditions. 10. Formulation of evaluation findings of clustering preconditions.

In view of the above-described stages, there is created combined economic evaluation Model of chosen country - Lithuania - Maritime sector clustering preconditions, which is presented in Figure 3.

Fig 3 - Model of economic evaluation of Maritime sector clustering preconditions



While evaluating preconditions of clustering, it is aimed to determine the importance of signs manifestation of preconditions of clustering and to evaluate the importance manifestation of the main risk signs, which are related to preconditions. After identification of the main preconditions and risks, it aimed to evaluate them with empirical research methods by using expert evaluation and statistical evaluation of the data processing, which were collected during the questionnaire survey. After expert and statistical evaluation of importance of manifestation of signs of preconditions and risks of chosen country Maritime sector clustering, statistical evaluation of preconditions and risks correlation is done by including into formulated evaluation results of preconditions of clustering and evaluation results of demand importance of cluster organization operating preconditions and risks of Maritime sector clustering.

For the increase of Productivity, Innovations and Competitiveness of preconditions of country's Maritime sector clustering, economic evaluation is oriented into identification, systematization, justification and verification of manifestation importance of preconditions of clustering. Additionally, economic evaluation is oriented into characteristics of risks and their verification of importance for realization of preconditions of clustering and at a later stage - into correlation analysis of preconditions and risks which results would justify clustering benefit or loss for region, sector, group of economic activities, partners-organizations and a company itself.

VI. CONCLUSIONS

The formation of clustering starts from the recognition of need or possibilities to collaborate, accentuation of value added and strengthening of reliance among the enterprises.

In process of work, the main preconditions and risks of clustering of Maritime sector are singled out and systemized according to their significant features, related with the increase Productivity, Innovations and Competitiveness. Such way of systemizing clustering preconditions and risks was fallowed because of the forces influencing the increase of Productivity, Innovations or Competitiveness, accented in their formulation, because of their strategic functions that are singled out in the working process and a more clear presentation of their formulation to the experts. The risks of Maritime sector clustering in this work are named as the barriers of the increase of the Productivity, Innovations and Competitiveness.

In the process of evaluation of Maritime sector clustering preconditions the indefiniteness of conception of clustering preconditions, the validity of methodology of evaluation of clustering preconditions, the insufficiency of data measured by indexes and systematic shortage of this measurement, the indefiniteness of differences in evaluation of clustering preconditions and benefit received from the cluster, the insecurity of publically accessible statistical data of research, the preference of analysis for cluster results over process of clustering and research of clustering preconditions, and absence of earlier economic evaluations of Maritime sector clustering preconditions are met. It was determined that the applied single quantitative, qualitative and combined research methods examine the stages of clustering only fragmentally and episodically, without evaluating the complexity of scientific problem and the object of research.

The methodology of combined economic evaluation of Eastern European Maritime sector clustering preconditions embraces empirical quantitative researches and the empirical quantitative research. When evaluating regional solidarity, level of clustering, scale of specialization and agglomeration, the quantitative indicators of empirical research were chosen because of their complexity and universality. These indicators are important and have influence over the evaluation of chosen Maritime sector state and are a part of combined economic evaluation of Maritime sector clustering preconditions. Empirical researches were chosen because of their informative nature, causality and opportunities to analyze the data applying the principles of correlation, regression, dispersion and comparative statistical analysis. After having checked the economic evaluation methodology of complex Maritime sector clustering preconditions it was determined that this methodology can be fully applied for evaluation of clustering preconditions of countrywide working Maritime sector, because under the grounds of this methodology it is possible to evaluate the potential and expenditure possibilities of Maritime sector, to single out the main factors conditioning and limiting the preconditions of clustering. This methodology can be applied in order to compare the clustering preconditions of the Baltic States. The suggested methodology of combined economic evaluation of Maritime sector clustering preconditions can be applied for the researches on Maritime sector clustering precondition of other countries.

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