EVALUATION OF THE COMPETITIVENESS OF FISHERIES SECTOR CLUSTER

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Abstract
The aim of the research is to elaborate the competitiveness assessment system for fisheries sector cluster, using which it could be possible to assess the competitiveness of fisheries sector cluster in time and space. On the basis of scientific literature study, the authors provide solutions of how to assess the competitiveness of the fisheries sector cluster. As a result of analysis, it was discovered that the best way to assess the competitiveness of the fisheries sector cluster is by using a comprehensive complex indicator – the Index of the Fisheries Sector Cluster Competitiveness. The created Index of the Fisheries Sector Cluster Competitiveness helps the institutions involved in the creation of fisheries policy more successfully elaborate and improve the common policy of fisheries.
Key words: fisheries, fishery, aquaculture, fish processing, index, competitiveness.

Introduction

The world economy faces changes, mostly related to the processes of globalization, uneven development of the countries, as well as the reinforcement of competitiveness. Nowadays the competitiveness of some country's companies more and more determines and influences the development potential of each country. One of the key aims in development strategy of states, spheres and companies has become ensuring competitiveness (Skapars & Sumilo, 2006). Assessment of competitiveness is a significant element in the evaluation of economic performance and sustainability of an industry and its companies.

Peculiarity of competitiveness lies in the fact that it contains social and economic, political and environmental consequences not only of the economic category (product, consumer and environment of rivals, etc.), but also of the non-economic category (systems of education, science, demography, politics and values, etc.), which determine the problems of evaluating thereof.

Various authors' interpretations of competitiveness differ. Some authors believe that companies compete only among themselves, not the countries, consequently, the basis of competitiveness is made by the indicators of entrepreneurship effectiveness, including entrepreneurship strategies, its management skills, marketing, efficiency of prices and costs. However, as we know, entrepreneurship is carried out by a company in a certain region, following the legislation of the area, and consequently many things depend on the measures carried out in the framework of the country and the created environment (Paula & Titarenko, 2009).

The experience of economic development all over the world has proven that competitiveness is influenced by many various factors. For a long time the factors of investments into the capital and infrastructure were the dominating. Later the neoclassical economists considered directing a resource flow to the "right" fields and "right" companies in the corresponding sphere to be the most important task. In the process of development of the science of economics, scientists supplemented the range of the viewed issues with several factors: human and social capital, technological progress and innovations, business relation to the development of the surrounding environment, nature of demand, diversification of products and market etc. Nowadays scientists working in the field of economics and entrepreneurship believe that the factors influencing the competitiveness are interrelated and should be evaluated in a common context (Kassalis, 2010).

In the development of Latvian economy the fisheries have always played a significant role, especially in the development of the Baltic Sea and Riga Gulf coastline areas. In Latvia, the fisheries sector has not only a long-standing history and traditions, but also an internal potential of self-development. Using the advantage of the support opportunities provided by the EU financial instruments and participating in the EU Common fisheries policy creation, Latvian fisheries sector obtains wide possibilities to facilitate its growth and competitiveness. Consequently, the assessment of the sector cluster competitiveness plays a significant role in facilitation of fisheries sector development.

The aim of the research is to elaborate a complex assessment system through which it would be possible to assess the fisheries sector cluster competitiveness in time and space.

To reach the aim, the following work tasks were set:
- to elaborate the assessment system for competitiveness of the fisheries sector cluster;
- to reflect the results of assessment system for competitiveness of the fisheries sector cluster.

The object of the research is the fisheries sector cluster.

The research reflects the results which are analysed and discussed in detail, more extensively in I. Biuksane's doctoral dissertation 'Evaluation of Competitiveness of Latvian Fisheries Sector Cluster', which was written between 2012 and 2016 (scientific supervisor Dr.oec., assoc.prof. I.Judrupa).

Materials and Methods

On the grounds of the theoretical insights found in the studies of Latvian and foreign scientists, the planning documents and research developed by the EU and Latvian institutions, as well as authors' scientific studies, the definition of sector cluster and sector cluster competitiveness was developed, as well as the Model of the Factors Influencing Competitiveness of the Fisheries Sector Cluster.

To evaluate the competitiveness of fisheries sector cluster, the authors viewed several well-known methods for evaluation and factor groups and indicators used in them. Considering the fact that the analyzed methods incompletely reflect the essence of competitiveness and they cannot be fully used for the evaluation of fisheries sector cluster competitiveness, on the basis of the created evaluation system the authors developed the Index of the Fisheries Sector Cluster Competitiveness.

During the research, the general scientific research methods were used - logically-constructive (induction and deduction), graphical, monographic or descriptive, mathematical-statistical and methods of sociological research (document analysis). In elaboration of conclusions mostly the methods of analysis and synthesis were applied.

Results and Discussion

Assessment system

In order to assess the competitiveness of the fisheries sector cluster successfully and efficiently, first of all, an assessment system must be developed (Figure 1).

In order to assess the competitiveness of the fisheries sector cluster, several globally known models and matrices were reviewed and analysed, for instance, M.E. Porter's five forces analysis model (Porter, 1980), BCG *matrix* or growth–share matrix (Henderson, 1970), General Electric/McKincey matrix (Udo-Imeh, Edet, & Anani, 2012), SWOT analysis model (Rauch, 2006; Kersan-Skabic & Tijanic, 2009; Sandybayev & Derkan, 2015) and 7S model (Shiri, Anvari, & Soltani, 2014). The following indices were also examined and analysed: Global Gender Gap index (World Economic Forum, 2014b), Business Competitiveness index (World Economic Forum, 2007), Global Competitiveness index (World Economic Forum, 2014a), Travel and Tourism Competitiveness index (World Economic Forum, 2015), Economic Freedom index (Heritage Foundation, 2015), Doing Business index (World Bank, 2014), *Competitiveness Index (*IMG World Competitiveness Center, 2016), World Knowledge Competitiveness Index (Centre for International Competitiveness, 2016), European Competitiveness Index (Centre for International Competitiveness, 2016), Fisheries Competitiveness Index (FCI Team, 2005), Fishery and Aquaculture Competence Index (PrimeFish Team, 2016), Fish Stock Sustainability Index (National Oceanic and Atmospheric

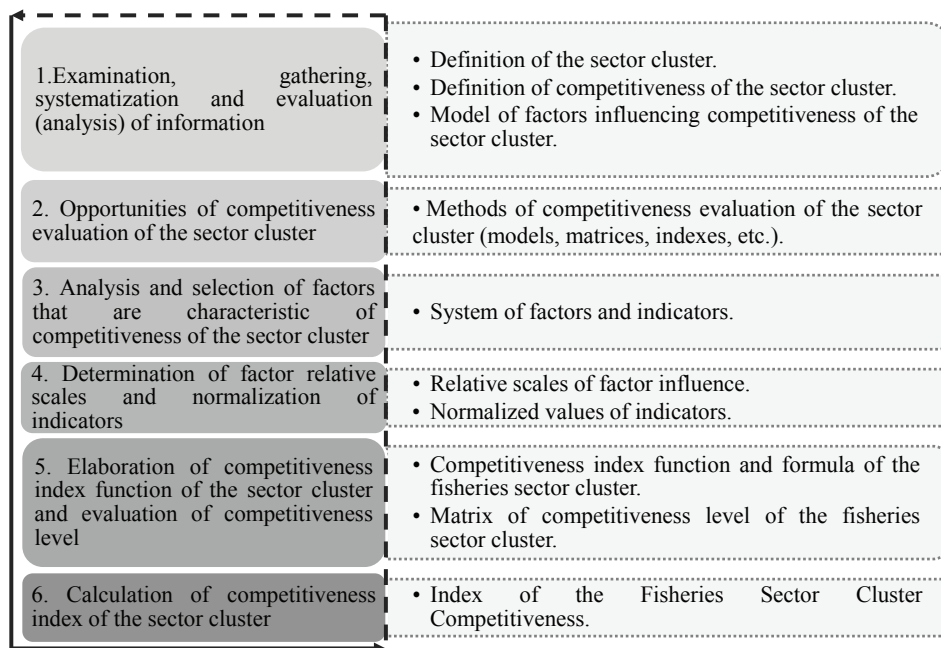| 1. Examination, gathering, systematization and evaluation (analysis) of information	• Definition of the sector cluster. • Definition of competitiveness of the sector cluster. • Model of factors influencing competitiveness of the sector cluster.
2. Opportunities of competitiveness evaluation of the sector cluster	• Methods of competitiveness evaluation of the sector cluster (models, matrices, indexes, etc.).
3. Analysis and selection of factors that are characteristic of competitiveness of the sector cluster	• System of factors and indicators.
4. Determination of factor relative scales and normalization of indicators	• Relative scales of factor influence. • Normalized values of indicators.
5. Elaboration of competitiveness index function of the sector cluster and evaluation of competitiveness level	• Competitiveness index function and formula of the fisheries sector cluster. • Matrix of competitiveness level of the fisheries sector cluster.
6. Calculation of competitiveness index of the sector cluster	• Index of the Fisheries Sector Cluster Competitiveness.

Figure 1. Assessment system of the Fisheries Sector Cluster Competitiveness (Biuksane, 2016a).
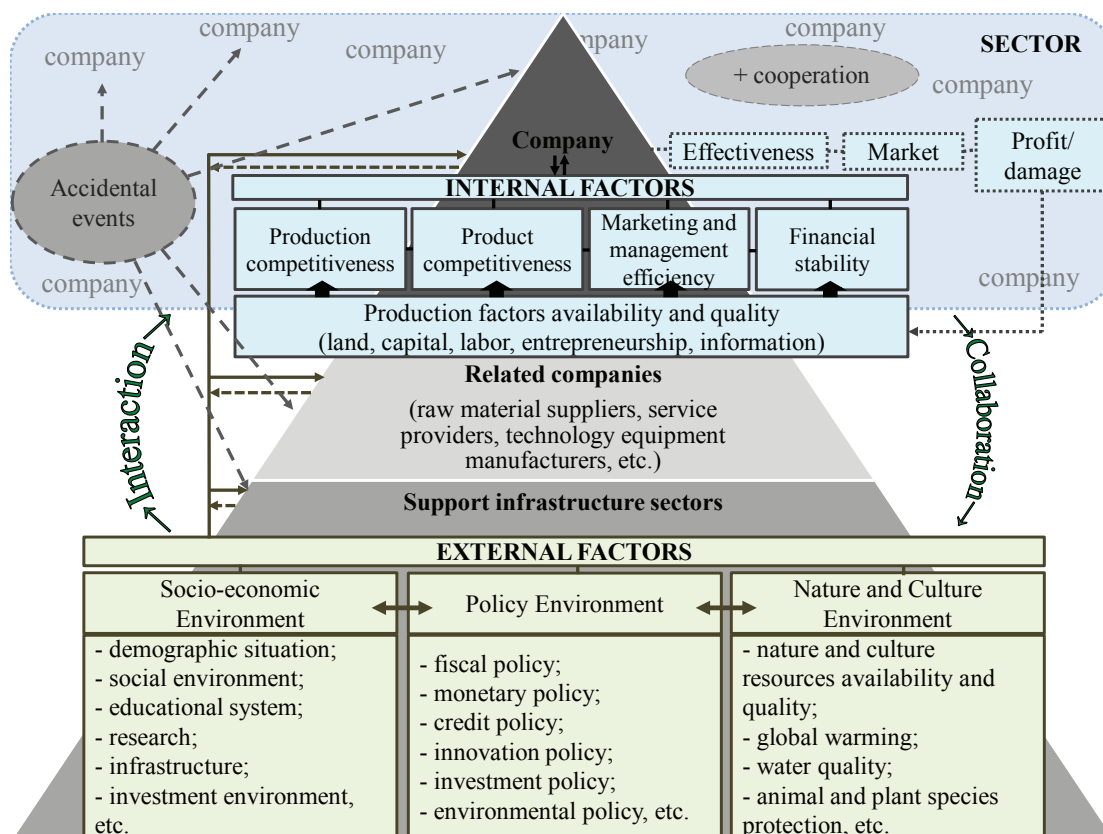
Figure 2. Model of the factors influencing competitiveness of the fisheries sector cluster (Biuksane, 2016b).

Administration, 2015); as well as other significant methods for assessment of competitiveness.

The analysed assessment methods and factor groups and indicators used in them refer only to a specific branch of activity, thus reflecting the essence of competitiveness incompletely. Moreover, the analysed methods cannot be fully used for the evaluation of competitiveness of the fisheries sector cluster.

In order to make an assessment of competitiveness of the fisheries sector cluster possible, a complex indicator – the Index of the Fisheries Sector Cluster Competitiveness should be elaborated. Elaboration of the index will be performed on the basis of assessment system for competitiveness of the fisheries sector cluster.

Outcome of the assessment system

The sector cluster is a cooperation network of similar or associated companies and institutions operating in the sector, which is located in a specific geographic territory. Within the framework of this network, the development and competitiveness of every separate company and, respectively, of all sector is facilitated by common cooperation (Biuksane, 2016a).

The sector competitiveness is the ability to sell a higher quality output (goods and services) in markets

more efficiently than the domestic and international competitors are able to do it (Biuksane, 2015).

Competitiveness of the fisheries sector cluster is influenced by a range of various, interconnected factors of microeconomics and macroeconomics (Figure 2).

Competitiveness of the Fisheries Sector Cluster is influenced by various internal and external social, economical, political, natural and cultural environmental factors (including random events) and the ability to adapt them, as well as the cooperation and formation of mutual interaction and cooperation forms, and the relationship among similar and affiliated companies and support infrastructure spheres (Biuksane, 2015).

Related companies and spheres included in the support infrastructure depend on the development of leading companies in a sphere. When the leading companies of a sphere are developing, both related companies and the spheres included in the support infrastructure benefit. In the environment of the cluster, the integrated long-term development of the companies may be observed at the horizontal and vertical level; as a result, not only competitiveness of the companies in a sphere increases but also competitiveness of a region and country.

The state competitiveness directly depends on the competitiveness of every company working in a
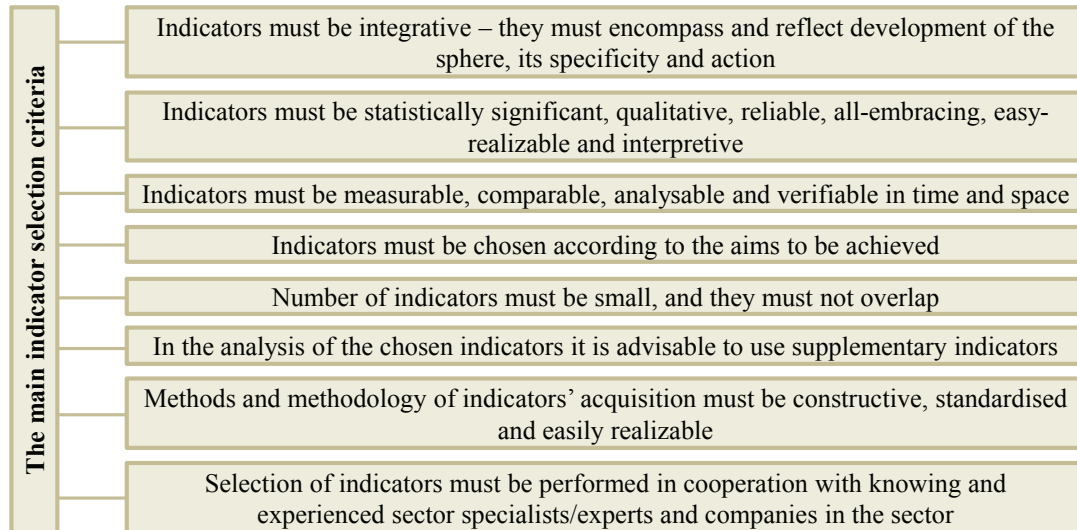
Figure 3. Main criteria of the selection of indicators (Biukšāne, 2016a).

specific economic sector. The more competitive are the companies at a particular sector, the more competitive is the corresponding sphere, and consequently, the state is more competitive at the world level (Skapars &

Sumilo, 2006; Labklajibas ministrija, 2007; Denisovs & Judrupa, 2008; Бочкова, 2009).

In order to elaborate the index, indicators describing competitiveness of the sector cluster must

Table 1

Algorithm for determination of relative scales of factor influence (Biukšāne, 2016a)

Factors	Number of respondents				Arithmetic mean value	Factor relative scales (importance)
	R_1	R_2	R_3	R_n		
F_1	b_1	b_2	b_3	b_n	$i_1 = \left(\dfrac{b_1 + ... + b_n}{n} \right)$	$\alpha_1 = \dfrac{i_1}{I_{kop}}$
F_2	b_1	b_2	b_3	b_n	$i_2 = \left(\dfrac{b_1 + ... + b_n}{n} \right)$	$\alpha_2 = \dfrac{i_2}{I_{kop}}$
F_3	b_1	b_2	b_3	b_n	$i_3 = \left(\dfrac{b_1 + ... + b_n}{n} \right)$	$\alpha_3 = \dfrac{i_3}{I_{kop}}$
F_n	b_1	b_2	b_3	b_n	$i_n = \left(\dfrac{b_1 + ... + b_n}{n} \right)$	$\alpha_n = \dfrac{i_n}{I_{kop}}$
Total:	-				$I_{kop} = \sum\limits_{n=1}^{\infty} i_n$	$\alpha_\Sigma = \alpha_1 + \alpha_2 + \alpha_3 + \alpha_n = 1$

where:

$F_1...F_n$ - factors influencing competitiveness,

$R_1...R_n$ - number of respondents,

$b_1...b_n$ - influencing values provided by respondents,

$i_1...i_n$ – average influencing value,

I_{kop} – total sum of influencing values,

$\alpha_1...\alpha_n$ - factor relative scales,

α_Σ - sum of factor relative scales.

be analysed and selected, taking into account the criteria of the selection of indicators which influence competitiveness (Figure 3).

Relative scales must be determined for the selected indicators describing competitiveness of the fisheries sector cluster, taking into account the opinion of the companies operating in the fisheries sector, as well as the opinion of institution representatives involved in the creation of fisheries policy. Determination of relative scales of factor indicators must be performed using surveys and expert method. Relative scales of factor indicators are determined on the basis of specific algorithm (Table 1).

After determination of factor relative scales, the normalization of factor indicators must be performed. Its main task is to prevent the situation when one or several factors may be dominant. Normalized indicators are calculated on the basis of initial source indicators. As a result of normalization, indicators lose initial units of measure, thus indicators of various factors become mutually comparable.

In order to perform the normalization of factor relative scales indicators, any of normalization algorithms can be chosen:

- normalization by decimal scaling (Patro & Sahu, 2015);
- min-max normalization after linear transformation of data set (Saranya & Manikandan, 2013), in the range of 0 to 1 (Judrupa & Senfelde, 2011) or in the range of -1 to 1 (Judrupa & Senfelde, 2011);
- normalization of Z-evaluation with standard deviation and average absolute deviation (Patro & Sahu, 2015).

Analysing the most popular methods of data normalization, min-max [-1;1] normalization is the most appropriate for the calculation of Index of the Fisheries Sector Cluster Competitiveness due to the following:

- branches of the sector are not compared with the average value of indicators but are compared with the best and worst value of indicators;
- average value of indicators is 0, which is essential for assessment of competitiveness level;
- relations among original source data are maintained;
- normalized values of indicators may be easily comprehended and interpreted.

However, in order for the factor normalized values influencing competitiveness not to be too tight on the axle, and not to have several decimal places, which would bother comprehension and comparison of factor values, the offered min-max [-1;1] normalization function is modified transforming it to min-max [-5;5] normalization function (Formula 1).

$$F_{nv} = 5\frac{f_f - f_{min}}{f_{max} - f_{min}} - 1 \tag{1}$$

where:

F_{nv} - normalized value of factor,

f_f - actual value of factor,

f_{min} and f_{max} - minimal and maximal value of factor

(Biuksane, 2016a).

As a result, the Index of the Fisheries Sector Cluster Competitiveness will be analysed and evaluated in the range from -5 to 5, where: -5 is the worst indicator (minimal value of indicator) and 5 is the best indicator (maximal value of indicator).

The Index of the Fisheries Sector Cluster Competitiveness is a complex indicator – it consists of Fishing, Aquaculture and Fish processing Competitiveness Index. (Formula 2).

$$FSCCI = \left(\frac{I_F + I_{AQ} + I_{FP}}{n}\right) \tag{2}$$

where:

$FSCCI$ - Fisheries Sectors Cluster Competitiveness Index,

I_F - Fishing Competitiveness Index,

I_{AQ} - Aquaculture Competitiveness Index,

I_{FP} - Fish processing Competitiveness Index,

n - number of sectors (Biuksane, 2015).

The Competitiveness Index of Fishing, Aquaculture and Fish processing is a function from the factors, influencing the competitiveness of the fisheries sector cluster and their relative weight (Formula 3).

$$I_F; I_{AQ}; I_{FP} = f\left(\alpha_1 F_1, \alpha_2 F_2, \alpha_3 F_3, ..., \alpha_n F_n\right) \tag{3}$$

where:

I_F - Fishing Competitiveness Index,

I_{AQ} - Aquaculture Competitiveness Index,

I_{FP} - Fish processing Competitiveness Index,

$\alpha_1...\alpha_n$ - relative scales,

$F_1...F_n$ - factors influencing the competitiveness of fishing, aquaculture, fish processing (Biuksane, 2015).

The Competitiveness Index of Fishing, Aquaculture and Fish processing is calculated on the basis of 9 sub-indexes: Sub-index of Availability and Quality of Production Factors, Sub-index of Production Competitiveness, Sub-index of Output Competitiveness, Sub-index of Marketing and Management Efficiency, Sub-index of Financial Position, Sub-index of Cooperation, Sub-index of Social and Economic Environment, Sub-index of Political Environment, Sub-index of Natural and Cultural Environment, and their relative weight (Formula 4).

$$I_F; I_{AQ}; I_{FP} = \left(\alpha_1 F_{AQPF} + \alpha_2 F_{PC} + \alpha_3 F_{OC} + \alpha_4 F_{MME} + \alpha_5 F_{FP} + \alpha_6 F_C + \alpha_7 F_{SEE} + \alpha_8 F_{PE} + \alpha_9 F_{NCE} \right), \qquad (4)$$

where:

I_F - Fishing Competitiveness Index,

I_{AQ} - Aquaculture Competitiveness Index,

I_{FP} - Fish processing Competitiveness Index,

$\alpha_1...\alpha_9$ - relative scales,

F_{AQPF} - Sub-index of Availability and Quality of Production Factors,

F_{PC} - Sub-index of Production Competitiveness,

F_{PrC} - Sub-index of Product Competitiveness,

F_{MME} - Sub-index of Marketing and Management Efficiency,

F_{FS} - Sub-index of Financial Stability,

F_C - Sub-index of Cooperation,

F_{SEE} - Sub-index of Social and Economic Environment,

F_{PE} - Sub-index of Political Environment,

F_{NCE} - Sub-index of Natural and Cultural Environment (Biuksane, 2015).

The Index of Fisheries Sector Cluster Competitiveness can be used as an instrument for assessing the fisheries sector cluster (fishing, aquaculture and fish processing) competitiveness in micro and macro level.

Conclusions

The sector cluster is a cooperation network of similar or associated companies and institutions operating in the sector, which is located in a specific geographic territory. Within the framework of this network, the development and competitiveness of every separate company and, respectively, of all sector is facilitated by common cooperation. The sector competitiveness is the ability to sell a higher quality output (goods and services) in markets more efficiently than the domestic and international competitors are able to do it. Competitiveness of the fisheries sector cluster is influenced by a range of various, interconnected factors of microeconomics and macroeconomics.

The methods for evaluation of competitiveness offered in the literature encompass only a certain field of activity, thus incompletely reflecting the essence of competitiveness, in addition, they can be fully applied for the evaluation of fisheries sector cluster competitiveness, as a result, the authors developed the Index of the Fisheries Sector Cluster Competitiveness.

The Index of the Fisheries Sector Cluster Competitiveness is an instrument offering the opportunity to evaluate and analyse the development of the fisheries sector (fishing, aquaculture, fish processing) in time and space, identifying factors which facilitate and hinder competitiveness at the level of microeconomics and macroeconomics. This index may help institutions involved in creation of fisheries policy to elaborate and improve the common policy of the sector more successfully.

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